

An Experiment with Design and Construction:  
Determining Barriers to Sustainable, Urban, Residential Renovation

by

Anna Weier

A Thesis submitted to the Faculty of Graduate Studies of  
The University of Manitoba  
in partial fulfilment of the requirements of the degree of

MASTER OF ENVIRONMENT

Department of Environment and Geography

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## ABSTRACT

The specific research goals of this project were to purchase and renovate a home using sustainable and pro-environmental materials, technologies and practices and to determine the barriers to sustainable residential design and renovation in a low-income neighbourhood in the context of a detached single-family dwelling. I was seeking to determine actual or potential solutions to these determined barriers, to create a sustainable home that could serve the purpose of a demonstration home and to share the research with involved communities.

The project identified both expected and unexpected barriers to urban, residential sustainable construction and renovation. These barriers are the construct of sustainability and our inability to define it and live by it, the current aesthetic and process of design and the lack of infrastructure and affordability of sustainable construction.

The thesis ends with a number of recommendations and opportunities that could help to facilitate sustainable residential renovation in future.

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## 1. PREFACE

The specific research goals that I was trying to meet with my this project were to purchase and renovate a home using sustainable and pro-environmental materials, technologies and practices and to determine the barriers to sustainable residential design and renovation in a low-income neighbourhood in the context of a detached single family dwelling. I was seeking to determine actual or potential solutions to these determined barriers, to create a sustainable home that could serve the purpose of a demonstration and experimental home and to share the research with the involved communities. I was also interested in finding ways to make the surrounding community more sustainable. I have since realized that the scope of my project would not allow for both an in depth exploration into the renovation itself and the surrounding community.

The following explanation of my project uses excerpts from my journals as well as information collected from other sources to explain what was done and discuss some of the lessons learned along the way. The following is about the things that can get in the way of sustainable buildings and communities and some ideas of how to jump overtop, crawl underneath, dance around, breakthrough and take apart those barriers to use them as “framing material” for creating new ways of doing things. For a year, while renovating a house to be as environmentally friendly as possible, I kept a record of the way that I was feeling, the conversations that I was having, the problems that I ran into and the frustrations that I had. I then went through those records and pinpointed the problems that came up again and again as barriers to sustainable design, construction and living. Analysing my 100 page journal yielded a list of recurring topics, which included community, design and aesthetics, creativity and imagination, infrastructure, psychology, affordability, how-to, sustainability and lifestyle. I then synthesized these topics into the following document, which contains a description of the process, some of the stories that came out of the process as well as discussions on different barriers to sustainable construction such as the construct of sustainability; design, aesthetics and creativity; and also infrastructure and affordability.

## 2. INTRODUCTION

The rise of urbanism and the corresponding environmental degradation that has taken place in the last century make the environment an increasingly important topic of discussion. In 1983 the United Nations General Assembly welcomed the creation of a new commission that examined worldwide environmental problems and purposed potential solutions to the year 2000 and beyond. The commission was called the United Nations World Commission on Environment and Development and in 1987 the commission reported back to the general assembly with their report called "Our Common Future", also known as the Brundtland Report after the chair of the commission Gro Marlam Brundtland (1987, UNWCED). One of the main tenants of the Brundtland report was to propose strategies for sustainable development and in the Chair's Foreword, Ms. Gro Marlam Brundtland points out that before the creation of the commission there were some who wanted to see the commission focus only on issues of the environment. In Ms. Brundtland's words:

"This would have been a grave mistake. The environment does not exist as a sphere separate from human actions, ambitions, and needs...the "environment" is where we all live; and "development" is what we all do in attempting to improve our lot in that abode. The two are inseparable."

Therefore the definition that was produced by the World Commission on Environment and Development integrates these two ideas. The definition of sustainable development that was brought forth by this commission is: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." This definition integrates the two concepts that Brundtland mentioned in her forward;

"the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and the idea of limitations imposed by the state of technology and social organizations on the environment's ability to meet present and future needs." (1987, UNWCED)

Since the creation of this definition in the Brundtland Report released in 1987 there has been a surge of sustainability- and sustainable development-related research and interest (Aguirre, 2002). This is an important definition because it brings up our responsibility to ensure that everyone's needs are met and it also realizes that there are limitations to what

the environment can provide. The approach taken by the United Nations World Commission on Environment and Development acknowledges that environmental protection will not happen in a vacuum and that it needs also to address the social aspect of our world.

Currently over half the world's human population resides in cities. This segment of the world's population is arguably the segment that is the most disconnected from the natural environment. Though we often view environmentalism as something that takes place somewhere else, like among forests that are being clear-cut or wetlands that are being drained, it is imperative that we start thinking of cities as part of the environment and as major contributors to environmental degradation. As we begin to see that cities are large contributors to environmental damage and also the location where many of the decisions are made that impact the environment it becomes evident that cities need to play a major role in improving our relationship with the environment. This means that people who are living and working in cities need to begin to realize that the city is part of the environment. It provides habitat for wildlife and a part of the water and nutrient cycles. It is important that specific environmental solutions for the city are created and implemented and that these solutions involve the people in the city. Not until we begin including cities in the cleaning up of the environment are we going to have a comprehensive solution for environmental degradation.

Though the city seems to be disconnected from the environment, as the detrimental human impact on the environment has increased there has been an effort to make environmental concerns a part of our social consciousness. Most people are at least aware of topics such as acid rain, ozone depletion or climate change. With this awareness of environmental issues have come attempts to mitigate the negative impact that humans have on the environment. Education programs have promoted increased environmental awareness and encouraged people to "Reduce, Reuse and Recycle". In an attempt to bring the environmental crises into our own back yards, people have been implored to "Think Globally and Act Locally". Yet it has been noted, that there is a considerable gap between environmental knowledge and pro-environmental behaviours (A. Kollmuss & J. Agyeman, 2002). So, we ask ourselves, why don't awareness and

education change negative human behaviour? What hasn't always been considered is the fact that in many ways, in order to protect our environment, people are being asked to go against the grain. Many of the frameworks that look at pro-environmental behaviours don't take into consideration that many of us have created habits out of behaviours that are not good for the environment and those habits are very difficult to break (Kollmuss & Agyeman, 2002). Often people are not given the assistance that they need to break those bad habits. It's easier to take the car, but you should take the bus. "Mend your fuelish ways". All the cheap food in the supermarket is grown far away with chemicals and fertilizers, but you should buy organic locally grown food. We're told, "Think Globally, Buy Locally". Even people who consider themselves environmental activists and work daily to protect the environment sometimes have to use public washrooms. Toilets use drinkable water to flush waste away, but it's important to conserve water. We're told, "Don't waste a drop".

While I was doing my undergraduate thesis in Psychology I realized that it is not enough to educate people and make them aware of the environmental impact of their actions (Weier, 2004). It is difficult to determine all the many factors that are involved in encouraging people to partake in pro environmental behaviours (Kollmuss & Agyeman, 2002), but the fact remains that we have all created habitual behaviours that are very often not good for the environment and this is an often ignored reason why it is difficult to encourage pro environmental behaviour (Kollmuss & Agyeman, 2002). When you are in the middle of the city in an air-conditioned theatre watching a movie or in a mall doing some shopping it seems very easy to forget about the natural environment and your responsibility to it. In cities we are surrounded by and spend most of our time in human created buildings. In these buildings we are surrounded by air that usually has been artificially heated or cooled. We use water that has been treated with chemicals and human made furniture, appliances and technology surround us. And we forget that we are still a part of nature. The air that we breathe, despite it being heated or cooled, is part of the atmosphere that surrounds the entire globe. The water that we use, although it has been treated with chemicals, is part of the water cycle and has been rainwater and lake

water and ground source water. Even the furniture and appliances that we are surrounded by are made out of what used to be a tree or metals that were mined from the earth.

My goal was to make a house where I could continue to be connected to the natural environment. Buildings are one of the major things that mediate our relationship with the outside world, especially in the city. I believe that while changing our houses we can also change our communities and our lives. By creating built environments that allow us to create new environmentally friendly behaviours and habits we can have a more positive impact on the environment. We need to change the buildings, the communities and the cultures that we live in that allow us to unthinkingly wreak havoc on the environment. I knew first hand that good intentions and environmental awareness only take you so far. I was also doing a degree in environmental sciences at the same time was working on my undergraduate thesis in psychology and I knew the environmental impact of my actions and that it is essential to stop environmental degradation, but that did not stop me from regularly borrowing my parents' car to go out or from buying new things and eating whatever food was put in front of me instead of making a conscious choice. It definitely didn't stop me from going to the bathroom multiple times everyday in a minimum of 6 litres of clean, drinkable water each time. I looked at my lifestyle and realized that something needed to change. I also knew myself well enough to know that I was not going to be able to make the difficult choice, the choice that was better for the environment, every single time. I wouldn't be able to go to the bathroom in the composting toilet at the local Mountain Equipment Co-op store all the time even though I joked about it. I could not make myself take the bus or walk every time I left my parents house because when I tried to do it I became a hermit. I realized that I wanted to make the difficult choices, but that I would only be able to so if I created my life in such a way that the better choices became easier choices to make and my only hope for that was to create a house, a community and a culture for myself that would foster my environmentally friendly behaviour.

The idea behind my thesis project is that the way that our society currently functions is not working. Our cities and our houses, our communities and our cultures are

designed in ways that are not good for the environment or us. Because of the fact that our environments are designed to foster certain behaviours we need to try to convince people to make sound choices in order to engage in environmentally sustainable behaviour. For this reason our built environment needs to be redesigned. The cultural norms that currently exist need to be redefined. It needs to start feeling strange when you flush the toilet with water that you could be drinking. Throwing things in the garbage needs to start disgusting people. Driving in cars everyday and eating food that comes from far away needs to become strange things of the past; the way that we used to do things when we did not know any better and had not considered these behaviours that were just a part of our everyday lives. We have to change the way that we think and the way that we act. In my mind, creating a sustainable house was a way to create a sustainable environment in which to live.

According to the most recent compellation of data from the Canadian Mortgage and Housing Corporation, in 2004 there were over 233,400 units of housing that went under construction (CMHC, 2005). The construction of one new dwelling unit produces on average more than 2.5 tonnes of waste and up to 10% of the lumber purchased for that construction project is part of that waste (D'Amours, 1991). From this we can see that overall the amount of waste that is produced by the housing industry must be astronomical. The above figures do not even include any appliances, furnishings or fixings. This is a vast amount of material and this breakdown does not consider the amount of embodied energy in the material.

Embodied energy is a measure of the amount of energy that is used to "mine or harvest, transport and refine a unit of building material" (Stein & Reynolds, 2000) and an accurate picture of the amount of energy that goes into creating a building should include this aspect of energy consumption. By building a home that is more sustainable it is possible to drastically reduce the amount of energy that goes into creating a home. This can be done by using locally produced materials or by using materials that have less embodied energy. Modifying building practices can also reduce the amount of energy being used in the running of homes. For instance, in a Natural Resources Canada study a

typical 1970s house was compared to an R2000 equivalent<sup>1</sup>. Despite the fact that more energy went into the creation of the R2000 house, there were savings in energy over the life of the house because less energy was needed to run the house (Trusty, 2003)

Changing the way that buildings are constructed is not the only way to reduce the environmental impact of houses. Houses also mediate our consumption of water, electricity, food and waste. In fact households account for over 50% of total municipal water consumption (Environment Canada, 1999). Twenty percent of the energy that is used in Canada is used in residential end uses and approximately 1.2 kg of household waste is produced per person per day in Canada (D'Amours, 1991). It is possible to modify the impact that our house will have on the environment. By keeping the environment in mind during the creation of a home it is possible to build a home so that the running of the home has fewer negative impacts on the environment.

There is, however, a disconnect between what is known about green building and what is being implemented. There is no shortage of green demonstration homes, but somehow the information that is learned in creating these homes is not being passed onto the public or to people in the building industry. Or if it is being passed on it is not being used. The only proof needed to understand that there is a gap between what is known about green housing and what is being implemented, is the fact that there are still so many houses being created that do not take the environment into account. In order to capitalize on solar gain houses should be built to face the south and yet houses are still being built to face the east or west. It is known and understood that it is a waste to use drinkable water to flush toilets and yet the majority of homes do not use recycled grey water or rainwater to flush away their waste. A change in the way that housing is created and used has the ability to greatly affect human's impact on the environment. Both through the production of housing and through the way that we run our households we create and add to major environmental problems. If we were to change the way that we

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<sup>1</sup> The Natural Resources Canada Office of Energy Efficiency introduced the R-2000 standard over 20 years ago. It is a certification program run jointly with the Canadian Home Builders association and it generally produces homes that consume approximately 30% less energy than a comparable non-R-2000 home (Welcome Home to R-2000, June 4, 2007). The requirements for an R-2000 home touch on three different areas; these areas are energy efficiency, indoor air quality and general environmental responsibility (Welcome Home to R-2000, June 5, 2007).

built and ran homes we could lessen our negative impact on the environment or even integrate our homes into environmental cycles that would increase our positive impact on the environment. There is a need to understand what the barriers are to implementing environmentally sustainable design in an everyday setting. Knowing what the barriers are to sustainable houses and communities will allow us to determine how to overcome those barriers and in the process create more sustainable houses and communities.

In Sheppard's 2006 article he talks about the paradox of urban environmentalism. This paradox is comprised of four parts: "1) known urban environmental problems; 2) known urban environmental solutions; 3) halting success in implementing solutions and arresting problems; and 4) the values and policies that drive inaction" (Sheppard, 2006). Sheppard argues that "even if it is decided that some major and systemic modification is needed, it still is the case that existing political, economic, technological, and social patterns and relationships in urban environments can make it very difficult to bring about the desired change". I believe that political, economic, technological, and social patterns and relationships can make it difficult to do a small project let alone implement widespread systemic change. Although Sheppard argues that the next step in trying to eradicate the paradox of urban environmentalism is not to come up with more solutions, but to combat the values that maintain inaction, with my project I wanted to be able to pinpoint the systemic reasons why specific solutions are not implemented and to combat the values that maintain inaction by taking action into my hands and hopefully by helping others to take action into their own hands. It is not just values that need to be overcome in order to create social change; societies often do not act on what they perceive their values to be and so it is equally necessary to understand barriers other than values and how to overcome those barriers to environmentally sustainable design so that it can be implemented in all settings.

Even the work that is currently being done to implement green architecture does not necessarily emphasize sustainability. The concept of environmentalism has been expanding (Montague, 2003; Feldman & Westphal, 2000) and with the concept of sustainability, it is no longer sufficient to consider only the environment. The focus on environmental issues can push the issues of economic and social viability to the background. In order for green architecture to bring all the benefits that it can offer, it is



Journal Entry August 9, 2005

I really hope that my project will do something to repay the debt that I owe humanity. It is really important to me that this project not be a self-serving endeavor. I had a really good meeting this morning with a woman who works in the community. We got together for breakfast (at the Ellice Cafe and Theatre) and we talked about the community consultation that I will have. She suggested to me that we have three meetings at the end of August or beginning of September. There will be one meeting for just the people on the street where the house will be. The meeting will be an info session and I will be able to get the opinions of my neighbours. For that one I will flyer all the houses on the street. The flyer will contain information about me and the project and information about the meeting. That meeting will be held either in a community garden that is on the street or it will take place in the house. I will also have a general community meeting. It will be an information session, but also a discussion group about what people would like to see happening in the community in terms of sustainable and community capacity building and community self-sufficiency. For that meeting I will poster and I will make sidewalk chalk announcements about it. There will also be one meeting with staff people from all the community organizations. This meeting will allow me to make sure that my project can map onto the mandates of the already existing community groups. These include other housing groups, a woman's organization and a community justice organization. I'm really excited about that meeting. I am excited about how my research is becoming more community based.

necessary that it be implemented holistically. In order for green architecture to be viable it must come from a place of sustainability. Social and economic viability must be considered in the implementation of green architecture. Involving the community in making decisions about sustainability and making them more aware of green design is a way to try and ensure that what is known about sustainable communities and houses can be implemented (Brown et al., 1999 as cited in Brown & Bhatti, 2003).

The process and methodology of my project actually began long before my Master's thesis and my study of design and community based research. I first started thinking about trying to build an environmentally friendly house

during my undergraduate education when I realized that I was not living my life as sustainably as I would have liked. I was first thinking about buying a house and renovating it with my stepfather, but then I realized that I didn't have the knowledge or the expertise to try and do an environmentally friendly house. Two of my friends suggested that I would be able to put my research about this type of project to good use if

I did this as a Master's project. It would be a way to help share the information. I began to try and figure out who I would need to work with in order to do a project like this. I was not sure if it would be a good idea to do a Master's in the faculty of Architecture or in a different faculty, and so I contacted two faculties looking for ideas. I believe that I first communicated with the Dean of the Faculty of Architecture. He was interested in the project and suggested that I talk to Dean Syverson because of the design/build projects that he had been involved in. I spoke with Dean and he was immediately interested in the project and suggested that we could do the house as a design/build studio class. I remember being extremely excited by this possibility. I told my friends that I was so excited that I thought my head might explode. At one point in time I thought that the house was just a dream and I think that the meeting with Dean was among the first times that I actually believed that the house project would be a possibility. Shortly after that I had a meeting with the Winnipeg Housing Rehabilitation Corporation (WHRC) and they also agreed that they would be interested in helping to do the project management of the house. They put me in touch with the Spence Neighbourhood Association (SNA) to see if they would be interested in having the project in their neighbourhood. After a housing committee meeting and then a board meeting, it was decided that the project would be in the Spence Neighbourhood. I think that around the same time I was meeting with my advisor from the Faculty of Environment, Earth and Resources and it was decided that it would make sense for me to do my Master's in that faculty. I was extremely fortunate that I was in a position to approach so many people and organizations for help and also that these people and organizations were so helpful. It should be noted that this project would not have happened had it not been for the support of the WHRC, the Winnipeg Housing and Homelessness Initiative (WHHI), the SNA and the University of Manitoba Faculty of the Environment, Earth and Resources and the Faculty of Architecture, not to mention the hardworking individuals associated with these organizations and others who volunteered and helped without the support of organizations. It was also extremely beneficial for me to do this project in Winnipeg where I have lived for most of my life and have created a large support network of friends and family who have connections in many different personal and professional communities in the city.

With much support, I began my thesis work in January of 2005. This was when I began taking course work pertinent to the project. I began learning more about housing policy and city planning at the same time as learning more about community and advocacy based research. The goals of my project began to reflect these experiences.

It wasn't until then that I truly realized that it would be short sighted and unethical of me to work on the house without looking at the context of the house and without examining how this kind of construction could be available to everyone in the community. It was at this point that I began to put

Journal Entry August 22, 2005

I had the meet and greet at the house on Saturday. I was so nervous that I would be standing in the yard alone for two hours. I had delivered the flyers on Tuesday. It was a little nerve racking delivering the flyers; I guess that I was worried that people wouldn't want me on their property. It was kind of strange to have to open gates to get into peoples' yards. Anyway, I spent Saturday making brownies and iced tea and I was standing in the yard at 3:00 and hoping that I wouldn't be standing there alone the whole time. The first people to come over were the two little girls from across the street. They ate some brownies and told me about home schooling. Then their mother and father came over and Gord who owns the house next door came over. Fatima and the kids came out even though it was supposed to be naptime. They had convinced Fatima that it would be unacceptable to not show up for brownies and iced tea after they had been invited. Alma...came over for a split second just to say hi. Gustavo and his wife and their two friends also came by. They are renting to own one of the WHRC homes. A guy named Ed who has done a lot of renovation in the area was also there.

together my methodology and consider how to involve the community and also how best to record and examine the process of renovating the house so as to share this information with others. I decided on a process with community consultations and I was going to try and do a more participatory approach with the design students and the other people working on the house. I did have an open consultation and also a consultation with some of the community workers before the project began and I had a design consultation meeting that was open to everyone in the community. These consultations were important, but one of the main things that I learned was that it is difficult to have community participation so late in the game and also while doing a project that had not been chosen by the community as an important project to do. I was doing a renovation project that was something that I thought was important and the community was involved

in a more peripheral way. In many ways, much of my community participation happened even before my Master's began when I was talking to the Spence Neighbourhood Association and other organizations and people in the community.

After starting the project I continued to have contact with the community, but it was as someone working in the neighbourhood and as a future neighbour. This made it difficult to act as a researcher in all of my interactions in the community and it has also presented some problems for me in the area of ethics reviews and informed consent. The way in which we involve communities in research does not always give protection to the community as an entity (Gilbert, 2006). I also believe that we often do not give the people that we talk to in the community enough credit for the things that we learn from them. In asking people to sign an informed consent form and in amalgamating information as is often done during the analysis phase of research, we turn other peoples'

Journal Entry September 15, 2005

I got to go on a field trip and get a walking tour of Spence and Wet Broadway. It made me realize that I am pretty tapped into the community and this appeases my concern that my research is not community based. I did, however, notice that Community based research deals largely with community organizations and staff from these organizations. It makes me wonder about the input of other people in the community. This is what I ask. I am trying to get people to come to community meetings and I am trying to advertise for them. Why are there people who do not come? [I think it must be] Because they are not interested. My research has no bearing on their life. If it is only a small group of people who are involved in the community organizations then maybe we are not addressing the issues that are important to other people.

stories and ideas into our own in a way that is not recognized by the way that we do ethics and then feel that our relationship with "participants" is over. This is something that I have struggled with a lot in my project and I am not sure that I have found an acceptable way to address this issue, but I have tried to do it by having personal communication with the people who's stories and

information I have used here.

I also learned that in doing a real world project I found that it was very easy to get caught up in the real world, making it difficult to always find time to document the process in a number of different ways and from a number of different perspectives. Because many of the people who were involved with the project didn't have the same

goals that I did as far as documentation of the project went and because of my lack of experience and knowledge, I was not able to turn the project into a truly participatory research experience.

After creating the structure of the more theoretical or academic part of the project I had to get on with preparing for the actual physical project: the house. My first step was to find a house that we could use for the renovation project. It is important to realize that this particular project is done as a renovation of a detached single family home. The reason for the renovation was because I believe that it

is important to try and use the housing stock that we currently have and the reason for the single family detached home was just because I couldn't manage anything more than that in terms of the scope of the project and also in terms of my financial commitment to the project. The finished house is currently in my name as well as my mother's name and I have housemates who rent from me. I do believe that other forms of housing and ownership are really important, but I was not able to prepare for them or accommodate them in this project.

Journal Entry August 22, 2005

The woman who used to live at 545 had a ton of cats. She disappeared off the face of the earth at one point and left her cats to fend for themselves in the house. By the time people realized that the woman was gone they went into the house and it was full of dead cats. Apparently on really hot summer days the stench of dead cats and urine is almost unbearable. Can you imagine owning a house and having it next door to a house that has been vacant and deteriorating for 9 years? And there is essentially nothing that my neighbours could do about it. I think that must be really hard. I love 545 Langside, but I know that it looks like shit. There is trash and glass all over the yard and my next-door neighbour Maria's house is full of beautiful flowers and is really well kept up.

#### Conventional Ownership

Is it really possible to create a house that is environmentally friendly if it is not possible to ensure that the future owners of the house will honour the energy and resources that are put into the house? For instance, if a sustainable house is built and then sold to someone who just tears it down, then putting in durable and re-usable materials will be all for not. Is there a way of putting a caveat on a house or property that ensures that it will always be handled in a way that is best for the environment and the community? And is conventional ownership what is best for the community? In many cases it can lead to gentrification of a previously low-income neighbourhood and it can also cause divisions of class between those who can afford to own and those who cannot.

I had decided on doing a house in the Spence Neighbourhood from the very beginning. There were a number of reasons for this. To begin with there are a number of important sustainability considerations when choosing a house. I was interested in doing a renovation because I feel like it is important to figure out how to improve the housing stock that we have. Spence Neighbourhood is an area that has been working hard at renovating their old housing stock. In a city like Winnipeg there is very little population growth and yet we keep on building new houses on the outskirts of the city. Further, when we allow houses to become derelict and then to get demolished there is often a huge waste of resources. I also did not want to do a huge renovation on a house that was recently built or renovated as that also may have caused a waste of resources. When I found my house, there were a number of houses on each block of each street that had gotten so bad that they were boarded up and had essentially fallen out of the mainstream housing market; there were a number of 100-year-old houses that were in need of major renovations.

Spence Neighbourhood is also very centrally located. It is near a number of different bus routes, the University of Winnipeg and a number of grocery stores. It is close to a lot of very good ethnic restaurants as well as the West End Cultural Center, a location that houses concerts and local events. This is also an area of the city that has relatively high density and a good mixture of houses, apartment blocks, rooming houses and commercial properties. In terms of sustainability of communities and lifestyles, it was a great place to look.

When I first saw the house I was really drawn to it. I don't know why, it definitely didn't really have anything to do with the siding, which was comprised of sheets of asphalt that were popular quite some time ago. It was the size and shape of the house and the fact that there was a decent sized yard for a downtown house in Winnipeg. It just seemed like a house that would be nice to live in. We had looked at a lot of different houses and so many of them were too big to even fathom being able to fix up and take care of with the budget and time frame that we had allotted. Some of them were much too small. One house was a one and a half story. It was tiny. It had two little bedrooms on the second floor and they were only accessible using a staircase along the wall that was cut into by the sloped walls of the roof. Anyone over 5'6" would have had

difficulty climbing up those stairs. I thought that I could make a go of that house, but was thankfully dissuaded. I was looking for a house that was in decent shape, but nothing too terribly big. I was also looking for a house with a decent sized yard for growing a garden and that got some decent sun to help keep the house warm in the winter and enough shade to keep the house cool in summer. It is difficult to find houses in the city that are oriented for solar gain as many of the streets in the city run north to south leaving all of the houses facing east or west with houses very close together on their south and north sides. I eventually found the perfect house at 545 Langside. There are two large trees on the property that shade the house nicely in the summer and the house does get a fair amount of sun in the winter despite its orientation.

#### Integrated Design

Integrated design is a process where the design takes place with the designers, builders and property owners. It also means that the design is taking place while materials are being found and in this way it can be easier to incorporate used materials that have been found.

In preparation of the renovations we spent a lot of time taking apart a house outside the city to salvage materials. There was a house outside of the city that had been flooded in the big 1999 flood. The house had been standing empty with a basement full of water since that time. A friend of mine was aware of the house and suggested that we take it apart. I would use part of the lumber for my house and he would use part of the lumber to create a building project that he was working on. We spent at least a month taking the house down piece by piece. Initially we had wanted to use the material to do an integrated design for the house, but there was not the time or the will or perhaps there weren't enough appropriate building materials. It ended up being difficult to find ways to use as much material as possible. For 545 Langside we used some of the dimensional lumber from the house. Most of the other stuff is at the farm waiting to be used. In a project like mine it is often difficult to save material because it takes time to prepare the material to re-use and it also takes a place to keep it until it can be re-used.

## 2. SUSTAINABILITY

Through my thesis, I learned about barriers to creating a more sustainable community. Through my project I have realized that when trying to put sustainability into practice the construct of sustainability, which was created in order to facilitate the process of social and environmental justice, can sometimes be problematic. Many different people use the word in many different ways, and it is too loosely defined to be helpful in many applications. The term needs to be defined on a case-by-case basis. It can be a difficult term to define practically and when it is defined for a particular project it eliminates the possibility of sustainability being a widely understood term that people can rally around. In addition, even when the term is defined specifically, it is difficult to measure and implement in meaningful ways. I believe that the only possible path away from the difficulties inherent in using this term is to acknowledge those difficulties and identify ways of meaningfully overcoming them in a general sense and also on a case-by-case basis.

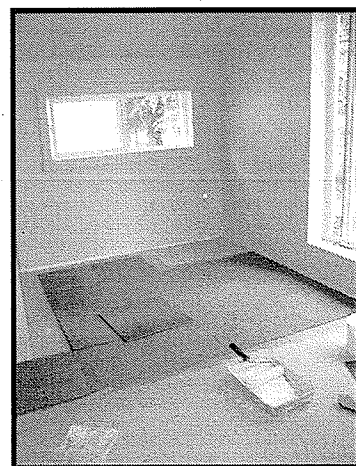
Though redefined by the Brundtland Commission in 1987, the word “sustainability” had previously been used in many different ways. In the scientific community this word had been used even before the Brundtland Report “among scientists

### FLOORING

I didn't really want to use carpet in the house because of the sacrifices that I would have to make in air quality, but it ended up being one of our best options. Sometimes what is best for the environment is not what is best for human health. It is hard to balance the environment and social factors. I used carpet tiles that are made of a minimum of 40% post consumer recycled plastic. The carpet tile also allows for non-expert installation because it is as easy as rolling down some glue and then placing the tile on top of the glue. The tiles are easy to cut and it is also possible to replace one at a time if one gets stained or burned. The tiles could also be easily picked up and used for something else. In terms of indoor air quality it is also a plus that the carpet can be taken out tile by tile and brought outside to get rid of dust. This would obviously take a lot of time, but it would be possible and probably worth it to do this once every couple of years.

studying strategies to ensure the proper use over time of specific natural resources such as fish, water trees and soil.” (Dixon and Fallon as cited in Aguirre).

The term was used to determine





a level of resource use that would not decrease the quantity of a population or the quality of a resource so drastically so that it could not recover and continue to produce. This more formal definition was based on the common use of this term in the English language. The Webster's New World Dictionary has a number of definitions of the term "sustain". These definitions include: "to keep in existence maintain or prolong" and "to provide sustenance for". From these definitions it becomes very easy to see why scientists in regard to fish, water, trees and soil used the word sustainable. They were trying to determine what level of resource use could be maintained. While the Brundtland definition makes some sense in light of the dictionary definitions of the word, the word can be used in a number of different ways to mean a number of different things. Obviously, the term sustainability can be and is used in many different ways in the English language, contributing to confusion when the word is used without context or definition. For instance, a fish population can be deemed to be sustainable without it being part of a sustainable development strategy, such as would be encouraged by the tenants of the Brundtland Report. If the term sustainable development is part of a "proposed strategy" (1987, Our Common Future) around which people are supposed to mobilize to provide information and actions that will allow humanity to better provide for present and future communities then it is essential that people understand what is meant by the word. Simply put, when people all over the world are having a conversation about sustainability, through government policy, research and advocacy (Aguire, 2002), it is important that everyone is talking about the same thing.

Near the end of my project I realized that perhaps we did not all have the same definition of sustainability when I began to ask the question "Do you think that we achieved our goal of making the house as sustainable as possible?" Despite the fact that the house was not perfect and that there were

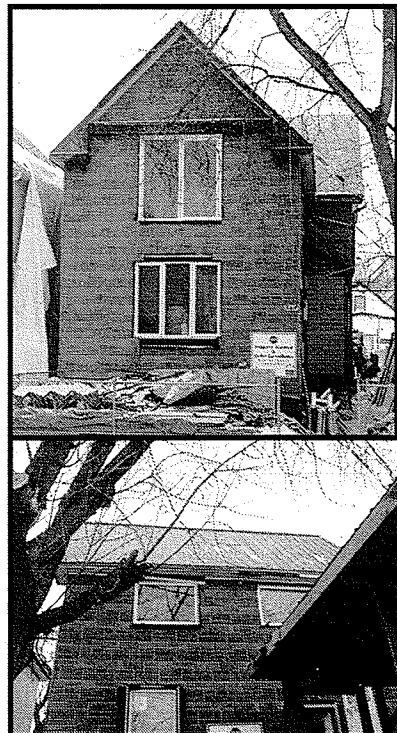
#### EXTERIOR PAINT

There was not a lot to paint outside. It seemed to me that the best thing to do was to go to the Re-store and buy some paint there. They have old buckets of paint there that people have bought and haven't finished. It does release volatile organic compounds, but not inside. I think that this is an ideal place to use old paint. It makes sure that it is used, but it does not negatively affect human health. Sometimes it is possible to use something that appears to go against one aspect of sustainability in a way that makes it an appropriate use.

a number of things that I would have done differently, I was under the impression that we had at very least done as much as we could have done to make the house sustainable. And yet I once asked the question “Do you think that we achieved our goal of making the house sustainable?” and the answer I received was “No”. I was taken aback and somewhat disheartened until I asked why. I was told that the house was not sustainable because it was not self-sustaining. It was still attached to the electrical grid and the city sewer system and was therefore not sustainable. At that point I realized that I had spent the better part of a year working on a project without making sure that we were all working with the same definition of sustainability. The Oxford Online Dictionary defines the word sustain to mean, “keep[ing] something going over time or continuously” (February 1, 2007). Using that definition it stands to reason that the house is not sustainable. It would not function continuously without inputs from the outside (electricity, potable water) and services rendered (sewer, garbage pick up) that are outside of the control of the person owning the house. A house that is self-sustaining is not necessarily the kind of house that fits in best with the idea of sustainable development and yet it does meet one definition of sustainability. Stephanie from WHRC has

#### ROOF

The roof was one of the things that we first started getting quotes on. I wanted to make sure that we had things in place before the cold Winnipeg winter set in. I decided to have a metal roof installed because despite the fact that metal has high embodied-energy it lasts the longest and is easiest to re-use or recycle if it is no longer being used as a roof. Also, there are fewer concerns about collecting rainwater from a metal roof. The people who were putting on the roof made sure that there was a waterproof membrane over the entire roofing surface. The labour has a 3-year warranty and the steel has a transferable warranty of fifty years. There are a lot of different factors that made metal the best choice as a roofing material.



suggested that there was a tendency to focus on a “green” architecture, using recycled, re-used and low-VOC products, but that energy use into the future is a part of green building that cannot be forgotten.

Even when looking specifically at the definition of sustainability that was provided by the Brundtland Report, problems can arise due to the multifaceted nature of the construct. The term sustainability is defined in the context of the environment, economics and social factors in an attempt to recognize that environmental sustainability cannot be divorced from social and economic concerns (Kates, Parris & Leiserowitz, 2005). The presence of these concepts within the term sustainability can make it even harder to advocate for a certain action based on sustainability. It is very difficult to weigh and balance the concerns of the environment, economics and social factors. Often, because of the multifaceted nature of sustainability it is necessary to weigh a lot of different information. This can make it difficult to make decisions and it makes it nearly impossible to define something as being sustainable because the judgement can change depending on the different contexts in which the judgement is being made. Specifically, in the discipline of environmentally sustainable design, it is often difficult to judge which

#### WINDOWS

The biggest lesson that was learned by trying to decide what windows to put in was that there are many facets to environmental sustainability. A window may be triple pane filled with Argon, so that heat does not readily radiate back out of the house and this would mean that the window would help the house to be more energy efficient, but does this mean that the window is energy efficient? What truly takes less energy when we look at the big picture? It was at this point that I realized that so many of the incentive programs that are out there are designed to make individual buildings more energy efficient. They are not designed to improve the overall environment. One more energy efficient house does not necessarily equal a better impact on the environment. For instance, I moved away from home in order to move into this sustainable house. Would it not perhaps be more energy efficient if I stayed in my parents' house with them? It was difficult for us to figure out what to do with the windows. We decided to go to the window and door warehouse to buy windows. We wanted to buy these windows because they were fairly high performance windows and yet we didn't have to commission the creation of new windows in order to use them. At first we went and found some windows that were all the same size. They were easy to integrate into a design and they would have been easy to use. I called the window and door warehouse...

course of action is best for the environment without even beginning to consider all of the economic and social factors of sustainability. Despite the fact that this is a difficult task, it needs to be done, the question is whether or not the term sustainability helps in this process.

When it comes to considering environmental sustainability in the context of green design, it is at very least necessary to look at issues of embodied energy (the amount of energy that goes into the production and distribution of a product), location of production, means of transporting a product, energy efficiency, water efficiency, toxicity, human health, durability, re-usability and recyclability. With all of these considerations that are sometimes at cross-purposes, it is often difficult to know where to put the emphasis. One of these instances where it is difficult to know where to put the emphasis in terms of making a sustainable

decision took place for me in the beginning stages of designing the house renovation.

The windows that were in the house when it was purchased were all single pane

#### WINDOWS continued...

...to make sure that there would be enough windows for us to use and they informed me that those windows were actually ordered by the window and door warehouse, meaning that they had been commissioned in order to sell. If we purchased those windows more would have been made to replace their inventory. We wanted windows that needed to be used up, so we had to go back to the window and door warehouse and try and find other windows that would work. This time we got windows that were a mix of PVC windows and wood and metal clad windows. We did find two windows that were the same size, but every other window was a different size and a different colour. We tried to get casement windows wherever possible because they are great for capturing a breeze to bring into the house in the summer and they seal really well in the wintertime. We bought all of our windows and exterior doors at the window and door warehouse except for five of our windows. One of the windows in my bedroom is from a house a few streets over that was being renovated. They broke one of the windows that they were using broke and they didn't want to fix it, so we fixed it and used it. We also got two matching windows and a bathroom window from Winnipeg Housing Rehabilitation Corporation. They were taking them out of an apartment that they were renovating. The two matching windows were windows that opened from below and they were in a space that was supposed to be a bedroom space. They could not be the only windows in a bedroom because they were not up to code, but because we were going to put two windows in every bedroom anyway, there would already be at least one escapable window per bedroom. Because of security issues we decided to board up all the basement windows and one window in the staircase leading to the bedroom we made with pre-ordered glass and scrap wood.

windows, many of which were broken and therefore did not do much to keep the house warm. The windows needed to be replaced, but the issue began when we started to figure out what they should be replaced with. The issue was essentially whether or not it was more important to get windows that were high performance in terms of keeping heat energy in the house in the winter or if it was more important to get windows that were made out of a renewable non-toxic material. We could have purchased high-performance windows that had frames made out of wood and metal. Neither of these materials is toxic, but these

#### Journal Entry October 6, 2005

Yesterday we went to the window and door warehouse as a class. The windows there are quite a bit cheaper and will allow us to spend more money on other sustainable systems. They are seconds, so they are windows that other people commissioned, but that they now can't use. There is a question as to how energy efficient they are. So what is more important, efficiency, re-using materials or spending more money on some other environmental aspect? There is nothing that is inherently sustainable about anything.

#### Journal Entry October 9, 2005

Dean feels that commissioning PVC windows would be a grave error. It is interesting because Stephanie said to me "How can you have a sustainable house [if you don't have]...windows that are at [minimum dual pane, low-e, argon filled]". Stephanie has since added "sure the windows would have been commissioned but my thought was that new windows would have reduced your impact on the environment well into the future by reducing the amount of energy consumed for space heating. I also felt that to maximize the benefits of the renewal energy systems, integrity of the houses thermal envelope was very important. Why spend thousands of dollars on a solar heating system when it would have to be topped up highly using hydro energy in order to heat the space?" Dean said to me "How can you have a sustainable house if you commission something new, where you can use something that has already been created, especially if you are commissioning new PVC windows". One option is focusing on energy efficiency and the other option is focusing on the environment. Getting better windows would be the option that would make the house more sustainable, but using the pre-commissioned windows would [perhaps] be the option that is more sustainable for the environment. There is a difference between the two and so much of the energy that is going into making things more "sustainable" is actually going to make them more energy efficient and cost effective. This is not necessarily what is best for the environment. I would like to make choices that are best for the larger environment, but often decisions are made that are best for the owner of the home.

windows would have been more expensive than windows made out of PVC, which is considered a toxic substance. We could not afford the wood and metal framed windows

#### FLOORING

I learned a lot while researching the flooring. I read an article by Patrick Moore; he is called a practical environmentalist and there are a lot of things that he thinks that I do not agree with, but the article that he wrote was really interesting. It talked about how bamboo and cork are touted as environmentally friendly products because they regenerate quickly, but that there are other factors to consider. For instance, bamboo is grown in a monoculture, which means that it is grown with a bunch of other bamboo plants. This does not provide a very good habitat for birds, animals or bugs. Both bamboo and cork are grown in far away places. Cork comes from Portugal and bamboo comes from China. This means that after they are harvested they need to be manufactured and then shipped to Canada. They both have high levels of embodied energy.

For the living room and dinning room we had had a huge design discussion about whether or not it was okay to finish a really rough looking floor because it would affect the aesthetic of the house. We agreed that it was okay and shortly thereafter found out that we could not refinish them because of the lead paint. I tried to find used flooring that we could use, but it just was not working in our time line. We thought that we had a deal with a salvage company to go into the old Canoe Club in Winnipeg and take out some maple flooring before the rest of the building was taken apart. Somehow the ownership did not transfer to the salvage company in a timely enough manner and the opportunity was lost. Re-using flooring material can also be very time consuming. There is the question of de-nailing it, laying it and then refinishing it. Gerhard and I talked about how at that point in the project we were not sure that we had the psychological stamina to take on such a big job. It was difficult enough just trying to get the house done on time. I felt like we were just holding it all together. We decided to put down pre-finished hard wood floors. We could not afford certified lumber at that point. The wood that we put in was from Quebec. That means that it was not shipped from as far away. There were different grades of wood and we bought the boxes that were filled with somewhat mismatched pieces and Gerhard made sure to install the floor in a way that minimized waste. I think that there were a few inch long pieces that weren't used, but that was about it.

and they would have taken too long to make and put our construction schedule far behind. We were left to decide whether it would be better for the environment to have higher performance windows that would help to conserve energy while the house was being heated or if it would be better for the environment for us not to commission new windows made out of a toxic substance that is harmful to the environment and also to people who work in factories to manufacture it (Pirastu R. et al., 1990).

The factors that need to be considered do not end there. The energy used to heat my house in particular is

electricity generated by large scale hydro dams in Manitoba, but perhaps the energy that was used to build the windows came from coal burning or some other fossil fuel burning method. Which of these methods is better for the environment? Does this information play a role in the decision that is to be made? We ended up buying windows from a clearance center that sold windows that had been ordered and then not used because they were the wrong size or the wrong colour. Some of the windows were framed with PVC and some of them were framed out of wood and metal. The majority of the windows are fairly high performance windows. They let a lot of light into the house in the summertime especially and they help to keep the heat in the house from radiating back into the atmosphere in the wintertime.



With all of the information that we had we were able to make a decision that worked fairly well for one situation, but it would not be possible for every single house to use windows from the clearance center. So just because this was a good option for this one case does not mean that it is a sustainable option. It is not something that would work on a large scale or for a long period of time. There is still work to be done in determining a more sustainable method of doing windows.

The window example highlights one of the decisions that needs to be made while building a house and how making a judgement about sustainability can be difficult, but we came up against so many other

Journal Entry May 18, 2006

I can't believe that my goal was to renovate a house to be environmentally sustainable as possible. What does that mean? No one really knows and that is a bit of a problem. Why didn't I set the goal to not use any new building materials? Or why didn't I set the goal to not buy building materials that came from more than 200 km away? Or why didn't I set the goal to have a zero net energy use house or at least a house that conforms to the R-2000 energy efficient certification? I guess that in part I was afraid of not reaching my goals, but I think that not setting them pretty much took care of making sure that they weren't reached. I think that when you set a goal or make a vow it ensures that you do everything that you can to stick to it, but even if you can't you at least come closer to the goal than if you didn't set it. It also makes sure that you think long and hard about what your goal should be.

decisions that were difficult to make. For instance, after realizing that there was lead paint on the floors in the house and that refinishing them would be a large issue in terms of human health, we needed to figure out how to finish the floors. In the building industry, bamboo is considered an environmentally friendly flooring product. Bamboo regenerates quickly and is thereby considered a renewable resource, but it is grown in China in monocultures that provide little or no habitat for any other species. It is shipped to Vietnam to be processed and then to North America to be used as flooring (Moore, 2006). Wood flooring is often grown in monocultures, but these do provide some habitat and in North America it is possible to get hardwood flooring that is harvested and processed on the same continent that it will be used on, thereby reducing the embodied energy of the product (Moore, 2006). This leaves us with the question: which is actually better for the environment? How do we assess this? Or is there an additional option that we should also consider? Decisions like this arise all the time while constructing a house. Deciding what is sustainable and what is not requires different information and sometimes that information can be contradictory. What is the best for the environment is not always possible and what is best for the community can often be detrimental to the

#### FURNITURE

My roommates and I decided to furnish the house without buying anything new. This was a way to begin acknowledging that over-consumption is a large part of an unsustainable lifestyle. The dinning room table was one that used to be in the kitchen at my grandmother's house. It was missing its leaves, so Gerhard made me new ones from some old oak trim that was taken out of a house in the neighbourhood. It looks beautiful. We decorated the dinning room wall with two sections of filigree made out of metal that had been taken out of an old building. There is a stool in the corner of the room that was found in the back alley and re-upholstered with old bicycle tubes.

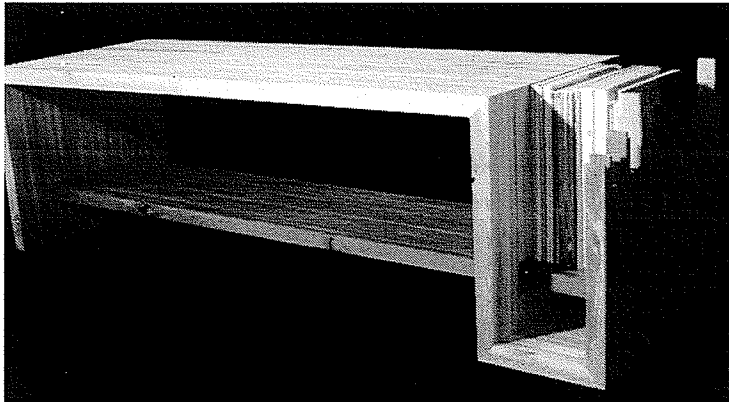
environment. Having a definition of sustainability that makes it necessary to consider not only environmental concerns can help to complicate the issue. It is made evident by the examples provided above that it is not always possible to make decisions that are the best for all of these different categories that impact environmental sustainability.

Due to the fact that making decisions about what is or is not sustainable becomes complicated in the midst of the multifaceted and somewhat complex construct of sustainability, there

are times when we focus on a limited definition of sustainability or neglect to define



sustainability at all. This issue was definitely a problem for my project. We never sat



down and talked at all about how we wanted to operationalize sustainability at the house.

There is a tendency for different projects to assign different levels of importance to different parts within the overall definition of sustainability. It

seems that in many instances, concerns for economic sustainability dwarf the concerns of social and environmental sustainability. Our need to focus on small parts of the overall definition of sustainability means that we might be spending a lot of time and money on certain campaigns or projects when there are simpler, more cost effective campaigns. For instance, a campaign to replace regular incandescent light bulbs with more efficient compact fluorescent light bulbs is one way of reducing energy consumption, but should it replace the idea of

conserving energy by turning off lights when people leave the room? Alternatively, when it comes to cars there have been increasing campaigns to buy cars with high fuel efficiency or even hybrid cars that do not use as many fossil fuels to run, but is it a good idea to promote the purchasing of new more efficient cars instead of

#### ...FURNITURE CONTINUED

The stools in the kitchen are from Value Village and most of the kitchen appliances and other things are things that my roommates already owned or are from thrift stores or my Grandma's and Oma's kitchens'. The back splash behind the stove is an old tin tile and the spices sit in a rack that was made out of old department store display cases. The living room loveseat is from my aunt and the living room couch is from a neighbour who decided that his living room was too full. There is a small side table made out of a drum that was found in the garbage and the entertainment unit is made of reclaimed lumber and very old books from the U of M library that were on their way to being recycled or thrown out. In the living room there is also a beautiful coffee table that was made by two of the architecture students. They took the lath from the old walls, planed it and made a gorgeous table out of it.

In my bedroom I have odds and ends from friends and family and my walls are decorated with old vent grates from the house before it was renovated. Sometimes it takes us longer to find what we need to furnish the house, but I think that is looks great.

promoting public transit and other alternative methods of transportation such as riding bike or walking. Despite the fact that approximately 10% of the energy used by an automobile in its lifecycle comes from the manufacturing stage of the cars life, it is true that over half of the toxic releases associated with an automobile are a result of the manufacturing stage of the car (Maclean & Lave, 1988).

In 1992 the United Nations Conference on Environment and Development accepted

**Sustainability isn't always Sexy**

We put flooring in all of our buildings and most of the time we put in a sub-floor before we put in the actual floor. That means that even if we are putting in a flooring material that is considered environmentally friendly, we are using twice as much material as necessary. Wouldn't it just be better to try and make environmentally friendly sub-floor and use that as our finishing material by oiling it or painting it? We are so concerned with appearance that we spend time and money making sure that what we can see is environmentally friendly, but what about the things that we can't see?

another document on sustainable development. This document is called Agenda 21 and in it there is mention of the need to create sustainable consumption patterns. This is mentioned as a problem in which developed countries should be taking the lead and yet it is true that many developed nations do not focus on consumption as a main tenant within the issue of sustainability because that would mean that it would be necessary to cut consumption. Cutting consumption is not a solution that is often emphasized (Hobson, 2003). This bias against curbing consumption leads to so called sustainable solutions that are consumption oriented and individually focused. This kind of action will not ensure that we achieve sustainability. For instance, a conservative estimate for sustainable consumption is 50% lower than current consumption. Other estimates put current consumption at 90% higher than sustainable level of consumption (Hobson, 2003). When we realize that these drastic cuts in consumption are needed it becomes questionable whether many of the government-initiated and endorsed projects are focusing on the wrong goals. For example, the Canadian Mortgage and Housing Corporation is currently endorsing a competition for the design of a number of Net Zero Energy Healthy Houses (CHMC, 2007)<sup>2</sup>. These houses will need very little energy to

<sup>2</sup> In 2003, a group of homebuilders along with developers that were involved in thermal energy and other forms of decentralized power created the Net-Zero Energy Home

run, on top of that they will need to have a net zero energy consumption, so they will need to produce, through photovoltaics or wind power, at least as much energy as they consume. This means that these houses will need to use the most cutting edge technology possible in order to bring their energy loads down to a minimum. On top of that the houses will require very expensive energy generation systems. It is estimated that \$35,000 over the typical cost for construction will need to go into each net zero energy house in order to make it extremely energy efficient and then an additional \$110,000 will need to go into each house to ensure generation of enough electricity to make it a net zero energy house. In order for a regular house to be built up to net zero standards it will require a minimum of \$145,000 above the cost of a typical

Journal Entry May 18, 2006

[My cousins] Andrea and David were talking about being vegetarians [at our Christmas celebration] and one of the caterers came by and said that she was a vegetarian of 2 weeks or something. I realized that if I wanted to become a vegetarian I would have to make a decision about it and just start doing it. It wouldn't be something that just happened. [My boyfriend] Chuck told me about an article in Nature that concluded that if everyone became a vegan, it would do more for decreasing green house gas emissions than if everyone drove a smart car just because of the fact that domesticated animals produce so much methane. It started to seem a little crazy to me that I would spend over a year and a bunch of money to make a sustainable home, but not do something as simple as stop eating meat (and maybe sometime soon dairy). The whole vegetarian thing also got me to thinking about other decisions that I could make about my lifestyle that would help me to be more sustainable. I could commit to never driving a car to get to somewhere in the city. I could commit to only buying food without packaging. I could commit to only eating local food. I could commit to only buying used clothing.

home in Winnipeg (Proskiw & Hockman, 2006). Twenty-four percent of that sum is spent to drastically reduce the energy consumption in the house and the final 76% of the money is used to install the PV panels that would allow the house to be NetZero. If we

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Coalition (2005). Net-Zero refers to homes that "would supply the grid with an annual output of electricity that is at least equal to the amount of power a home would purchase from the grid" (2005) in that same year. Most recently, the Canadian Mortgage and Housing Corporation has held a competition to encourage the design and creation of Zero-Net Energy Healthy Homes across the country. This initiative has now been branded Equilibrium Housing (CMHC, 2007)

do the math, we can see that the entire sum of money, \$145,000, could be spent making four houses very energy efficient or the money could be spent making one house a net zero energy house. Which outcome would be better for the environment in terms of energy consumption? Option number one would save the most energy. Which outcome would significantly lessen the energy bills for more people? Option number one again. This is not to say that CMHC should not be involved in these kinds of innovative projects. One of their goals is to generate interest in the concept and also to get a number of design and building professionals thinking about energy efficiency by being involved in creating designs for the competition.

Increasing ideas and interest are two really important things, but decreasing consumption and sustainability are not always going to be as sexy as a nearly self-sustaining house.

Sustainability is about the overall picture and making one house really energy efficient while sacrificing overall energy savings does not help to work towards sustainability. This example is indicative of the kind of piecemeal approach that is often used when dealing with sustainability.

#### WATER

I feel that water and plumbing is a really big issue. Currently there are a lot of incentives and advertising encouraging people to reduce their energy consumption, but water is an equally important issue that governments will hopefully start to pay more attention to. One of the things that I was really hoping to be able to do to deal with water issues was to put in a composting toilet.

Another example of how easy it is to focus on the sexy part of sustainability comes

#### Journal Entry September 3, 2005

I don't know if I mentioned from the meet and greet, but I sense a bit of tension between the homeowners and the renters in the area. I think that it is interesting that my neighbours were up in arms when they thought that I was with Manitoba housing. Gord says that it's because there is too much subsidized housing in the area. The triplex two doors down from my house is Manitoba Housing. Gord says Manitoba Housing is not always great at getting rid of problems tenants and that things used to be far worse in the neighbourhood. Gord feels that the Manitoba Housing should be spread out. I have felt a lot of neighbourliness from the homeowners, but maybe it has something to do with the fact that I am also a homeowner. How could we bridge the gap between the homeowners and renters without encouraging more gentrification?

from an article regarding the green house gas emissions associated with an animal based food diet and a plant based food diet. This article demonstrates that in the United States it would be possible to decrease the amount of green house gases produced by 6% just by having people switch

from an animal based diet to a plant based diet (Eshel & Martin, 2006), and yet this is not a green house gas reduction strategy that gets much publicity.

This helps to demonstrate that the campaigns that we are focusing on to promote

#### Gentrification

A reality of my project is that I was involved in the renovation of housing stock in a low-income neighbourhood. I, an educated and privileged young white woman, received grant money, media attention and the support and volunteered time of many different organizations and individuals in order to create this house and complete this project. I do not believe that the issue of gentrification is a simple one and my understanding of the issue has grown in the last two years.

Journal Entry May 18, 2006

I [was] talking [with a friend] about gentrification and he [was teasing me] that I should be hoping for gentrification because that way my property values will go up. I like the neighbourhood the way that it is now. *Although I now realize that this neighbourhood does not serve all of its occupants in the same way that it serves me.* I think that it is going good places. I was thinking about people like Maria and her family though. She has lived in that neighbourhood for 30 years and 10 years ago her...husband stopped feeling safe when he sat out on the front porch. That is why they built the back porch on the second floor. Is it fair that that happened in the neighbourhood where they lived? Now that things are getting better their daughter is moving into the area. Maria takes care of her yard and is a great neighbour.

Gentrification or cleaning up the neighbourhood is helping them. Their property values are going up to what they should be. I don't think that gentrification is good, but it is like a swear word in city planning circles and I am not sure that it is that black and white. As long as there is poverty there is the possibility of gentrification, so it is important to deal with poverty more than the location of the poverty. *The gentrification of low income areas takes place when the wider population begins to recognize the conveniences and benefits that lie in that area and also when government funding begins to go into certain areas in order to provide those areas with more benefits and conveniences. In saying that the location of poverty is not the issue it allows us to feel like gentrification is not a process that needs to be stopped or slowed. It allows us to believe that the benefits of certain locations are not owed to the low-income people who have lived in that area.*

sustainability are not necessarily the ones that will have the most impact. Would we as a society be willing to consume no meat or animal by-products to help the environment or is it more likely that we will go out and buy some new gadget in the name of environmental sustainability?

There are also a number of examples in actual community development that have been cited as sustainable when they most likely only focus on the environmental aspect of sustainability and not the social aspect. This further demonstrates the propensity to focus on

a limited definition of sustainability. These projects perhaps focus on one aspect of sustainability and for that reason they are labeled as sustainable, but upon closer examination it is easy to see that many so called sustainable projects taking a piecemeal approach to sustainability where they focus only on the environment. In his 2000 article, which addresses the concept of sustainability, Aguire lists two unbelievable examples. He first of all describes how Rozdilsky (1996 as cited in Aguire, 2000) purports that the community of Valmeyer, Illinois, which was relocated due to flooding is now a sustainable community. He contrasts this opinion with that of Beatley (as cited in Aguire 2000) who argues that it was unnecessary to move the community in the first place because the evacuees could have been housed in other towns, the town rarely flooded and the relocation, which cost the government \$22,000 per person, moved the town to undeveloped land and in doing so threatened an endangered bat and also disturbed burial grounds of a native American community.

Aguire also pointed out the example of poor and minority people that constituted many of the victims of a tornado in Arkadelphia, Arkansas. The environmentally friendly features of the houses that were rebuilt in the community meant that the houses were often too expensive for lower income people. As a result, many of these people needed to move to areas where houses cost less (Childers and Phillips as cited in Aguire 2000). These are examples of how within the multifaceted definition of sustainability it is easy to focus on only one part of the solution. In the course of my project, I was so focused on the environment that at times I did not spend enough time thinking about the

Journal Entry June 15, 2005

I went and saw the house on Young Street today. The landlord there apparently sent an eviction notice to his tenants long before he heard from us, but the fact remains that people would be evicted from their homes if we decided to buy that house. It was weird to look at the home while it was still someone else's space. The house did not look as though it was very livable and yet people were living there. I was talking to Alexis about it and we were talking about gentrification and how maybe I shouldn't buy a home where the people were evicted in order for the house to be sold. The landlord says that the people who live there owe him money and they are bad tenants and that is why he gave them eviction notices. The apartment on the main floor contained one bathroom that was in the basement, which I don't think is to code. The basement is unlivable space and there was some trashy bathroom half rigged up...so, what do I do? Do I not use a house that used to be a rental? Do I only use the burnt down house from Sherbrook or the too small house on McGee? Can a sustainable house kick other people out of their house?

community that I was working in.

As can be seen by the previous examples the term sustainability has been used to give credibility to many projects that do not actually demonstrate a full understanding of

#### INSULATION

We used five different kinds of insulation in the house and I think that this begins to demonstrate that in terms of doing what is most sustainable different circumstances and constraints call for different solutions.

We used some old fibreglass insulation that was taken out of an old sound room. This is the insulation that we used in the sloped walls on the second floor (the house is technically a two and three quarter story). We ended up buying some of it new also when we ran out of the reclaimed insulation.

We also used rock wool insulation on the interior walls in order to reduce the amount of noise that would travel from room to room. This is an important thing to do in order to make sure the house is comfortable for multiple adults to live in it. We also used the rock wool insulation in the joist spaces underneath the floor to make sure that the heat from the radiant floor heating would travel through the floor and to the floor that it was intended to heat.

We used icynene insulation to insulate the basement. We did not want to use batt insulation because we did not want to have any moisture problems in the basement. We went with icynene because it was a spray foam insulation that was not a petroleum-based insulation. I was under the impression that it performed better with water than other non petroleum-based insulations like soy based foam insulation

On the interior of the exterior walls we used a rigid insulation in order to add to the R-value of the exterior walls while at the same time decreasing the amount of heat that is lost through the stud walls to thermal bridging. This is when heat is lost through 2X4s because they do not have a good insulation value compared to manufactured insulation. We had also talked about trying to insulate the interior part of the exterior wall with straw bale, but we would have lost a lot of space in a small downtown house on a small downtown lot, not to mention the fact that it would have been difficult to do with current city codes.

the United Nations definition of sustainability. It is pointed out in Blueprint for a Green Economy that: "There is some truth to the criticism that... [sustainability] has come to mean what ever suits the particular advocacy of the individual concerned." These examples demonstrate that the term sustainability is often used in ways that are not in line with the United Nations definition of sustainability.

Even if we are able to properly define sustainability and make sure that all facets of sustainability are considered, the definition continues to be impotent if we do not

have enough information to ever accurately assess environmental, social and economic

sustainability. For my house project, I was trying to make a house that was sustainable or as close to being sustainable as possible. I am finished but I have no idea whether or not the house is sustainable or allows for sustainability. In order to define and work with the concept of sustainability, we as a society have tried to gain more and more information about different species and resources. We are scrambling madly to get enough information to be able to define sustainability. Yet it is true that:

“[our]...line of inquiry has clearly gotten out of hand. There is no way that societies could keep track of all of the flows that are quantifiable, no way that they could make sense out of them if they did, and no way to keep track of unquantifiable flows at all. Sustainable development cannot be defined operationally” (Norgaard, 1994).

Without all the correct quantifiable information it becomes difficult to argue for protection and management of specific resources. This demonstrates that without all the information necessary it becomes even more difficult to advocate for solutions that may help resources to maintain their sustainability (Auster & Shackel, 2000).

It is important to note that even with all the scientific information that is being amassed and with an appropriate working definition of sustainability; it is not a title that can be granted. No action can be deemed sustainable because sustainability cannot be judged in a vacuum. Sustainability is a construct that is so complex that its parameters may not be knowable as it is something that changes in different contexts. Sustainability will be different with different population sizes (Hails, Loh & Goldfinger, 2006) and different rates of consumption. Sustainability is a very general and multifaceted construct. It was probably created this way to be more universally applicable and that can be a good.

Despite the fact that some difficulty arises from the multifaceted nature of sustainability, the strength of the term sustainability is perhaps also in its multifaceted nature. On a small boat traveling from the Peruvian city of Pucallpa to Dos De Mayo, Christine Padoch and Robin R. Sears, two scientists, discussed the “sustainability debate”. Despite the accusations they had heard that the term is not definite enough, they responded, “What is better than a concept that many disparate communities and individuals can make their own? What is more compelling to most people around the world than a term that speaks of the future, of achieving and maintaining a livable world—conceived in more than one way—for their grandchildren?” (Padoch & Sears,



2005). The idea of sustainability as a flag around which many disciplines can rally (Aguirre, 2002) demonstrates that the usefulness of the term may come from the fact that it is so general. But due to the general and multi-faceted nature of sustainability, due to the fact that it focuses on development and due to the fact that it needs to be redefined almost every time it is used, it is a dangerous term and one that should be used and considered very carefully.

I have struggled with my own ability to work within the construct of sustainability. In my own project I went through each of the pitfalls mentioned above. And I continue to struggle with whether or not I can call my house sustainable and how I could have done things differently to have made it better or how I could make other houses better in the future. I think perhaps I made too many mistakes to call the house sustainable:

Maybe we have illegitimately co-opted the term sustainability. Should I even be able to call my house sustainable? Is it sustainable to throw out tons of lath just because we couldn't think of where to put it or what to do with it right away? Is it sustainable to move away from my parents' house so that they are now two adults living in a 16,00 square foot house?

In fact when the project started I called it the M.O.D.E.L. House project. M.O.D.E.L. stood for Mark of Designed Ecological Living, but after the house was finished I no longer felt comfortable calling it that. I was uncomfortable for two reasons. To begin with I do not think that the house demonstrates ecological living to its' utmost and also the title focuses mostly on the environmental aspects of the house. I have now started calling the house M.O.D.E.L.L. House. The second "L" stands for learning, because I think that the project has turned into something that will continue to grow. It will hopefully grow to have less of an environmental footprint and it will also hopefully grow to increase our quality of life without having to increase our income or ecological footprint. It will be a process.

Perhaps the construct of sustainability also needs to be a process. One of the dangers with sustainability is that there is no guarantee that we will constantly re-evaluate what it means. Despite the fact that sustainability can be a dangerous construct, it will continue to be a construct that we need to work with. Because of this necessity it is important to make sure that we are able to use the idea of sustainability so that it

continues to serve us rather than allow us to feel an undeserved sense of satisfaction. Perhaps if sustainability is a process, it will be more likely for people to strive towards sustainability in the present while continually evaluating what is mean.

## SIDING

The siding is one of the most distinctive things about the house. I was drawn to 545 Langside for I'm not sure what reason, but it was definitely despite the appearance of the siding. Most people that I know think that the siding is UGLY!!! There were also a lot of community members who were really sceptical of the idea of keeping the siding. They thought that it would not look good with the other houses in the neighbourhood despite the fact that it had been there for a lot longer than much of the vinyl siding in the area. The thing that frustrated me was that I didn't think that I was in that kind of community. I know that there are crazy suburban neighbourhoods where you can't dry laundry outside and you have to paint your house a certain colour to fit in with the block. And at first I was scared that that was what I was running into, but what I realized was that my neighbourhood wasn't like that. There were people in the neighbourhood who wanted to make sure that the house looked nice because they are working so hard at improving the housing stock and the community.

In any case the siding was one of the first things that we needed to decide whether or not to keep. We wanted to make sure that we could do a good job of insulating the house. We knew that we were going to need to insulate the stud spaces, but in order to do a really good job of insulating we knew that we would need to add insulation on the inside or the outside of the wall and it was just a question of which. The inside of the house smelled a lot like cat pee and the plaster looked like it had some water damage. The siding looked like it was doing a decent job of holding up. There were some areas of the siding that were a little ripped up or had been spray-painted, but we figured that we would be able to integrate some new siding into the old siding. That is what we decided to do. We decided to use cement board siding on the areas where we needed to remove the old siding. Cement board siding is durable and low maintenance. It is not toxic like the vinyl siding is.

The design students spent a lot of time coming up with a design that would look good. It was difficult because of the fact that we were incorporating the old siding with the new. Had we decided to go with all new siding, it would have been much easier to come up with a design. We did not want to go with something as basic as just covering the entire bottom half of the house with the new siding because we wanted to do something that looked a little more like an intentional decision based around aesthetics. The siding looked even more finished when we were finished painting.

## 4. DESIGN, AESTHETICS AND CREATIVITY

What is  
beauty? Is it  
inherently sustainable?  
Is it something that is  
timeless? Is it  
something objective?  
Is it something  
important? Beauty is  
definitely something  
that is kept in mind  
while building and  
decorating houses. We  
build our houses to be  
beautiful or to fit in  
with a certain  
aesthetic. We want  
our houses to feel  
comfortable and  
relaxing. We want  
people to like the way  
that our houses look  
when they visit.

However, in terms of

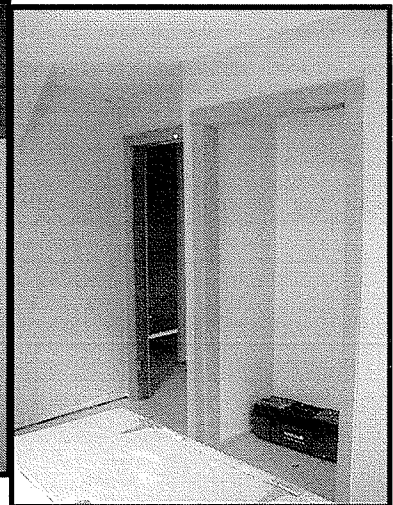
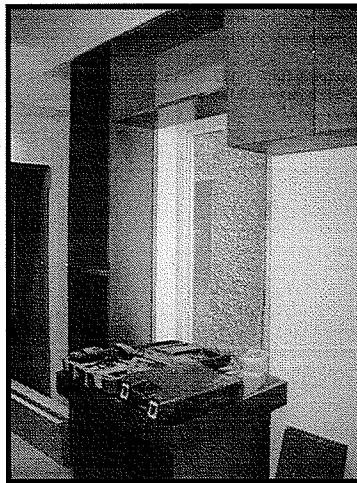
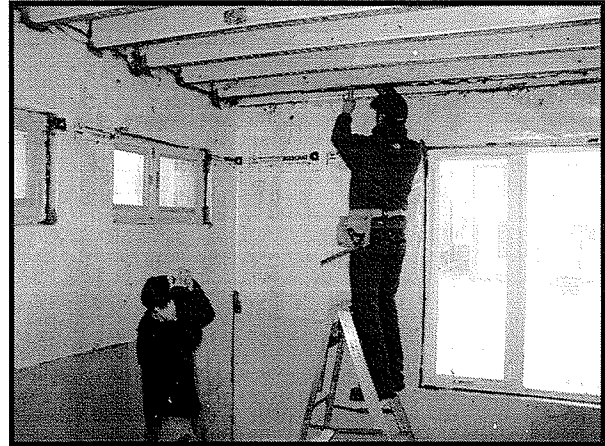
design there seems to be a constantly changing aesthetic. As is evident from elements of popular culture such as design magazines and television programs that record the destruction of entire homes to replace them with ones that are bigger and better and more beautiful, style or a particular aesthetic is not a constant in our culture. In fact, it is something that changes even seasonally. There will be a colour or a fabric or a piece of furniture that is particularly stylish one year and the next year it will be something entirely different. Home decor has obviously changed drastically from the 50's to the 70's to current times. Not only that, but even in one time period not everyone agrees what is attractive to see in a house and what is not. Aesthetics are at least to a degree subjective and somewhat temporary. And yet we let something temporary and subjective decide how we are going to create our built environment. Houses are not made to stand one year and come down ten years later and so they are kept, but remodeled. They are built to last and to stay the same, but they are constantly pushed to change to fit the current aesthetic. This is a process that consumes many important resources. Our fickle relationship with beauty and aesthetics causes the destruction of rainforests and the global warming of the climate. Why is it that we feel that the design of a house should be guided by a particular aesthetic? Would it not be better to let such an important task be governed by function, longevity and impact on the environment? As seen above, there are some problems with the construct of sustainability, but there are also problems with the construct of aesthetics if it is not possible to create a more long lasting aesthetic that would include the idea of function and environmental protection as beauty. And that is where we must head if we want to guard against houses that are built to last, but treated as disposable. We must create a new aesthetic that does not fall prey to the inequities of temporariness or subjectivity. We must create an aesthetic that is not only pleasing, but also that is lasting and that can be incorporated into design decisions in a way that does not force us to compromise things that are arguably more important such as the environment or the people around us.

In construction, a large part of the work that is done is to ensure that the building looks a certain way when it is done. Over half of the time spent on a project can be

spent in the finishing of the house (Johnston & Master, 2004). This is the part of construction that is used to make the house look and feel a certain way. There is still a feeling among people in the renewable energy industry, as noted during the Workshop entitled:

Unleashing the Potential of Residential

Energy Efficiency and Clean Energy Technologies in Canada, that there is more of a willingness to spend money on luxury items like granite countertops than on energy efficiency (Industry Canada, 2004). The way that we finish a house, the products that are



used, the colour that it is painted, the style of the fixtures and architectural elements are determined by style. This propensity to spend time and effort finishing the house to make it look a certain way was something that I encountered in my own project.

Despite the fact that the focus of my project was sustainability, a large part of the time spent on the house was spent making the house look and certain feel a certain way

Journal Entry January 25, 2006

I was talking to Benita the other day and it dawned on me that essentially everything that we are doing for the house from now on is totally for aesthetics. Can you believe that? I can't.

and it almost seemed like once we starting making those sorts of decisions, sustainability fell off the map entirely. In the second half of the project it seems like we spent the majority of our time picking out colours and designing mouldings, cabinets and closets to look a certain way, without really

considering sustainability anymore. Maybe we were at a point where we had already made the decisions having to do with sustainability, but should we not have even considered aspects of the aesthetic within the overall context of the home? Perhaps we were spending too much time thinking about aesthetics and our time would have been better spent still trying to incorporate a grey water system or long-term cold storage. Or perhaps we should have made sure that the aesthetic itself was sustainable. Was the aesthetic that we chose one that would stand the test of time? Will it be flexible?

We spend all this time making a house fit into a certain aesthetic, but is it even something that will be lasting? Current architecture is largely based on an aesthetic that is less than objective. We seek experts to tell us what is pleasing and attractive in the buildings that we build, but we often do not stop to think if those people are experts in what **we** will find pleasing and attractive or if they are experts in what they find pleasing and attractive. In fact, in a study from the year 2000 (Gifford et al) there was an examination of why architects and non-architects disagree so frequently about the aesthetics of modern architecture. The authors of the study were so convinced by the volume and consistency of previous literature that they began their study stating as fact that there is a precedent set already demonstrating that architects and non-architects often do not see eye to eye on their judgments of what is attractive and visually pleasing. The study was attempting to get more agreement between lay people and architects by making sure that they were using the same physical cues to determine their judgments about a building, but even in this context the architects and non-architects did not use the cues in the same way and still came up with vastly different ratings of the building's aesthetics. In my own project I also felt like there were times where I perhaps did not have the same opinion about what was attractive as the others did.

Not only do lay people and architects not always agree on what is visually pleasing, but

Journal Entry November 6, 2005

We talked about the exterior of the house on Friday, [the design students]...have a very definite idea about what is attractive and I don't think that it is the same as my idea of what is attractive. I am worried that I will not like the look of the house or that my furniture will not fit with the style.

also it seems that architects often do not evaluate a building using the same criteria as the

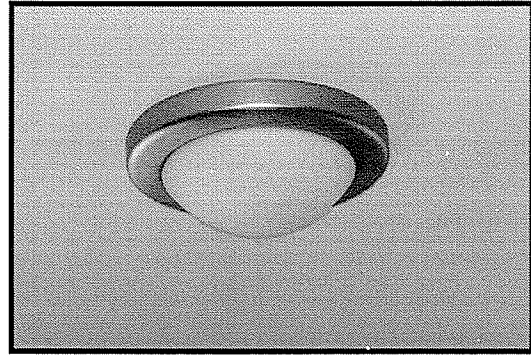
#### LIGHTING

The lighting fixtures were a difficult decision for me. There came a point when the electrician wanted to finish and I had not yet researched lighting fixtures. We had been thinking that we would be able to get some of the lighting fixtures from the Canoe Club that we were going to help dismantle, but when that fell through there wasn't much else that I could suggest. In a whirlwind affair I ended up rushing off to home depot and buying light fixtures for the kitchen and the exterior of the house. In the same hurried trip we picked out the light fixtures for the bedrooms, bathroom and hallway. And in a flash I had a bunch of new lighting fixtures. We got light fixtures that easily accommodated compact florescent light bulbs, but that was the extent of the environmental features. The dining room light fixture is often more elaborate and I didn't know what I wanted, so I didn't get a light fixture for the dining room. I told the electrician not to worry about it and having this extra time (it took me until my roommates moved in to actually get a lighting fixture) allowed me to look for and find a beautiful old light fixture. It had to be rewired using new wiring, but it made me happy that is was at least an old light fixture. I think that is would have been possible to find lighting fixtures that were used. Many of the lighting fixtures that were available were from the eighties and may not have fit into a modern aesthetic, but I think that we could have designed the house in a way that would allow them to be incorporated. Like the doors, it may have made things easier if we had had the fixtures before we designed the electrical plan because it would have allowed us to make sure that the older fixtures were placed in a way that would light up the necessary areas of the room, but instead we bought the fixtures after those decisions had been made. The house has many windows, so most of the time it is possible to work and read and hang out using

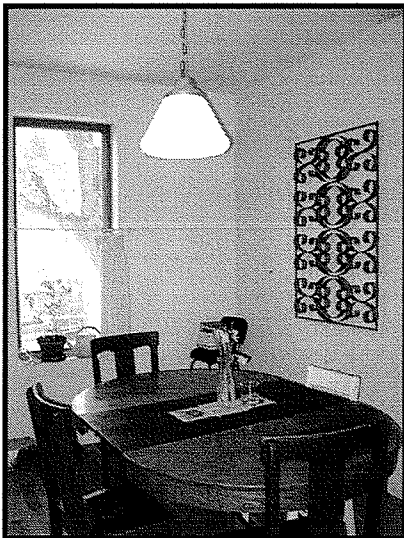
people for whom the building is built to be used by. In an article looking at the public's assessment of award winning architecture (Marans & Spreckelmeyer, 1982) it was found that the people who worked in a particular building had opinions about the quality of the building that were often at odds with those of architects and the public. The occupants of the building graded the quality of the building quite unfavourably especially compared to most of the public. It was presumed that this was because function affected the building occupants far more than anyone else and so their judgment of aesthetics was balanced more with their opinions of the building as a functional space. Perhaps it is the case that architecture is often not generally evaluated in terms of function.

There are actually a surprising number of examples of award winning architecture that ends up being far less than functional for

its occupants or for the people surrounding it. The John Hancock building is a famous example of this. The building is a very tall glass skyscraper that uses large pieces of tinted glass. At some point large pieces of the glass started falling off the building and



crashing to the ground below. This building was a danger and cost the company who owned it millions of dollars in repair, but the architect received a National Honour Award from the America Institute of Architects for the building (John Hancock Tower, 2006). The Wexner Center for the Arts was opened in November 1989. It was supposed to be used as an art gallery, but the building had been designed in such a way that too much light came in and there was a concern that it would damage the artwork that was supposed to be housed in the building. The building also had a climate control system that did not work very well. The building later need to be renovated and reopened in order to function properly and yet it was still described as "an art form." (Wexner Center for the Arts, 2007). The description of the "[t]owers [that] symbolize the Armory, which used to occupy the site" and the "white metal girders [that] represent the street layout of the OSU [Ohio State University] campus and the City of Columbus." does not take into consideration the fact that the architect did not take the information provided to him by the client, that the building was intended to house art, and use it to make a building that was functional for its' given purpose. (Wexner Center for the Arts, 2007).



This kind of valuation of a building as art while disregarding its failure to function as a building is obviously not rare; in Architecture Week, a design and building magazine, Thomas A. Schwartz wrote that "Bad things happen to some good, even great, buildings. Sometimes good buildings fail because their designers have pushed the limits of



technology in order to create something new. As an example, Frank Lloyd Wright's Fallingwater is now undergoing structural repair to its famous cantilevers." (Schwartz, T.A., 2000). A feature of the building that made it a particularly good example of modern architecture also makes it necessary for it to undergo major structural repairs less than 85 years after its' creation.

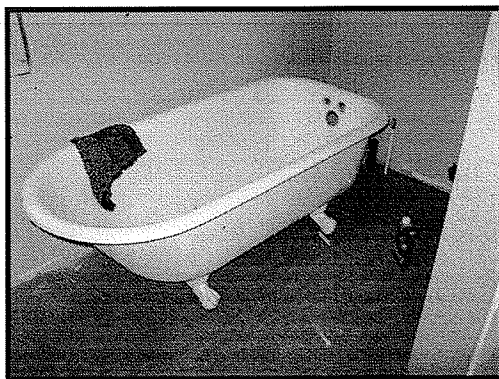
With examples such as these it becomes evident that aesthetics will often win out over function. Although the previous examples of architecture where aesthetics seemed more important than function or cost were all large commercial buildings where architects were the ones who largely made the decisions about aesthetics it is not true that aesthetics do not affect the decisions made within perhaps more modest streams of architecture such as residential architecture.

#### FLOORING

We considered marmoleum for a lot of the flooring. It is great environmental product in that it is made out of flax and jute. It is installed with environmentally friendly glues and it can essentially be composted when it isn't being used as flooring anymore. I ended up using it in the bathroom, but I couldn't convince myself that it would give a homey feeling to the rest of the house. I essentially decided not to use it because of an aesthetic reason.

Making the choice to do something because it will be more aesthetically pleasing is also something that is done by laypeople and not just architects. In my project I also found it difficult to make sure that sustainability and function won out over an arbitrary idea of aesthetics. It was not only an external struggle, but also an internal struggle for me. There are a number of examples of decisions that could have been more sustainable and instances where I questioned my own ability to make decisions that were sustainable in the face of aesthetics:

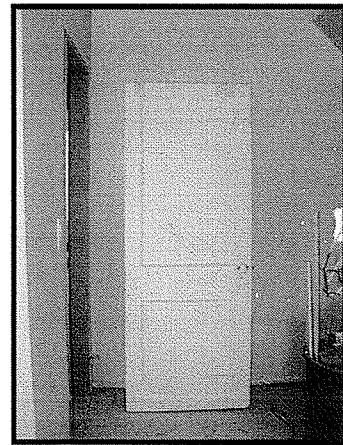
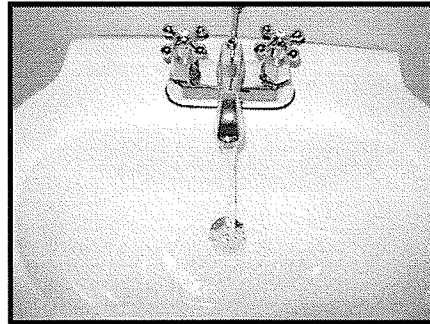
I talked a little bit with Mom and Gerhard about how it can be a detriment



to sustainability to have the homeowner involved. People want to have nice houses, so they are willing to spend a little more here and there just to make sure that the house is the best that it can be. If homeowners were not involved it might be easier to keep the

budget tight and spend more on sustainability?

I guess that we could get marmoleum, but it is so institutional. I am beginning to believe that a large part of the problem is aesthetics. Honestly, the entire restore is full of lighting fixtures, but they are all so ugly (yes, I too have been socialized to buy into beauty ideals, or fashion ideals or style) that no one would ever use them. Especially since more attractive lighting fixtures that are new are not that much more expensive. It is so funny how fashion or style is so changeable. In the eighties what was cool was vastly different than what is cool now and that was



#### INTERIOR PAINT

The interesting thing about using commercial low or no VOC paints is that you cannot use deep colours because the universal colouring that is used has high levels of VOC. When I was choosing the paint colours it was difficult because anything too deep would mean that I was straying into the area of higher VOC paints. We had talked about putting a feature wall in some of the bedrooms with the higher VOC paints, but I just didn't end up buying them when we went to the store. I'm really glad that I didn't end up using the higher VOC paints because in retrospect even the idea of a higher VOC paint just to get a certain colour seemed really silly to me. The main part of the house is white and the bedrooms are a green called camouflage. The bathroom is a blue called wedgewood. They are lighter colours, but the paint didn't end up being any more expensive than other paints. I was also interested in looking into natural colouring that we could add to the low VOC paint or natural paints. There just didn't seem to be any time to do the research. I would like to think that the drywall that we used would be better as clean fill because of the fact that it is low-toxicity.

only twenty years ago. If buildings are built to last over one hundred years, but fashion

drastically changes more than five times in that hundred years, the house has to be rebuilt or at least redecorated five different times. That is not an efficient use of materials. The...redecorating shows are just as bad. People have to repaint and re-floor and make things look pretty over and over again.

And the decisions that were overrun by aesthetics do not end there. I bought new, matching light fixtures for most areas of the house even though it would have been possible to get older ones that were

perhaps out of date. I spent more time on helping design the look of the cupboards than I did on researching the best composting toilet. There was a question of whether or not we should even use the composting toilet because it looks different than a standard toilet and is not considered attractive. I bought a new more attractive sink that would look better with the old bathtub and I bought new matching faucets for the bathtub and sink even though I should have been able to find old faucets that we could have modified to have low flow features. The low VOC paints only come in more muted colours and we were going to use darker paint on feature walls to add character to the rooms even though that would mean using paint that was not low VOC. Along with my roommates I have agreed to furnish the house using only old furniture and accessories, but we bought mattresses, organizers and blinds for specific windows new because sometimes it is not possible to get things to work or look a certain way if you are only using reclaimed or used furniture. I feel that often more focus was put on how the house looked as opposed to what would have been the most sustainable. People did not want us to use the asphalt siding because it was out of date and ugly, even though it was still working. When we were thinking about re-using the flooring, there was some hesitation because it looked rough. We put mouldings in and painted because it looks nicer. There were also many decisions that just seemed too small to consider in terms of sustainability and therefore we fell back on making those decisions based on aesthetics even though they probably could have had an impact on the sustainability of the house, such as the fact that we used new matching light switches and electrical outlets

Perhaps it is not appropriate to expect architects and architecture students to be the ones doing the work on trying to make buildings more sustainable. The training that architects receive and the kinds of jobs that architects are given do not necessarily prepare them to do all of the sustainability work:

So the design meeting on Wednesday was interesting. We talked about the windows for a while and then we talked about the floor plan, electrical and plumbing. It struck me again that the design students are really focused on what they consider architectural details and the systems or other aspects of sustainability seem to not be important to them...No one came up with a task lighting scheme to reduce on electrical use. No one

looked into grey water or other plumbing issues. I find it kind of frustrating.

If architects are the ones who are supposed to push the envelope and they aren't interested or don't have enough information, then what...are we going to do.

#### FLOORING

For the house, I did decide to use cork in the kitchen and I decided to use it because the non-profit that I was working with had a bunch of cork tiles that had been sitting around in a basement for a number of years. It is a red colour and no one wanted to use something that was that colour. Dean told the design students that it was their job to incorporate it into the kitchen design in a way that was attractive. It was a way of using a material that essentially was being treated as though it was obsolete. The funny thing is that when Gerhard and I were putting it down, we were just a little bit short so we had to go and get some scrap pieces from the flooring store. They were ugly white tiles, but it didn't matter to us so much because we were just going to put behind the door on the way to the basement. When Gerhard put the flooring down he just flipped the tiles over and used the other side. He had to sand some glue off, but that way we were able to use the side that looked like natural cork instead of the painted cork. Someone else could have done the exact same thing with the red cork if they had wanted to, but it is so beautiful that I am glad that no

Simon was talking about how there is one class or maybe one and a half classes in the faculty of architecture that talk about [technical] sustainability at all. [The studio classes take up much of the time and there is not necessarily any sustainability components in those classes]. Maybe they do not have the information they need to help build sustainable systems. Who do I go to for that?

Perhaps a lack of information and guidance is one of the reasons that architects sometime seem to focus on aesthetics to the detriment of functionality and sustainability.

Perhaps it is because aesthetics are

what we focus on as a society. I do still think that design is where we can find the solutions. Designers and architects have a responsibility and an ability to make things look good and to make things work together. For instance, there were times when the design students took materials that they were forced to use and made them



look good together:

The other day I was talking to the design students about paint colours and counter tops. They kept on bringing up the red cork flooring and how they would never have picked the colour themselves. And Dean said that he agreed with them, but that now that we have decided to use it (because it is sustainable to use up things that no one else wants to use it), it is their responsibility as designers to make it work and make it look good.

Despite some of the problems with focusing on aesthetics in design there was a reason that I was drawn to design:

One of the reason that I was attracted to design is because [of its] forethought and planning. It allows for [conscious thought] in creating space and culture. If that is used only to make sure that something is as aesthetically pleasing (according to one style that has been taught in school to those educated about design) then to me it is a waste of that potential. I guess that I don't even really understand how something can be considered beautiful if it is supposed to be functional and its supposed beauty keeps if from serving its function. I understand that there are things that are just meant to be beautiful. I think that the beauty of function lies in the elegance of utility. There are elegant and beautiful systems. Appropriate technology is beautiful. Simplicity can be beautiful. Forethought is beautiful.

#### PLUMBING FIXTURES

We tried to put in used plumbing fixtures. We used the original bathtub, but we used a new sink and in retrospect that was probably for aesthetic reasons. We put an extra low-flow showerhead in the shower that uses only 1.5 gallons a minute. In the kitchen we used a reclaimed sink and we have another reclaimed sink that we would like to use in the three-season room. All of the faucets that we used were new, but I think that it would be possible to find used faucets and put new aerators in them to adapt them to use less water.

Design is about forethought and planning, and hopefully we will be able to spend some time thinking about how to create an aesthetic that will allow for us to feel comfortable and happy in a space and allow for things to be created without ignoring function and elegance. If it is true that aesthetics are malleable and that it is possible to create a different look every ten years and get people to like it, then wouldn't it be possible to create a look that was more amenable to sustainability? Or if it is true that aesthetics are timeless then shouldn't it be possible to create an aesthetic that doesn't need to change every ten years? There are things that are consistently considered aesthetically

pleasing. Perhaps it is time that we start to design things according to an aesthetic that is more amenable to re-using things.

... I would like to develop an entirely new aesthetic. I would like to develop a style that I will advocate should follow modernism and post-modernism and it should emphasize the beauty of function and not just form. It should allow for using reclaimed materials and therefore might require an aesthetic that doesn't prize clean lines and sharp corners. It could focus on mismatch of styles. Alexis has advocated that I start an aesthetic of decay. Interesting. I was talking to Dave today about how everything that we have been doing for the last four months has been about finishing and he made the very good point that is healthier for us spiritually and mentally and emotionally to live in a place that feels finished and looks beautiful. But is our idea of beauty entirely socialized, because if it is then we might be able to socialize ourselves into finding an unfinished home beautiful and calming.

Watched the movie Tsotsi the other night and the pictures of the shantytowns made me think about beauty and design. Made me think about function and what is really needed.

The houses that were displayed in the movie Tsotsi were an example of an aesthetic that I think would more readily allow for functionality and sustainability. Perhaps it would be possible to create or perhaps it already exists, an aesthetic that is less rigid in its specific stylistic components. An aesthetic that is

#### VENTILATION

We decided not to have an artificial air conditioning system for the summertime. We located windows in such a way that we can get a really good cross ventilation. We put two high windows in the living room, so that we could keep them open all night or while we were gone without worrying about safety or security issues. This summer we were in the house and it was not that hot. We used a fan on some nights, but the house stays pretty cool during the day because two large trees shade it.

Due to the fact that we have a radiant floor heating system, it is necessary that we also have some way of circulating air throughout the house. Usually when people have a forced air heating system they have a furnace that will heat air and circulate it throughout the house. We needed a different kind of system because our heating system wouldn't do this for us. In the house we have a Heat Recovery Ventilator. It uses the warm exhaust air to preheat the cold air that is coming in from the outside. There is still an electric duct heater in the ducts to make sure that the air is warm enough that it will not cool the house down. I think that the heat recovery ventilator and keeping the house cool with shade are both examples of good design and solutions that are not necessarily used that much in conventional building these days

based on certain general principles of heterogeneity and functional beauty rather than specific forms and expressions. This aesthetic would be more about personal style and the constraints of individual projects, areas, cultures and climates than it would be about overarching similarities.

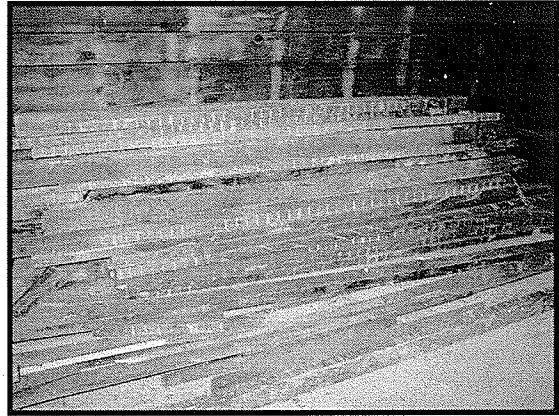
Perhaps this aesthetic would be an aesthetic of true creativity rather than an aesthetic of repeated and similar design decisions. The reason that I believe that this aesthetic would need to be one where true creativity was reflected is because I think that there is a certain kind of creativity that we have begun to ignore. This is not the kind of creativity that prizes only novel solutions or personal artistic expressions. This is the kind of creativity that would provide new ways of looking at cultural and societal tenants. For instance, imagine a winter fridge where you can use the cold air from outside to help keep your food cool inside instead of using electricity to keep your food cool. Imagine planning cities so that all buildings could take advantage of passive solar heating in the winter and passive cooling in the summer. Sometimes it is difficult to imagine these things because they may be outside of what we are currently used to. But these are ideas that have been present in our history. The idea of cold storage without electricity and of using the sun to help heat our houses are things that in our history were replaced when we began using electricity and other kinds of fuel to both heat and cool spaces. Using more active forms of energy became the norm in terms of space heating and cooling, but perhaps re-evaluating things that have become the norm within the current context of environmental problems will allow us to see that some of the solutions that we seek have been present all along. Coming up with new designs and ways of planning things that help us to reduce the amount of energy that we use is very important, but so many of the norms that were created in our society were created when the environment was of lesser concern or when we didn't realize that so many of our resources are not infinite. That is why it is so important to creatively reconsider the ways in which we do things. We do the same destructive things over and over again in design and construction and also in creating our cities and our lifestyles. We need to understand the nature of creativity and look at how we can use it to instigate new ways of doing things that are better for the

environment. We need to define design and planning as tools to implement creative solutions in our buildings, our communities and our lifestyles.

#### FRAMING CARPENTRY AND WALLS

We tried to re-use as much lumber as possible when doing the framing carpentry. When we were taking apart the interior walls of the house we saved all of the 2X4s. We also bought 100 eight foot salvaged 2X4s and we used close to 100 salvaged tongue and groove 2X6s. We also used some of the lumber that we had salvaged from the house outside of the city.

We did not order any certified lumber. While we were trying to figure out the design for the siding on the outside I had an interesting realization. We used a lot of reclaimed lumber for the framing of the house, but we did need to buy some new wood. I had done some research and found out that it would not be that much more expensive to order certified lumber, but that it would need to be ordered about a week in advance so that it could be shipped in time. I talked about this with the rest of the group, but it was decided that we wouldn't be able to do that because the design/build process would need to be more fluid than that. Also we were working with a major time crunch and needed to get stuff done. So we didn't order the wood. In retrospect I think that we probably could have used at least some certified lumber, but we would have needed to make more of an effort.



First of all, it is important to understand what creativity is in this context and how it works. As explained by Ackhoff and Rovin in their 2005 book entitled *Beating the System, Using Creativity to Outsmart Bureaucracies*, creativity in the context of problem solving is comprised of a three-step process. This process starts with identifying the assumptions that are present in our everyday lives. There are so many of these assumptions that we live with that often they are even difficult to identify. These assumptions can

manifest themselves in behaviours such as “keeping quiet during a classical music concert and applauding at the end, allowing women to pass through doorways first while a man holds the doors, and shaking hands when meeting a person.” These are all cultural norms that we get used to following and they become actions based on assumptions. They turn into behaviours that we are doing based on old ideas that we may not even know about.



After identifying the assumptions that we make in our lives it is then necessary to deny those assumptions. We need to realize that applauding after a concert is not the only possible outcome and this is true for many of the situations in which we find ourselves. Once we have identified and denied the assumptions that we make on a daily basis we are free to see the other possibilities that are available and truly act in a creative way. Creativity can be seen as working outside of cultural constraints. Within the design and construction industry there are also many assumptions that we make that if they were denied could provide for more creative possibilities. In many ways green design is the process of rethinking those assumptions that have been made about construction.

Acknoff and Rovin explain that

"all of us are constrained by what we assume can or can't, should or shouldn't, be done. Implicit assumptions lead to behaviours that are carried out automatically, without thought, and these behaviours constitute an organization's or society's culture. Culture is what we do when we do

Permaculture is a system of design that promotes permanent agriculture and permanent culture. The system is generally promoted for large pieces of land that are being used for agriculture and homesteading, but there has also been a movement of urban permaculture. Permaculture is based on an ethic of care for the earth, this ethic includes care for all living and non-living things specifically care for people and meeting the needs of people and finally of distributing excess time, energy and money towards earth care and people care. These ethics are supported by the principles of permaculture. These principles include conservation, stacking functions, repeating functions and reciprocity. Permaculture is a systems approach, which seeks to create system where waste from one system is seen as inputs for another. Permaculture deals not only with buildings, but also promotes the consideration of food, water and energy systems (Mollison & Slay, 1991). This system was first created in Tasmania by Bill Mollison and David Holmgren and since that times it has moved to both the United States and Canada. There are many design activities used by permaculturalists in order to increase creativity. These design activities allow designers to work outside of cultural and societal constraints to move to a place of greater creativity. These activities include such exercises as random assembly where locations for different aspects of a system are examined by assessing the results of random assemblies (Mollison & Slay, 1996). Another activity is one where inputs and outputs of different systems are examined so that systems can be put together in such a way that the outputs of one system can be the inputs of another.

not decide consciously what to do...Societal and organizational cultures are major sources of the constraints that influence out behaviour".

Creativity is actually a process whereby we must force ourselves to look at the culture that we live in and try and work outside of that culture. It is not that culture is inherently wrong; it is just that culture is comprised of a set of implicit rules that we need to follow to fit it. These implicit rules are a part of the assumptions that we make that hold us back by keeping some of the possible solutions, to the problems that we have, in the dark. It is often difficult for us to see that our lives and the decisions that we make are governed by all of these assumption because since our very birth the people and society around us have been working very hard to teach us these rules, they have socialized us, so that we can function and fit into our society.

This idea that we are constrained by socialization can be examined by doing a few simple experiments provided by Bernard McGrane in a book called "The Un-Tv and 10 mph Car". This book is filled with social experiments that ask people to do things that are outside of our socialized behaviour. The exercise for each experiment to observe without judgment or expectation, so as to truly be able to witness what can happen in the face of social differentiation. The experiments include things like going into an elevator and facing the back of the elevator instead of the front and watching a TV that is not turned on (McGrane, 1994). This kind of creative thinking and distancing from social norms is very important, but not always present in design and construction. In the housing industry things are done in almost every house that are not good design. These problems could often be solved using creative thinking. Not only that, but there are things in our lifestyles that we do over and over again that seem to make sense because it is how we have always done things, but many of these things are also problems that could be solved using creativity. It is possible to foster creativity and this is one of the things that we must do in order to promote living that is better for the environment.

In the book *The Ingenuity Gap* by Thomas Homer-Dixon, he makes the argument that in the current times where we need to quickly deal with a number of pressing social and environmental problems, one of our biggest potential impediments is that the solutions to our problems are exceeding our intellectual grasp. In fact, in the previous

chapter I also mentioned our lack of relevant information surrounding issues of sustainability as one of the reasons why it is so difficult to define and achieve sustainability. But perhaps rather than trying to solve the worlds' problems by trying to accrue more and more information, what we need to do is pinpoint the problems and the assumptions that we have made that have lead to those problems. Perhaps the ingenuity gap lies not in informational deficits that keep the correct solutions out of our grasp, but perhaps the gap lies between the solutions that we can see and the solutions that are available to us, but that we do not see. For instance, in the housing industry people have been encouraged to seek

out more and more efficient fridges to use so as to decrease the amount of energy that we use in houses and yet in many climates there are houses that are in cold weather almost six months out of the year. It would be more efficient to use the cool air from outside to cool food down than it would be to keep trying to create more efficient fridges that run on electricity or gas.

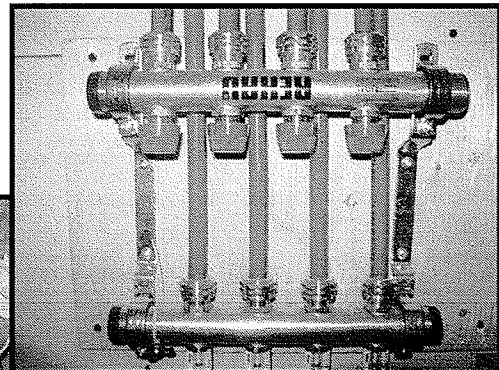
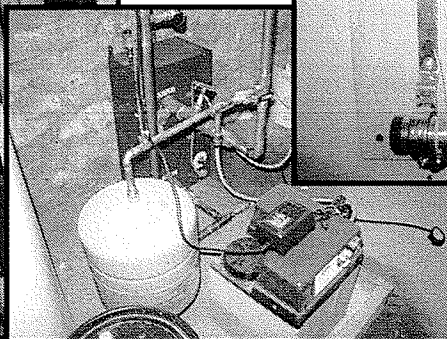
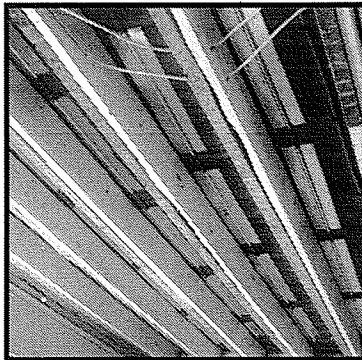
As explained above, one of the most important steps towards

#### HEATING

Heating is such an important part of a house in Winnipeg, Manitoba. While considering geothermal heat we thought a lot about distribution of heat throughout the house. We were told that using radiant floor heating would be the most efficient way of heating the house. This is in opposition to the forced air method of distributing heat in the house. We decided on radiant floor heating throughout the house. An added benefit to this kind of heating is that it will be relatively easy to attach a solar thermal system to this kind of heating system. We didn't have enough money to put the solar panels up right away so we decided to make sure that the house was solar ready. We put copper pipes in from the basement to the attic space so that we wouldn't need to dig into the walls later on. The house is now set up, so that later on we will be able to set up the solar thermal system to heat our domestic hot water and also to preheat the anti-freeze solution that is passed through the radiant floor heating. In retrospect we have been thinking about how we probably could have powered our entire heating system off of the hot water tank instead of getting a boiler. There is another house in Winnipeg that is done like that and we just didn't think of it in time. The radiant floor heating is set up so that it is possible to adjust different loops of the system depending on which parts of the house are naturally warmer or colder because of their orientation. Heating is a system in most houses I think that could use a little more creative thinking as to figuring out how to use waste heat from hot water and ventilated air.

creativity is to determine the assumptions that previous decisions were based on. The construction industry is guilty of making decisions based on incorrect assumptions. The industry assumes that using drinking water to flush away waste is an acceptable and necessary practice. The construction industry assumes that every house can be designed the same way and plunked down in whatever location is available. The industry assumes that the house needs to look a certain way in order for it to be sellable and attractive. Society assumes that everyone needs their own washer and dryer and that the industry must have all the solutions. The building industry is also not likely to change without pressure because they assume that the consumer makes all the same assumptions that they do and that consumers therefore will not want a house that looks different and behaves differently in the environment (Skelton et al. 1995).

In our project specifically there were a number of assumptions that we made that kept us from making the decision that was best for the environment. In fact the assumptions that were made often kept the best most environmentally friendly decisions entirely hidden, so that we didn't even consider them as options. For example, we assumed that there was no way to make the electrical system in the house more environmentally friendly. We got a regular electrician to do the plumbing without much thought of getting an electrician who was R-2000 certified. An R-2000 certified electrician would have been more careful generally with the vapour barrier and with thermal bridging. We also did not think much about the fact that there are so many different things that draw electricity, such as clock



radios

and the clocks on ovens  
and just about

everything you could think of. There is also a device that will stop the electrical draw when you are not using an appliance. We did not think to use one of those. It may also have been possible to recycle the old electrical wire. We powered the boiler by electricity when it actually would have been able to power the boiler off the hot water heater instead. This would have decreased the amount of material we used to create more appliances. As mentioned before, the construct of sustainability can be dangerous. We did not take the time to redefine sustainability, we assumed that the current definition was sufficient and as such we did not have firm enough goals. We also assumed that the only way to keep food from going bad is to have it cooled using electricity by cooling an insulated box within the house. We are now looking at having an out door winter freezer and also an indoor root cellar to keep things cool. We only discovered some of these solutions when we threw out the notion that there are no positive aspects to living in a winter city (in terms of sustainability). We realized that we could use the cold as an input into the system of our house. We also made a lot of assumptions about how a house has to look and the fact that a house needs to be finished with a lot of trim. In terms of lighting fixtures, we didn't even think about the fact that there are a lot of used lighting fixtures that we could have used that would have worked well with compact fluorescent lighting. We also produced a lot of waste due to the assumption that it takes too much time to find a place for all of the parts of an old house. Fortunately, we disavowed the assumption that there is nothing you can do with old lath and two of the design students made a table out of the old lath. There was probably more that we could have done with the lath, but we were also confined by time and storage space for the lath.

The cultural norms that currently exist need to be redefined. It needs to start feeling strange when you flush the toilet with water that you would be drinking. Throwing things in the garbage needs to start disgusting people. We have to change the way that we think and the way that we act. Social psychology reminds us not to negate the pull of culture and socialization. (Weier, 2006)

We not only make assumptions in the construction industry, but we also make a lot of assumptions about our lives and the way that we need to live. These assumptions

about our lifestyles are largely based on culture. We assume that we need to drive everywhere we go and eat highly packaged food from far away places. We obviously all need to have children and buy ourselves and our children and our families and neighbours and friends new things. We need to have lots of room to live in and our houses should be far away from our neighbours. We can't grow our own food and make our own houses. We need to re-decorate our houses every number of years. We need to buy new furniture. It is when we challenge these assumptions that we have made room for creativity. It is interesting that creativity is seen as a positive and sought after thing when really the majority of people believe that they want to lead almost the same life as everyone else with no room or desire for creativity.

Obviously, the changes that we need to make are not just changes in the technologies and products that we use. It is also important to look at the way that our communities and cultures work. It is necessary to

#### APPLIANCES

I have a fridge, an oven, a washer and a dryer. They are energy star appliances, but they are also fairly conventional. I have thought a lot about appliances. First of all there is the question of what is actually needed. Almost everyone that I know owns a microwave. I didn't get one (actually I returned the one that I had purchased) because I realized that it was not necessary. I also realized that having a microwave encourages the purchasing of highly packaged, unhealthy food that can be cooked in a microwave. Also, I was going to get a new microwave because it fit better in my kitchen. Sometimes I cannot believe the things that I was going to do in order to just get the house done. But the idea of necessity can expand past the use of a microwave. Why is it that we need such big fridges? If people were more connected to their communities and went shopping for perishables as needed, it would probably be possible to keep a much smaller fridge that contained leftovers and a few essentials. Of course, people used to get by without fridges; they found other ways to use cold storage, but how many new houses contain root cellars these days. I do not have a root cellar right now either, but we do have plans to either dig a root cellar or build an insulated box in the basement that is vented to the outside of the house and the room will be able to stay cool that way. We are planning on storing vegetables and canning in this room. We also use a lot of energy to cook food, but there are people out there who are raw foodists. There is solar energy to cook food or biomass energy that people can use in Adobe ovens. If we were to focus more on our communities instead of our individual houses it might be possible to share a lot of the appliances that we have. Why not have a little laundry house on every street, which uses the most efficient washing machine and many places to dry laundry naturally? (Chiras & Wann, 2003)

rethink the ways that we do things. There is a movement of social inventions that demonstrates that we need to challenge assumptions that we make when it comes to producing physical solutions, but also when producing social solutions (Albery, N. et al. (ed.), 2001). These are ideas about how to do things differently. When we look at what our current ways of organizing are doing to the environment, we can see that we need to

Strangely enough, it is our efforts to establish a thoroughly sanitized world that have led to our toxic world. Our quest for wonderworld is making wasteworld. Our quest for energy is creating entropy on a scale never before witnessed in the historical process. We have invented a counterproductive society that is now caught in the loop that feeds back into itself in what can presently be considered a runaway situation.  
(Berry, 1999)

Creativity is the process whereby we identify and work outside of the implicit false assumptions that we have internalized; therefore, in order to be creative we need to work against ourselves and our cultures to step outside of the feedback loop that continues to create destructive solutions. When we come to the crisis of not having energy we cannot just assume that the only solution is to produce more and better energy, but perhaps the solution would lie in us reducing the amount of energy that we consume.

Within the context of assumptions we also need to look at the idea of constraints because in the problem-solving process the two are inextricably linked. When we do not look at the implicit assumptions that we make within the problem-solving context we are unable to see that there are or there should be constraints made upon us in many different ways. Therefore by identifying the implicit assumptions that we make, we are able to identify appropriate constraints, which opens up the possibility of future creativity. For instance, in the case of human waste we have set up a system in most cities where we use clean drinking water to transport waste from its point of origin to its point of treatment. We then use potentially toxic chemicals to treat the water. When we begin to realize that at some point in our future there may be a shortage of clean water we begin to come up with solutions such as low-flow toilets and dual flush toilets where we use less water to flush away waste. These are the kinds of solutions that we come up with when we are

trying to work within the assumption that it is acceptable to use drinkable water to flush waste away, that it is acceptable to put effluent into our waterways and that chemically treating water is acceptable. Perhaps when we can see that these are the assumptions we are making we can begin to realize that perhaps we need to put constraints on what we are doing. When we deny the implicit assumptions that we have been making in some cases we are placing more constraints. This can help us reach more strict goals in terms of performance.

So the other day I was at Simon's having breakfast and we were talking about how creativity is fueled by constraints. I think that is too easy to renovate an entire house without being creative at all. In many situations people won't even try and think of creative solutions unless the run of the mill solutions aren't working. Well guess what folks, the run of the mill solutions aren't working, so the creative solutions must be brought on. The constraints that are provided are actually the goals that need to be reached.

I think that our idea of design and creativity needs to change and grow to allow for more sustainability in design. When we begin to look at design differently it is then that we will come closer to our end goal of sustainability.



## 5. AFFORDABILITY AND INFRASTRUCTURE

As mentioned above, it is essential that not only environmental aspects of sustainability be considered when we are taking about sustainability. One of the major social issues when it come to environmental technology or solutions has to do with whether those solutions are widely available or only available to a small number of individuals. This is a major issue for sustainability because it is an issue of equality, but also because sustainable solutions will not be effective unless they are widespread solutions that are implemented across the board rather than in a few specific situations. It has been argued that in particular the implementation of environmental gadgets and technologies can be more accessible to wealthy individuals who can afford to implement more expensive environmental technologies (Skelton et al., 1999). Perhaps wealthy people will be among the few who can afford to build new houses with the proper orientation for solar gain or install expensive composting toilets, but if all the environmental innovations that are available are so costly that only the wealthy can afford them there is little likelihood that we will be able to succeed in creating human settlements that are not harmful to the environment.

It is not only important to the future of the environment that environmental sustainability is affordable; there is also the question of the quality of life for individuals who cannot access expensive innovations. Should low-income people be forced to eat fruits and vegetables that have been sprayed with chemicals, because they can't afford to buy organic food? Or should they be forced to pay higher water bills for a flush toilet because they cannot afford the large initial payment to install a composting toilet? How then is it possible to bring the benefits of environmental sustainability to groups of low-income or marginalized people? If environmentally sustainable options are only available to the wealthy then there is an inequitable divide that should not be supported by our society. Many environmental issues affect those who make their living off the land or those who cannot afford to clean up environmental messes in their communities and yet environmentalists have been notorious in the past for not considering the social issues that are wrapped up in environmental problems (Weinberg, Pellow & Schnaiberg, 2000). It is essential that marginalized groups of people are able to create and live in

sustainable communities and therefore it is necessary to ask if that option is affordable to them.

For the sake of both the environment and the people that live in it, it is essential to ask: Can environmentally friendly homes and communities also be affordable and can low-income communities and households afford to live sustainable lifestyles? Due to the growing knowledge of sustainability and environmental justice, this is a very good time to be considering questions of affordable green settlements. When considering sustainable settlements the actual buildings that people live in can be important along with the greater community around the buildings. There are a number of projects that demonstrate willingness to work towards affordable green housing and communities. Below are examples first of environmentally sustainable ideas for homes and residential buildings and then of environmentally sustainable innovations that are being implemented in communities. If we work towards expanding the projects that are already being started and also begin to look at environmental innovations in a new light, there is no reason why environmentally sustainable settlements cannot also be affordable.

In order to set the stage for a discussion about affordable and sustainable settlements, it is important to note that over the last twenty years there has been a shift in the way that society looks at environmentalism. There are now many more groups that are focusing on not only the environment, but also environmental justice. The environmental justice movement has been growing since the 1980's as an alternative to conventional environmentalism (Montague, 2003). This is a movement that incorporates a diverse group of other movements including the occupational health and safety movements and the indigenous peoples' and native lands rights movement (Montague, 2003). Allowing for this kind of diversity within an environmental justice movement demonstrates the need to focus on the many different areas that environmental issues encompass. In fact, the environmental justice movement specifically acknowledges the need for equity in regard to the environment (Montague, 2003). This addresses the issue of affordability. If environmental protection is to be equitable it must not be limited to those in our society who are wealthy. In fact, the environmental justice movement has led to some of the issues of minority and low-income populations being addressed by

certain of the major environmental groups in the United States (Warner, 2002).

Environmental justice acknowledges that environmental issues also touch people.

The concept of sustainable development is another concept that allows for a more holistic view of our interaction with the environment. At its most basic it contains the three pillars of sustainability, which are the social aspect, the environment and economics (Kates, Parris & Leiserowitz, 2005). As Kates, Parris and Leiserowitz point out in their 2005 article it is in part the ambiguous definition of sustainability that allows it to encompass even more than just the three pillars might first suggest. It is this wider approach to sustainability that allows affordability to be part of the environmental debate. In fact, in a report produced by the CHMC on sustainable communities in Canada, one of the criteria for judging a community to be sustainable was its affordability (2000). It seems that the way in which we consider our environmental performance is now much more holistic. With governments and environmental groups working to promote sustainability, now is a very appropriate time to be looking at promoting environmental settlements that are also affordable. However, just because this is a good time and place to consider affordable environmentalism does not necessarily mean that affordable environmentalism has been achieved.

Better environmental practices can lead to cost savings. Using different kinds of environmentally friendly technologies **can** help to reduce peoples' monthly water, electricity and gas bills. For instance, in my house project we used a composting toilet instead of a flush toilet. Estimating 3 flushes a day for 3 people using a regular 6 litre a flush toilet that would mean that over the course of a year we would save approximately 696 cubic feet of water and \$57 considering Winnipeg current water rates (<http://www.winnipeg.ca/waterandwaste/billing/rates.stm>, July 7, 2007). Within the structure of green building less money will also need to be spent cleaning up landfills full of toxic building materials or replacing materials that are not healthy for people. For instance, in my house project we could have just refinished the floors in the house instead of putting in all new floors if it hadn't been for the lead paint on the floors. All this, however, does not necessarily mean that using environmentally friendly technologies and safer building materials is an affordable alternative. There are a number of reasons why it can be quite expensive to implement environmentally friendly building. First of all,

green building is not mainstream especially not for non-commercial buildings. There is not sufficient infrastructure for green residential building. Trying to circumvent the lack of infrastructure can be a very expensive endeavor. Additionally, so much of what is focused on in terms of sustainability is fairly high tech. This can cost a lot of money, especially because of economies of scale. The majority of people do not have shelter building skills and the city requires certified trades people for buildings to be built to code; it is therefore necessary to hire expensive trades people to do all of the work. It is possible, however, to overcome some of these problems by approaching affordable sustainable housing from the ground up rather than trying to modify the way we currently construct housing to make it less expensive and more environmentally friendly. There is a lot of work that needs to be done to help create the infrastructure to support environmentally sustainable residential construction. Also, focusing on lifestyle changes rather than just focusing on the built environment can allow for environmentally friendly behaviour without the need to spend extra money.

The first thing that one realizes when trying to do environmentally sustainable construction in an environment that is used to mainstream construction is that everything takes longer. Instead of running to the nearest hardware store to get a toilet or even finding a free or salvaged old toilet, it becomes necessary to do research. Research on where to find a composting toilet, research on where it comes from, research on how it works, research on whether or not it can be installed and

#### EAVES TROUGH, SOFFITS AND FACIA.

It was really important to replace the eaves trough, soffit and fascia on the house. Initially, there were no eaves troughs and the fascia was old and did not allow for ventilation into the attic. I was hoping that we would be able to use at very least reclaimed eaves troughs, but I could not find a trades person who would work with used eaves troughs. It would have taken a lot more time to work with reclaimed material and it would therefore have been a lot more expensive. The eaves troughs are an important aspect of the house because they will allow us to collect rain water, which will be used for landscaping and also hopefully in a summer kitchen for dishes, gardening and potting. It also helps to keep the water away from the foundation. This will help protect the basement from flooding.

research to try and find someone who will install it. This one example of the composting toilet can help to demonstrate the various levels of infrastructure that would be necessary in order to make environmentally friendly building easier for individuals and companies.

### INTERIOR PAINT

For the interior paint we wanted to make sure that we used something that had low levels of volatile organic compounds. My plan was to use the commercially available paint, but then a volunteer named Benita pointed out that we also might be able to use natural paints. I think that that would have been a really cool idea, but so often it is just easier to go with whatever is more readily available.

research wasn't necessary at all it would also be possible to cut the costs of the time spend finding the answers to all of the above questions.

Within the current building culture it is very difficult to take time with design and construction. Time is money and when doing sustainable construction it seems like there is always more to learn. I felt as though I was constantly running into problems where I could have used more time to find used building materials or to do a little more research on different products or systems.

Maybe the biggest impediment to sustainable design is the pace at which our society works.

Maybe it is too crazy to design properly. Maybe that is the biggest...problem.

Jamie and I were looking for doors on Friday. It takes a good long time to find things that are used.

Permaculture says that you should spend at least a year doing an analysis of the site. I think that they are right. Design and planning

Of course if there is a company who does all the research and then can replicate it over and over again in the construction of multiple environmentally sustainable houses it means that the cost of this research can be distributed over a number of houses or if the time put into this

### WATER SYSTEMS

There is a house in Winnipeg that is having a grey water treatment system installed into it. It was not possible to implement this system at 545 Langside because we did not have the time or money to get an approved system and to implement. We didn't want to eliminate our options in terms of putting in a grey water treatment system, so we installed our plumbing in such a way that it will be able to install a grey water treatment system in future without opening any walls. We will hopefully be able to implement a system in the basement that will allow us to use water from the bathtub/shower and bathroom sink for landscaping in the summertime and also for the washing machine. We have also installed an emergency/party toilet in the basement that will hopefully only use grey water. We would like to use rain barrels to put the grey water in. The water would then be filtered and used the same or following day to ensure that it would not grow bacteria or anything.

allow for things to be made more elegantly and with more thought, but a time crunch is not really what one needs for good design. It is all kind of frustrating.

We should have tried to make out own lighting fixtures. It is probably one of the few things that would be pretty easy to make from garbage. We bought new fixtures instead. Lack of time.

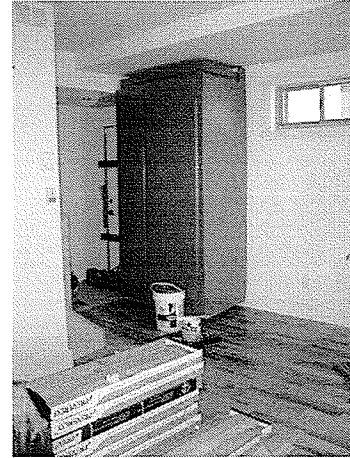
I feel like I have to be on top of it all the time. No wonder that no one does sustainable renovations. How can people be expected to have all this information on their own? I would really like to get in touch with the Manitoba Home

Builders Association and figure out what they think about this project and how they do try and want to try in future to recommend sustainable building practices.

Maybe the biggest impediment to sustainable design in the pace at which our society works at. Maybe it is too crazy to design properly. Maybe that is the biggest...problem

One of the reasons that all of this extra time is needed is because the infrastructure for sustainable building is not adequately in place. If there were well organized warehouses containing used

products that were easy to find it would not take so much time to find used products. Or if everyone were used to using salvaged material, there would be more of an



#### CABINETS

The cabinets that were in the house were totally unusable. We had decided that we wanted to use strawboard for the cupboards and moulding. The reason that we wanted to use strawboard is because it was produced locally in Eli Manitoba, it is made with a waste product that would otherwise most likely be burned, it is made with less harmful glues than other sheet materials and it is also very attractive. We decided to treat the strawboard with a water based urethane, but in retrospect I think that it would have been interesting to do more research on how to finish the strawboard with different kinds of oils. We did however, run into some problems acquiring the strawboard. In December we learned that the plant was closing down. By the time that we bought the strawboard in January they only had large sheets left. We were able to buy thirty sheets of 5X8 strawboard. They were difficult to handle, but we were able to manage them because we used the wood shop at the University of Manitoba. We made the cabinets out of strawboard and wood glue and it took a long time to do. Because we made all the cabinets by hand we could maximize the space that we had in the kitchen. Even the infrastructure that we have in terms of local production is going out of business.

understanding about why things would take so long. Also if people within the building industry were more accustomed to doing green projects they would have all the information that they needed at hand instead of having to do so much research. There are a lot of people who need to have more information about sustainability.

Is geothermal the best decision or is radiant flooring. [I now know that it would be possible to have both] Do we even have enough information to make all of these decisions? It is just so hard to know. This stuff just has to become more mainstream. People have to know more about it, but how can you make that happen? They had to do a whole three-year long documentary in order to show all different facets of PVC. How can anyone do that much research about all products?

I should have done more reading and more research before now. If we do not have enough time it will be my failure.

I am thinking about how all the specialty stores have been so helpful and have had environment information. The box store has lead to the demise of informative salespeople and as such people are not able to make informed decisions about consumption.

A couple people have also insinuated that maybe I haven't done enough research. This may be true, but it is nearly impossible to prepare for all the possibilities for this house and if I am only playing the role of homeowner how can we expect homeowners to carry this burden. Why isn't there anyone to go to for consultation? That is why ECO is such an amazing store.

#### INTERIOR PAINT

Purchasing and using low VOC paints is one of the things that many people could do to increase the health of their home and yet I find that even informed people often neglect making this decision. Another thing that is often neglected is the fact that low VOC paints smell better and are better for the painter. They can save money also because there is no need to ask people to move out of the house or vacate the office when painting is being done.

#### ROOF

A lot of old shakes and shingles were taken off of the old roof and unfortunately most of them were landfilled. In many places it is possible to re-use old asphalt shingles and that is something to look for.

Is there a problem with misinformation? Not enough information.

In many places where there is no infrastructure in place for environmentally friendly building, money ends up filling the gap. For instance, there have not been a lot of residential

greywater systems implemented in Canada and most municipalities are not prepared to allow it to happen unless there is some sort of president set. If someone wants to implement that kind of a system than they would need to pay an engineer to design a system, make drawings and stamp them. This would be a large expenditure that most homeowners could not afford, least of all low-income homeowners. There are also systems and products in use that essentially do that work for the consumer. They design their system and get it approved by the Canadian Standards Association and then it becomes easier for municipalities to allow those materials or systems that have already gone through some sort of an approval process. However, there can be problems with that in our market also:

... another impediment to sustainable products in Canada is that the majority of American producers (there are a ton of them) do not want to spend money to get their products certified in Canada. In terms of sales or size, they think of Canada as just another state that they have to get an entirely new certification for. It's just not worth the money for them.

There are trades people and contractors who are trying to fill the

#### DOORS

The interior doors were a bit of a problem. When we were gutting the house I didn't even think about saving the doors. They were in pretty bad shape, but it might have been possible to save them. We framed the house so that the doorframes would fit standard size doors, but the thing about re-using material is that you can rarely find re-claimed material that comes in standard sizes. In retrospect we should have bought closet doors and interiors before we even started framing. That way we could have framed to custom fit odd sized reclaimed doors. Instead we found reclaimed doors after we had framed and therefore had to do a lot of extra work to make the doors fit. This is one of the reasons that it is often difficult to get trades people to work with used material. It sometimes takes a lot of time to use reclaimed material. Not only was there more work fitting the doors, but there was also a lot more work in preparing the doors. After we had purchased the old doors I realized that the paint that was on them might have been lead paint. I got them tested and sure enough, some of the doors had lead paint on them. I decided that the best way to deal with the situation was to take the doors outside and scrape off the old paint. We put down a tarp in order to be able to collect the paint chips, wore masks and scraped the doors. Then the doors were repainted and we brought them back into the house to hang them. Most of the danger around lead paint has to do with lead paint dust or flakes of lead paint that can be ingested. I wanted to use the old doors, but also deal with the lead paint in as responsible a manner as possible. A lot of these kinds of problems can come up when using second hand materials.



gap. On our project we had problems with not knowing what to do with excess material:

We got rid of as much of the lath as possible, but a lot of it just had to go in the dumpster. Simon took some, Gerhard took some, Gord took some and the students took some, but bottom line in that we can't use it all right away and we really have nowhere to store it. In our backyard it is a fire and safety issue and so it needs to be disposed of. It's just easiest to throw it into the big bin...we have been conditioned to be a disposable society. The problem with big bins is that you just throw everything in together and there is no opportunity to save anything. I don't want to throw all the lath and plaster together and have them all land filled. However, doing stuff with the trailer means more loads and more fossil fuels used. It's a no win situation.

There are now companies being set up that have the organizational infrastructure to deal with a lot of these problems that do not have larger infrastructural solutions already in place.

You just can't make the same amount of money as you do when you do commercial work. It is just so much bigger

In many cases we are still missing the infrastructure to reuse and recycle things properly. In Canada we have begun to set up household recycling programs, but we still lack the ability to recycle much construction waste:

There were a lot of people there bringing a lot of things. I guess that it is a good thing that people are trying to recycle shit, but it is down cycling. Gerhard and I were talking about how in places in Europe there are companies that have to take their products back and that way they create their products to be more easily reusable.

I think that today Gerhard went to the dump and ended up throwing away the old toilet. It got put into the trailer when we cleaned up the yard the other day. There just doesn't seem to be room to keep everything that we would like to be able to recycle or reuse. I think that that is one of the reasons that we are getting all that stuff from WHRC. They brought us a bunch of interior doors, light fixtures, cork flooring, floor grates and windows. It's awesome that we will be able to use it. It just brings to mind that that is one of the reasons that we end up throwing away so much. [We have no where to store it. I'm sure that so many of the materials that we took from the house could have been used, but where do you keep it while you are waiting for the right time to use it.] I mean Simon and Daniel both have a stash of stuff so that they can [save it to] use it in their buildings.

At the dump with Gerhard I was also thinking about how easy it is to throw things away. There is a short list at the dump of things that you aren't supposed to dump there, but they don't ask you anything when you go to the dump. When we were unloading our plaster, someone next to us was unloading branches that had been cut from a tree. That is stuff that they could have taken to Fort Whyte. They have a wood chipper there. All you have to do is drive to the dump and pay the minimal fee of \$4 and you can throw a whole bunch of shit away. Also because there is no pick up for a lot of this recycling that we want to do and because we aren't terribly well organized we end up driving a lot more than I would like to. That is the use of gasoline.

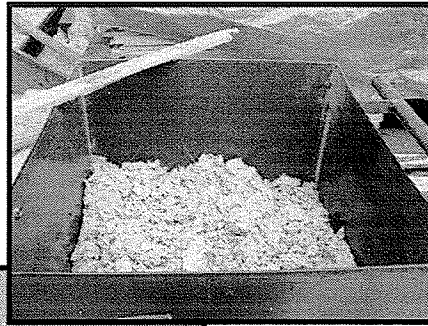
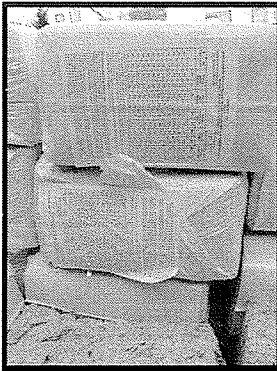
#### MOULDINGS

When we were taking down the house we tried to save the mouldings, but the majority of the mouldings were so dry that they cracked and snapped. They weren't in very good shape to begin with; they each had many layers of paint and were chipped and broken. We decided to use strawboard for the mouldings as well as for the cabinets. It is more environmentally friendly than medium density fibreboard and it performs better than MDF when it gets wet. We used it for baseboards, closets and shelves as well as for trim around windows and doors.

One part of the infrastructure is the fact that the government does not encourage recycling and reusing as it seems that often stores are required to charge PST and GST even on used items:

At the Salvage Supermarket on Monday we ended up talking about how you have to pay GST and PST on used stuff. I think that that is a barrier to sustainability. The GST and PST have already been paid on that lumber.

When we are looking at the affordability of housing it is so very important to look at infrastructure. I have already demonstrated a number of ways that the physical and social infrastructure is not in place to help green building especially in the residential sector. The GST and PST is one example of how the economic infrastructure is not in place and another example of that is the lack of full cost accounting:



Was listening to CBC radio the other day and about cancer and all the carcinogens that are present in products and that aren't even labeled. It made me think again about full cost economics and about what we consider important.

If we are creating houses for people that are not even healthy for them, then there are a large number of costs that will end up being paid in health care and community programming in order to deal with these problems after they have occurred. Perhaps if we used full cost economics we would see that more toxic materials end up costing us more in the long run.

The trades are largely untrained to implement many of the systems that are more sustainable, so even if you can afford it, it is CSA approved and the city has no problems

#### INSULATION

We used many different types of insulation in the house. The kind of insulation that we used the most was cellulose insulation. This is essentially finely cut pieces of recycled newspaper treated with borax to be fire and mould retardant. It is manufactured locally, it is easy to use in renovations without even tearing into your wall and it is possible to compost. Not only that, but it is healthier than fibreglass insulation. It works so well in renovations because it does not come in batts. It is blown in. In many old houses the stud space goes all the way from the top of the house to the bottom. Houses now are built from the ground up. The first floor is built and then the second floor is built on top of the first floor. Older houses were built with longer pieces of lumber. You could put the entire exterior wall up at the same time and then you would build floors in between them. This means that in many older houses it is possible to cut a hole in the plaster or drywall at the very top of the stud space and then it is possible to blow the insulation all the way down to the bottom of the first floor wall. In any case this is a really good product, but it depends on quality installation and it is really difficult to find people who are trained to do it well. There are also times of the year where there are shortages and it is difficult to even get the product. It is a good solution, but it doesn't have the infrastructure to support it well.

with it, it is often very difficult to get anyone to do install more environmentally friendly systems and to have the information to maintain them once they are installed

Anyway, [the plumbers]...quoted on the plumbing and heating and then had to change their quote because they had not included an HRV. They didn't fully understand what would need to be done in order to install the radiant floor heating. That was really frustrating.

I'm really starting to think that in order to have sustainable housing it will be necessary to have sustainable contractors and sustainable building stores. It's not going to happen otherwise.

[The plumber]...was putting in the radiant floor heating and he asked me if I wanted a furnace. He said that he would give me a really good deal.

Journal Entry December 9, 2005

At least two neighbours have come by to talk to Keith, the carpenter from the University of Manitoba. People ask for advice about renovations that they are doing to their homes. I think that it would be cool to try and hire a carpenter to talk to people about their home renovations. It would create a helpful resource in the community.

He doesn't want to do the complicated shit.

[The plumber]...told Stephanie that we should just put in a low flush toilet.

So while I was gone I think that [the electrician]...hooked up the boiler, but since he has never done it before he did it wrong (I don't think that he had all the

right information from... [the plumber]). The trade's people don't want to work on things that they have never done before. They can't make as much money that way. It will end up costing the electrician more time because he didn't know everything.

#### Construction Materials as Cookie Dough

It is standard in the construction industry to order a minimum of 10% more construction material than is necessary. This is because there is always waste. Ends get cut off of wood, insulation, flooring and siding. It is usually possible to re-use or burn wood, but that is not the case for many of the other materials. It makes me think of baking cookies. You roll out the dough and cut the shapes and even if the shapes do not fit perfectly on the rolled out piece of dough, it is possible to just roll the left over dough into a ball and start again. If materials were infinitely recyclable this would be possible to do with them also (McDonough & Braungart, 2005). Until then, it is important to choose materials that take into consideration re-use and recycling of waste. It is often possible to recycle drywall or use it as clean fill etc.

A lot of good and sustainable construction has to do with skilled labour and skilled construction. While working on the habitat for Humanity Build and while working on my house I found out that:

Volunteer labour is great, but it causes a lot of waste. [The manager]...told me that we use probably twice as many nails as a regular build. Also, because so many people did the same job there was not a lot of opportunity to pre-plan jobs to minimize the use of materials. Volunteers also make more mistakes and therefore have to use more materials on redoing things.

I think that a lot of sustainability functioning of the house also has to do with good quality work. If stuff isn't done properly it might need to be done again and this would be very wasteful.

Integrated design is a good way to promote understanding among the different players in the design and construction of buildings. Integrated design is a process where the design of the building is done with the help of the builders, architects, engineers and other specialists.

I have noticed that there is a lot of waste because there is not a lot of communication between the sub-trades and the designers. Things have to be changed. We had to build a bunch of new walls for the heating guys and we might have to change the plumbing. The pipe for the sink is on the very edge of the bathroom wall and it will interfere with the drywall and all because we put the wall just above the joist space.

Simon has brought of the issue of integrated design and the people at the Healthy Home store also brought up concerns regarding the actual people who are doing the construction. If the people who are doing the work do not understand the design or why certain things are important to do, chances are that they will not do those things...the builders [could] have information that perhaps the architects do not have.

#### The lowest of All Low Tech

With a lot of the high tech sustainable houses out these days it seems like it is easy for people to forget that one of the easiest ways to use less energy (especially in a cold climate where your shelter needs to be heated) is to have more people living in a smaller space. The more densely we are able to live (within reason) the less energy we use and the less our cities sprawl into undeveloped land.

Not only does the lack of infrastructure makes things more expensive, but also the kinds of solutions that have been focused on in the Western world tend to be solutions that are more high tech and more expensive. In developing countries there has perhaps been more of an emphasis on appropriate technology, which focuses on technology that is affordable, accessible and easily maintained. This has not necessarily been the focus in the West because usually there is the presumption that there is more money to spend on technology and a higher level of knowledge about the technology in the western world and yet not everyone in the Western world has access to the money and the knowledge that are necessary to access environmentally sustainable technology.

With the changing views on how to implement solutions for the environment there has also been a change in the kind of settlements that are being created to meet that need. A green affordable housing project was recently built in Seattle, Washington (Anonymous, 2005). The 2005 article in *Natural Life* that looks at this particular development mentions that in the United States green buildings can be built for no more than a 1 or 2% increase in the cost of building and yet can provide incentives by way of reduced running costs. While actual developments are being erected in the United States, Canada has also demonstrated some movement towards creating affordable and environmental housing. Affordable, green design charrettes have been hosted by CMHC in Regina and Calgary (CMHC, 2004; CMHC, 2003). The innovative designs that were produced at the Regina charrette were designed to cost no more than \$600 a month for a two-bedroom apartment. The charrette that took place in Regina produced designs that included such features as use of materials from deconstruction of buildings on site, rain water catchment, the use of locally sourced and durable materials, building placement to capitalize on passive solar and active solar gain and individual meters for energy consumption (CMHC, 2003).

Even when it is not possible to build new buildings with environmental aspects, such as when you are dealing with old housing stock, there are other ways of promoting sustainability in the houses that have already been created. People can modify the ways in which they use the energy in their homes. Reducing energy is good for the environment and it also helps to reduce energy costs. In a book produced by the Rocky Mountain Institute called *Homemade Money* there are numerous suggestions of how to

lower energy or water costs (1995). The suggestions that might be accessible to a large group of people are the low-cost suggestion. These suggestions cost anything from no money to \$26. There are a number of possibilities for community economic development in terms of the small businesses and jobs that could be created. A community business could be set up around auditing houses and suggesting small renovations that could be done in order to make them more energy efficient. In my community there is some work already happening to make a composting business. It would be a way of employing local people, providing a composting service to the community and creating fertilizer for the community gardens or for sale.

Yet just because progress is being made does not mean that there are not still problems with sustainable affordable buildings. To begin with, there were many energy and water saving tips that were suggested in *Homemade Money* that would not be affordable especially to someone with a low income. In fact, the suggestions that would save the most energy and money in the long term were the suggestions that cost the most to implement. This suggests that there are still large aspects of environmental sustainability that are not affordable or accessible.

Also, that there is one small development in Seattle and that cities in Canada have been considering green affordable housing projects, does not mean that affordable and environmentally sustainable housing is truly being created. To begin, the two charettes in Canada were just that; they were design exercises. A

Journal Entry October 16, 2005

I have also been thinking lately that I should go back to the housing committee etc. and say, "What would be beneficial to you guys?" That way I would be doing real community based research. Maybe they would like to see me do workshops on rehabbing windows or a perennial swap. Maybe we could get rain barrels or compost bins in bulk so that we could reduce the price. I think that we could do a lot of things that would really be helpful. I will need to do this follow up.

A lot of good ideas came out of the exercises, but there was no research to determine if the plans were feasible or if they could be created with the budget that was outlined. Even if Regina implemented its green housing at \$600 a month for a two-bedroom apartment it is questionable if this kind of housing would be affordable for everyone. The minimum wage in Regina is \$6.25 an hour. If a person worked 40 hours a week at \$6.25 an hour,

that person would earn \$1000 a month before taxes and other deductions. The core housing need indicator suggests (CMHC, 2004) that people should not have to spend more than 30% of their income on housing, and for people who make \$1000 month that would mean less than \$300 a month to spend on housing. If they were willing to live with someone else they probably could not quite afford to share a two-bedroom apartment. So if this particular person had even one dependant this kind of housing would be way out of their reach. Whether in reference to green housing or not, it is still usually renters that are in the very lowest income bracket that have to pay more than 30% of their income in housing (Hulchanski, 1990). This is a problem that has not been created by instigating environmentally friendly housing, but it is also not solved by it. If housing in general is not affordable for people then environmentally sustainable housing is not either. Considering that there are already issues in regard to affordability and housing there is also the question of whether or not it is effective to link housing and the environment as they are both considered fairly low priorities by the government (Canada or UK and this is a shift from above statement of government interest) (Brown, Bhatti, 2003). In this situation it is up to government or non-profits to promote green housing, but there are still approximately 75,000 firms in the residential construction industry (CMHC, 2003) and it has been argued that residential construction firms feel that green residential building is not being sought after by consumers and therefore they are unlikely to produce it (Skelton et al., 1995). This does not even take into consideration the fact that low-income people do not have a lot of sway in the market. Of course this does not mean that governments should not strive for affordable green housing, but it does point out the fact that green housing will not solve all the housing problems within Canada.

Green housing, however, is not the only way to make environmental innovations accessible and affordable. Another way of promoting environmental features in human settlements is through creating sustainable communities and sustainable lifestyle choices. Often, these kinds of choices are the ones that are more accessible to people who do not have a lot of money to spend on technology, however it is important that we do not focus on lifestyle choices for people of low-income while leaving more wealthy households of the hook in terms of behaviour change. A book called "Superbia" makes suggestions of what can be done in communities to promote sustainability. These are suggestions that



the authors have already seen implemented in communities in the United States. They suggest that people can retrofit spare rooms or garages into apartments. This increases the density of an area and also can provide extra income to a family (Chiras and Wann, 2003). Low-income neighbourhoods could approach the city about buying eco-passes for the public transit system in bulk (Chiras and Wann, 2003). If the passes are bought in bulk there can be a discount for them. There have also been communities in the states that have created community energy systems or environmentally friendly water and waste water systems (Chiras and Wann, 2003). There has been some suggestion that these kinds of smart growth ideas will only be successful in neighbourhoods where people are in mid to high income brackets in sub-urban areas, but as was pointed out by Tony Hiss in his essay entitled "A Burden, A Blessing" there are diverse, working class communities that are also excited about the prospect of incorporating these kinds of ideas into their communities (2003).

In many low-income communities, community economic development is also encouraged to promote skill creation and jobs for people within the community. In fact many people suggest that it is necessary to get community members involved in local development (O'Hara 1999). Along with community economic development can come sustainable community economic development. For instance, while working on the house it was not always easy finding skilled trades people for certain jobs:

Just called...[one of the dense pack insulation contractors]...and it sounds to me like he is a busy man, and yet I don't really know where else to go for the dense pack insulation. There was the same problem for metal roofers. The market is not flooded with trades people who are able to do the more up and coming sustainable stuff. Plus these guys are not from Winnipeg, so they have to drive in all the time.

It was very difficult finding skilled people to do dense pack insulation due to the fact that Manitoba Hydro had only trained people from three different companies in Manitoba. Currently, to try and fill the void the Spence Neighbourhood Association is looking into the possibility of creating a small business in the community that will do dense pack cellulose insulation. This business will require Manitoba Hydro training for a number of the community members and the purchase of a dense pack cellulose insulation machine. It will allow the skilled application of an insulation technique that works

particularly well in old houses that do not currently have a lot of insulation. These are the kinds of houses that are currently being renovated in this community. Community design and planning can be seen as a way of empowering low-income or other marginalized groups (Frelman, Westphal, 2000), but it is also important to remember that this kind of community involvement can increase the quality of work and research that is being done in these areas. Including local knowledge, even in urban settings where people may not have lived there for a long time, is valuable not only to the community, but also to those working outside of the community, who are trying to plan for the community (Corburn, 2005).

The implementation of community economic development is not all good news stories. In an analysis of recycling in the United States, Weinberg, Pellow and Schnaiberg suggest that recycling began in many cities as community economic

Journal Entry May 18, 2006

The house was almost broken into again a couple of Mondays ago. The dog next-door (the one that barks and freaks people out) barked and freaked people out and the neighbours came out and scared the "would be" burglars away. The next day I found a note on the drywall in the vestibule. Someone wrote something along the lines of "It must be nice to have a job; it isn't like that if you are an Indian". Oh yeah, I remember, the break in happened on the day that the federal budget came out and all the money that the Liberals had promised to First Nations was cut out of the budget. I wondered if the two were related.

development projects where they considered not only the environment, but also economic and equity concerns (2000). Unfortunately, the job that these small often non-profit organizations were doing were taken over by municipalities and then contracted out to private companies. As a result, the bottom line of these recycling programs became profit only and the environmental and social benefits were largely lost (2000). The authors of this analysis stated that they

continued to believe that sustainable community economic development was important, but that there are pitfalls that definitely must be considered. They suggested that perhaps a link between large environmental groups and community economic development could help to promote the cause of communities. In the case of recycling this would only work if environmental groups paid attention to the quality of the recycling that was going on and not just the quantity of it. Weinberg, Pellow and Schnaiberg maintain that the

important question that still needs to be asked is “how is it possible for communities to actually achieve a balance among the three Es of economy, environment, and equity?”

From the examples given above it is evident that there are governments, non-profit groups, community organizations and individuals that are all working towards balancing the three Es of economy, environment and equity by creating communities, houses and apartments that are both environmentally sensitive and also accessible and affordable to diverse groups of people. However, it is also evident that there is a lot of work that needs to be done before the goal of sustainable human settlements is reached. There are many good ideas and interesting initiatives to promote sustainable settlements, but these initiatives seem few and far between and in many cases they are just ideas that have not been implemented on a wide scale if at all. The goals of sustainability and environmental justice are difficult to pursue because of the fact that they are holistic and they require constant balancing and re-evaluation. The aspects of sustainability and environmental justice that make them difficult to pursue, however, also make them the only thing that we can strive for if we would like a healthy, vibrant and equitable society. In order to create a building environment that is hospitable towards green and affordable design, it is important to remember one of the things that I learned doing my project and that is “that there is no easy solution”; there is still much work that needs to be done in terms of educating ourselves and others and creating a culture and infrastructure that promotes sustainability and community.

## 5. WAS THE HOUSE SUCCESSFUL?

It is always difficult for me to answer questions about the success of the house because in my mind the house and the project fell short in many ways. Fortunately, I think that I learned a lot from the failings of the project. For one, I think that the house could have been more sustainable than it was. There were many ideas that we had that could not be implemented in the timeline and with the budget that we had. This does not necessarily mean that these things will not be implemented at the house; it just means that they have not yet been implemented. We were interested in doing a greenroof, grey water, reclaimed hardwood floors, something other than drywall on the walls or at least recycled drywall, solar power, thermal mass on top of the radiant floor heating, used light fixtures and plumbing fixtures. It also would have been better if we could have diverted more waste from the landfill and perhaps insulated better.

Journal Entry April 28, 2006

I just started looking over my journal and I don't want to continue. I'm scared. Scared that I will realize that I have not lived up to my ideals. Scared that I will see that since September I have not had community involvement. Scared that I won't measure up and that the house doesn't measure up. Scared that I have learned so much that looking at all that I have learned and doing it over an even shorter period of time will cause me to spontaneously combust.

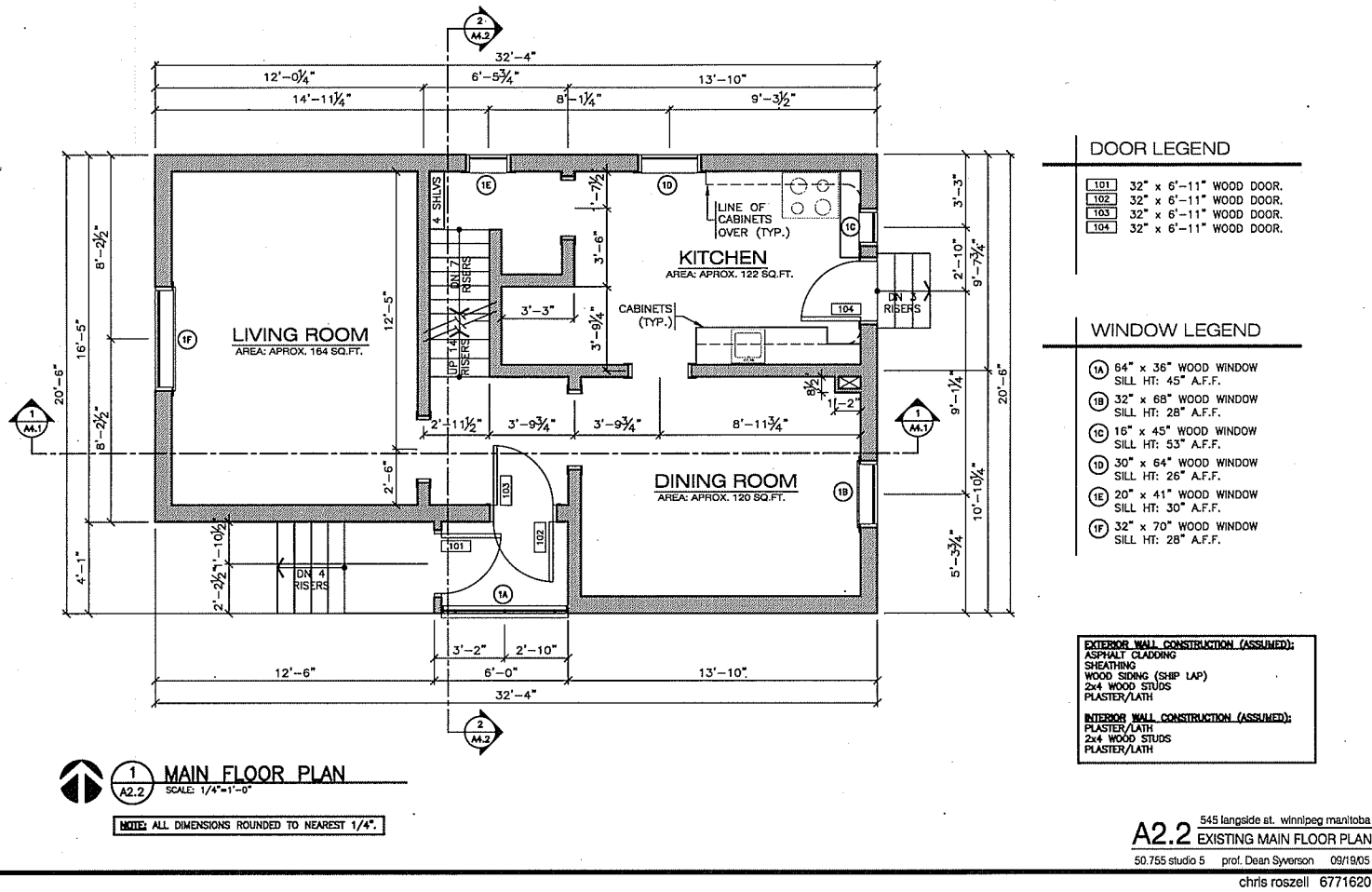
There were also many successes in terms of environmental sustainability. We have been paying about \$40.00 a quarter for water and according to the city of Winnipeg the average three person household pays about \$194.48 per quarter. This means that we have cut our water consumption by approximately 80% from the average (Personal Communication, Water and Waste Department, January 29, 2007). I have no gas bills and my average electrical usage is about \$150 per month. We have made the house solar thermal and grey water ready. All the interior doors were used. The mouldings and cabinets were made of strawboard. The house was a learning experience for many students. All the windows and exterior doors were seconds. The paint and caulking was low VOC. We re-used a lot of old siding and used durable cement board for the rest. We reclaimed old exterior paint. The roof is very durable and recyclable metal. We used a lot of reclaimed lumber. We have a used bathtub and kitchen sink. The carpet tile is recycled and is low VOC. The red cork in the kitchen is reclaimed. The hardwood is

produced in Canada and we had very little waste. The three-season room will help us to start plants. The house is very well insulated. We used reclaimed brick to repair the basement floor. The kitchen cabinet pulls and laminate are all reclaimed. Despite some problems that we have had with the composting toilet, I feel that we are much closer to a solution. We have furnished the house with lovely old furniture and are preparing ourselves to complete some of the projects that we did not have the time or money for. We are also continuing to work on changing our energy intensive lifestyles by preparing for a local diet. I do think that if we had set more measurable goals for ourselves we would have done a better job at making the house more sustainable.

In terms of an affordable and sustainable house, the house itself cost around \$140,000-\$150,000. This money came from the Winnipeg Housing and Homelessness initiative, a down payment grant program and approximately \$90,000-\$100,000 from my savings and a personal mortgage, which was co-signed by my mother. While this sum is only around \$10,000 or \$20,000 more than the amount that is used for the majority of the other housing projects in the area, this sum does not take into consideration the amount of volunteer labour that went into this project. The thing about revitalizing houses in my neighbourhood is that it is not usually possible to renovate it and make the cost back in a sale. This is probably in part due to the rising construction costs and the relatively modest housing market in Winnipeg, but it also has to do with what people will pay for houses in this particular neighbourhood. The majority of the houses that have been renovated in my area are subsidized renovations. Also despite the fact that the renovations are subsidized they are often sold to people who are upwardly mobile as opposed to low-income families. I think that the project demonstrates that there are things that can be done to houses to make them more sustainable without increasing their cost by too much, but this might require changing the structure or emphasis of the way that we design things as discussed above.

## 5.1. BEFORE AND AFTER DRAWINGS AND PHOTOS

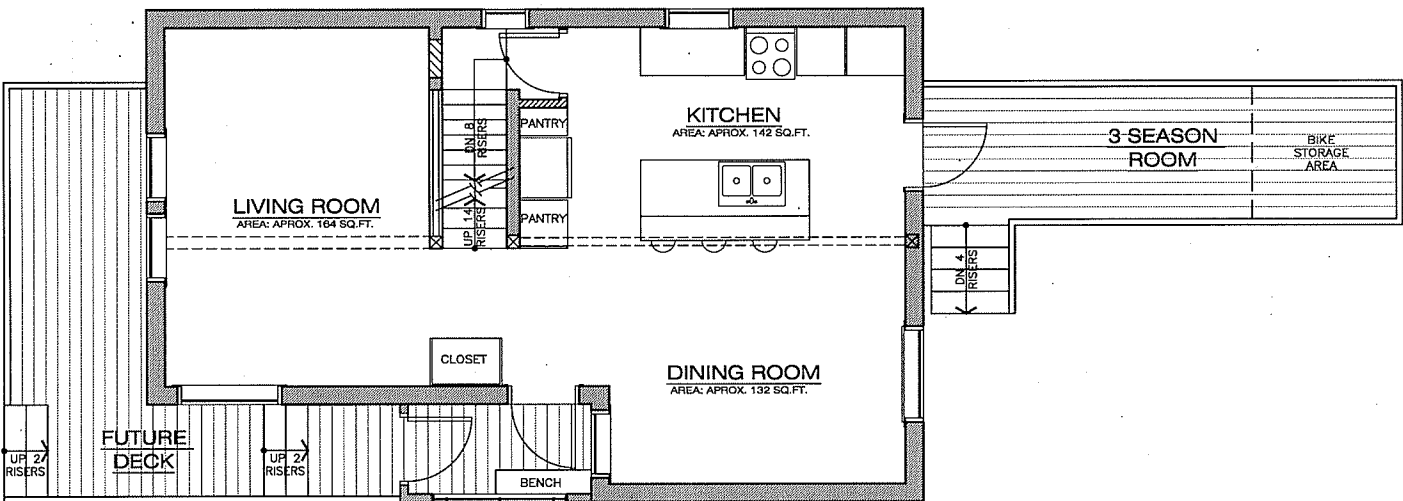
# 5.1.1. MAIN FLOOR BEFORE



Drawings By Chris Roszell

Anna E. Weier

5.1.2. MAIN FLOOR WORKING DRAWINGS



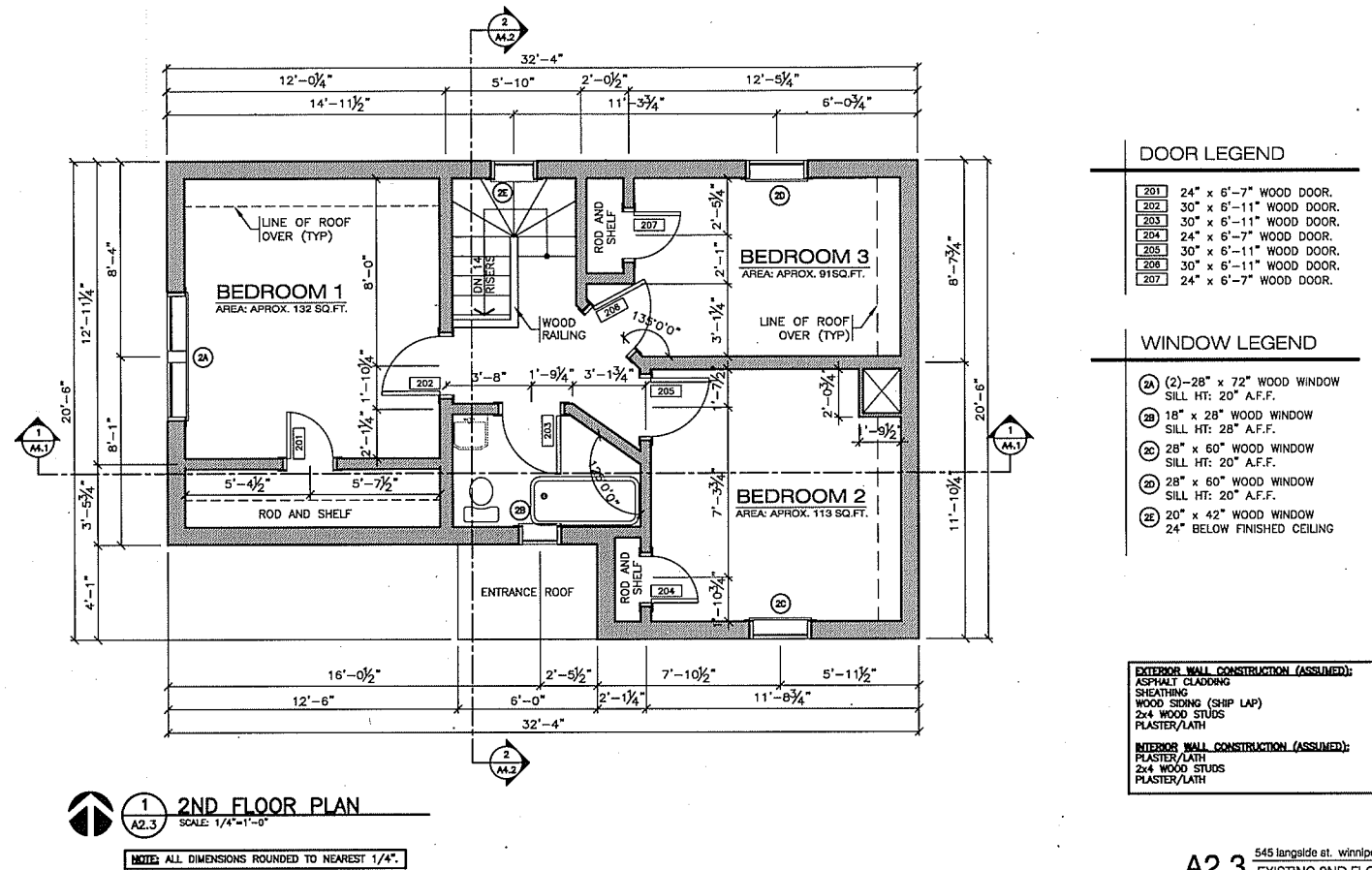
1 PROPOSED MAIN FLOOR PLAN  
A2.2 SCALE: 1/4"=1'-0" GROSS AREA: 587 SQ. FT.

	EXISTING EXTERIOR WALL/ INTERIOR PARTITION
	NEW INTERIOR PARTITION

Drawings By Chris Roszell

Anna E. Weier

5.1.3. SECOND FLOOR BEFORE



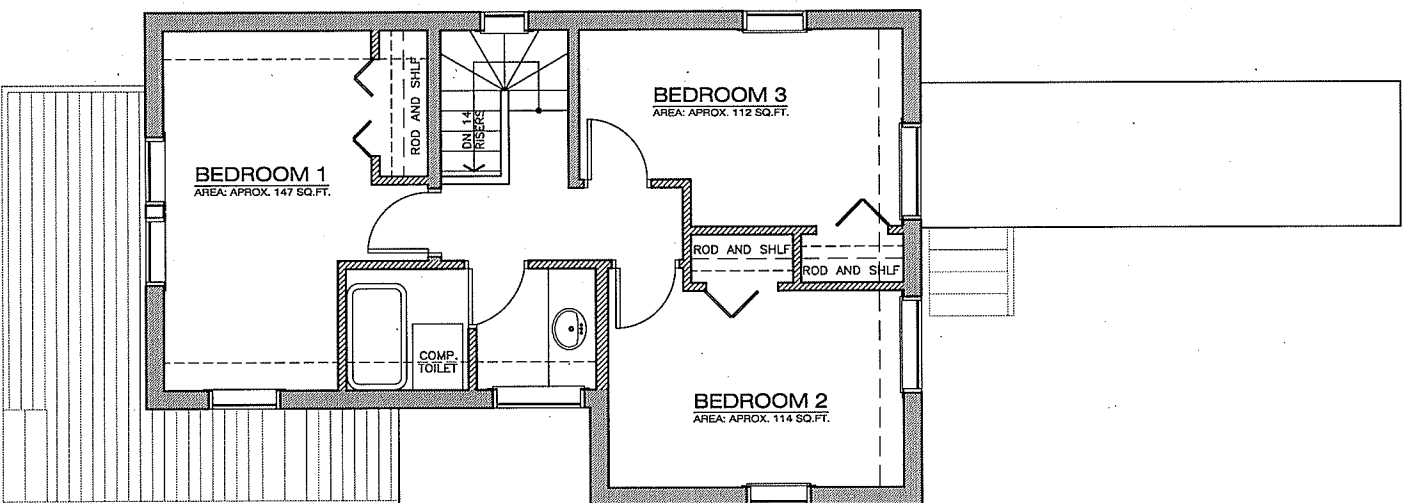
545 langside st. winnipeg, manitoba  
**A2.3** EXISTING 2ND FLOOR PLAN  
50.755 studio 5 prof. Dean Syverson 09/19/05  
chris roszell 6771620

Drawings By Chris Roszell

Anna E. Weier



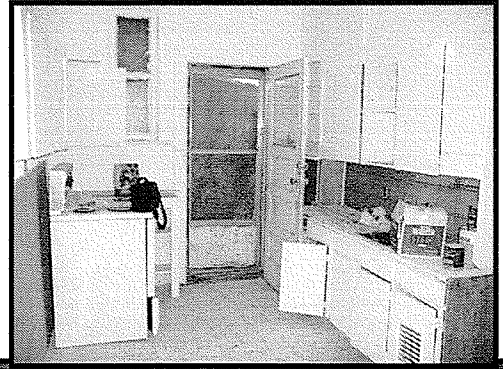
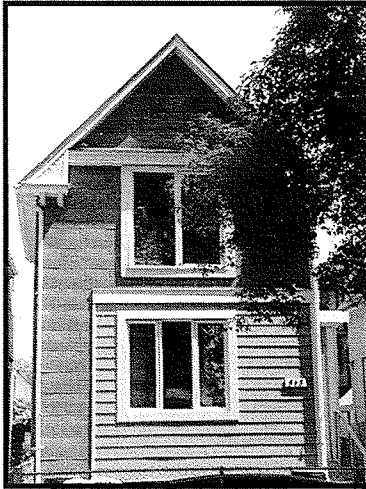
# 5.1.4. SECOND FLOOR WORKING DRAWINGS



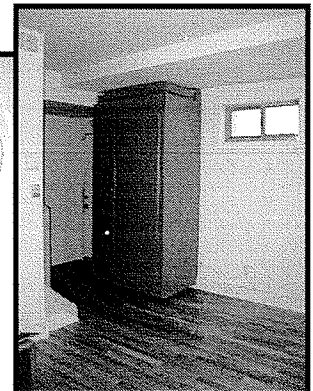
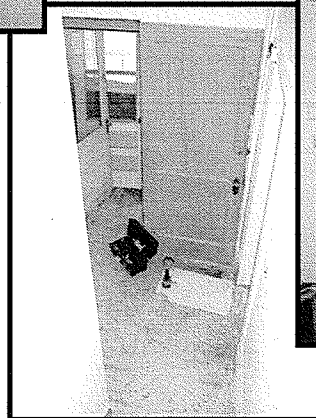
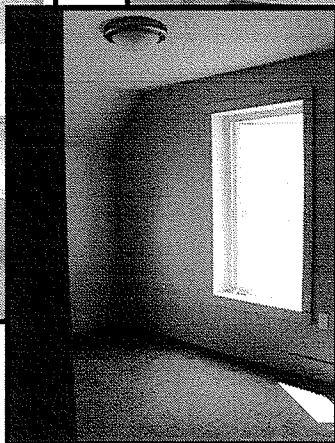
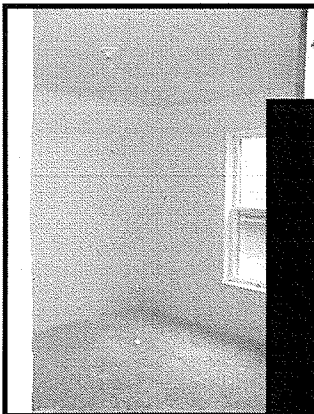
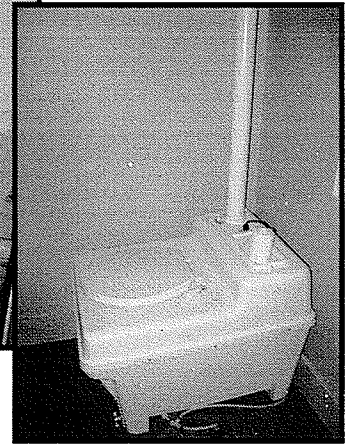
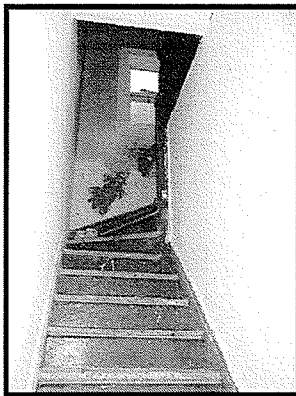
1 PROPOSED 2ND FLOOR PLAN  
A2.3 SCALE: 1/4"=1'-0" GROSS AREA: 567 SQ.FT.

Drawings By Chris Roszell

Anna E. Weier



5.1.5. BEFORE AND  
AFTER PHOTOS



## 6. CONCLUSIONS, RECOMMENDATIONS AND OPPORTUNITIES

### 6.1. CONCLUSIONS

Through the aforementioned project I learned a lot about the barriers to sustainable, urban, residential renovation. In my project I learned a lot about community based research and I also listed the three main categories of barriers to sustainable

#### WAYS THAT I HAVE CHANGED AS A RESULT OF MY THESIS

I am a vegetarian on a local diet.

I am less patient.

I am a homeowner and a housemate.

I am more cynical about the prospect of humanity increasing its positive impact on the environment.

I feel like a member of a neighbourhood community.

I don't have a dream anymore (not that that is a permanent state of being).

I keep my feelings bottled up.

construction as the lack of communication, definition and goal setting around the construct of sustainability, the current aesthetic and the current use of design and also affordability and infrastructure. I also learned a lot about myself and changed as an individual.

#### 6.1.1. COMMUNITY AND COMMUNITY RESEARCH

Community based research should encourage communication and dialogue and the use of "participants" or "subjects" in research often hampers that.

I feel that the use of terms like "participants" and "subjects" usually does not encourage continued communication with community members and it does not value the things that community members add to research. However, having more involvement with community members can take a lot of time and energy. Making a commitment to a community is a very time consuming endeavor because there are a lot of different responsibilities that come with being a member of a community. Throughout the course of my project I also realized that true community based research needs to be born out of the community. My project had been conceived of before I had any community

involvement and as such it was difficult to have meaningful community contact throughout the project because the project was not necessarily meeting a community identified need. Because of the fact that the community had not identified the project I feel that I often overlooked the needs of different stakeholders within the project that I had conceived. As a result I often felt that I was compromising the intention of the project because I

THINGS I HAVE LEARNED AS A RESULT OF MY PROJECT

Scraping paint is not that fun.

My dad is proud of me.

I have the best step-father that money can buy and I get him for free.

Never rely on the kindness of strangers, but be willing to accept their help because it can be the greatest gift.

Home packed lunches are a source of much nutritional and emotional health.

Soup nourishes the soul.

Generally, there is a lot of work left to do in this world.

Building cabinets is a fun thing to do.

I, myself, have a certain level of discomfort around pooping in a vented bucket and leaving it just sitting there in my bathroom.

In my experience, time spent doing construction and amount of donuts consumed are positively correlated.

There aren't enough women who are skilled in building.

Expletives keep me going.

Living in community is easier said than done.

It takes more time to find things used, but it is more rewarding.

A garden is a glorious thing.

The daily grind gets in the way of many important things.

We don't have time for futile endeavors, except for the fact that they are necessary to our mental health.

Work around the house is never done.

A cold house makes room for cuddling and coziness.

had not done a good enough job of planning the project in a way that would meet my project goals and also the community project goals. This also might have happened as a result of the fact that the project happened quite quickly and therefore there wasn't enough time for good communication. I realized that partnerships (research or otherwise) need to be approached with open and honest communication and need to be supported by the principles of co-operation. In the end I feel that it was through individual contact with neighbours that helped to connect me to the community, although despite these connections I still felt distanced from my community through the process of writing up my thesis. I found that academic writing meets the goals of the University rather than the community in which the research took place.

#### 6.1.2. SUSTAINABILITY AND GOAL SETTING

As mentioned above I feel that I did not always have adequate communication with all of the different stakeholders who were involved in the project. I feel that goal setting is a good way to stick to sustainability, however I never sat down with the different parties that were involved and set targets and goals to meet through the project. Also, I never made sure that everyone in the project was working with the same definition of sustainability, which could have provided at least a loose target that we were working for. I learned that everyone who is involved in the building process needs to be aware of and committed to sustainability in order to make it work and of course this takes communication. People have a tendency to focus only on certain aspects of sustainability and people also tend to spend more time on sexy sustainability like technology and fancy materials, rather than on the basics, such as increasing population density, cutting back on consumption etc.

#### 6.1.3. DESIGN, AESTHETICS AND CREATIVITY

Once the goal has been set as sustainability it is important to figure out how it will be possible to achieve that goal. I feel that design is a good tool, but it needs to be used carefully in the context of sustainability. For instance, it is necessary to acknowledge that a lack of creativity can be an impediment to sustainable building. Obviously the way that things are currently designed is not working and as such new and innovative ideas need to

be implemented. In fact, we have become so disconnected from what a sustainable life looks like that it is difficult to design a house to support sustainable living. Aesthetics can also be a barrier to sustainability. Trying to achieve what is currently considered aesthetically pleasing can make it difficult to reuse materials or to focus time and energy on things like innovative design and energy efficiency.

#### 6.1.4. AFFORDABILITY AND INFRASTRUCTURE

There is much lacking in infrastructure that would support sustainable building and design. Most of the time, re-using a material takes at least ten times longer than just buying something new. It can also be difficult to find trades people who will do more sustainable systems and if they will it generally costs more because it takes them more time. The city coding department is not fully aware of sustainable systems and so getting through the coding process is also more difficult. The city will usually approve a system that has been CSA approved, but these tend to be more expensive and are not necessarily rigorously evaluated to ensure that they work well. Affordable sustainability can be difficult because sustainable technologies and materials can be expensive, but on top of that money is also necessary to overcome the lack of infrastructure for sustainable building. It also, more than money, takes a lot of energy to decide something or do something that is counter culture or out of the normal. This impedes social change.

We are also not used to saving every bit of money in the budget for sustainable systems. Even if a more expensive product isn't more or less sustainable than the cheaper version, buying something that is more expensive means that you have less money for other perhaps more expensive sustainable products in future. I think that in order to be able to create affordable sustainable homes we need to start treating resources the way that I think that we would after an apocalypse. We use resources in a way that is far too casual without actually realizing the full impact on the environment. Perhaps if we were more focused on using all available resources including things that are thought of as waste it would be easier to design sustainable and affordable housing. For instance, it might be easier to achieve dirt-cheap sustainability than affordable sustainability because you approach those two things in vastly different ways.

## 6.2. RECOMMENDATIONS

This research has pointed out that there are many things that can be done, in Winnipeg and beyond, in order to address some of the barriers to residential sustainable design and construction. These recommendations are not for a few select groups of people. There are a number of things that governments, trades people, designers, contractors, project managers and educators can do, but there are also many things that everyone can do.

### 6.2.1 TRADES

One of the biggest issues for trades is that the majority of them are not getting the training they would need in order to be major players in the sustainable construction industry. It is the designers, architects and engineers that are getting training having to do with sustainability, but that kind of education is not being extended into the regular curriculum at trade schools. There are sometimes certification programs for trades that involve new and different techniques, but many of these programs require an additional cost and are not provided extensively. The majority of sustainable topics are not taught at trade school.

With more information about these issues, the trades will be more able to be involved in an integrated design process, so that they can bring knowledge about the practical problems and benefits of actually putting the sustainable solutions in place in sustainable design and construction. This is especially important for residential construction and renovation where many homeowners are unable or unwilling to pay a designer, architect or engineer to bring information about sustainability into the process. In residential renovation it is very important that the trades or contractors have this information to bring or sustainability will continue to be something that is mostly integrated into new construction and commercial or governmental construction.

This kind of change in curriculum for trades could be initiated by the schools that provide this training, it could be encouraged by the provincial government and it could also be either initiated or encouraged by the unions that are organized for these trade

workers.

### 6.2.2. MUNICIPAL GOVERNMENTS

Municipalities have a large role to play in trying to improve the sustainability of urban residential construction. In large part the coding departments of cities can either help or hinder sustainability in construction and especially home construction. For large-scale commercial projects it is often possible to hire an engineer to draw up and stamp a system, thereby making it easier for this to be approved by regulating bodies. The majority of residential projects, especially renovations, are not large scale enough to have a budget that would include the cost of engineers or technical advisors about new technology. If a home renovation project would like to include a greywater treatment system or any kind of an unconventional mechanical system they can run into problems by not having the proper experts to help them through the city coding process even though some of these systems can be extremely low-tech. The City of Winnipeg currently provides information pamphlets for how to design and construct, garages, decks and fences to code. If the city were willing to put together some of these pamphlets to educate people about how to do sustainable systems to code or even make them aware of some of the issues that would need to be addressed in order to make sustainable systems to code it would become much easier for homeowners and contractors to work within city regulations while building things to code.

Municipal coding bodies also have the ability to make minimum code recommendations for new construction or substantial renovations. For instance, a municipality could create and enforce regulations that require low-flow water fixtures, minimum storm-water catchment standards or higher minimum insulation values to name a few changes. Municipalities could even work towards a code requirement system that was based on a green certification program such as LEED or they could require all homes to be built with infrastructure for solar panels. There are already municipalities that have a green belt around the city where no construction is allowed in order to minimize urban sprawl.

Municipalities could also become involved in making more regulations around



dumping. Dumping fees in Winnipeg are extremely low compared to other cities in Canada and increasing dumping fees or even not allowing certain kinds of things to be dumped could eliminate a lot of the waste that is left there.

### 6.2.3. ACADEMIC INSTITUTIONS

There are a number of ways that education for designers could be improved in order to teach designers how to integrate sustainability more into the design process. For one, designers could be taught more about integrated design, which is a way of working with community members, engineers landscape designers, architects, sustainability consultants, contractors and trades in order to use all kinds of information together in a way that allows for better design. The integrated design process requires communication and conflict resolution skills that many of these professionals have never been taught. Designers are often educated in a way that leaves them without many of the practical skills necessary to implement sustainable solutions. With more technical and practical knowledge of how building systems work they will better be able to more fully understand the implications of the design decisions that they make.

Also, achieving a certain aesthetic is often taught as the main goal of design and this can impede the ability to fully integrate sustainability into all aspects of design. Designers, as is true with most people in our culture, have been brought up with certain norms. Designers need to be taught to step back from assumptions about the built world in order to truly evaluate the options that they have to create beautiful and functional buildings.

### 6.2.4. PROVINCIAL GOVERNMENT

The provincial government has taken a big step in supporting sustainable design by mandating that all government buildings are built to a minimum of LEED\* Silver

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\* The U.S. Green Building Council created the Leadership in Energy and Environmental Design (LEED) Green Building Rating System<sup>TM</sup>. This particular system is very prescriptive. It delineates minimum requirements for rating qualification and also mandates a certain number of points that a building must have before it can be certified. There are certification programs for a number of different kinds of buildings also including neighbourhood developments, commercial buildings, houses and major

certification, but there is more that can be done. The provincial government could take a part in working to increase sustainability training for trades and could also be involved in pushing issues regarding building codes.

The provincial government could also consider putting pressure on Manitoba Hydro to increase Hydro prices within Manitoba or at very least not give energy discounts for bulk energy use. With such low energy prices it is makes it more difficult to encourage people to conserve energy because it is often not as cost effective in the short term to put infrastructure in place to conserve energy. The provincial government could also put into place any number of programs that would give subsidies for solar panels or geothermal heat pumps.

#### 6.2.5. INDIVIDUAL PEOPLE

There are numerous books out there that tell people how to improve the energy efficiency, water efficiency and nutrient cycling in their homes. People can do anything from turning down the temperature on their hot water heater to installing a solar hot water heating system. People can begin by composting the organic waste that comes from their kitchen and they can also try supplying their kitchen with food that they have grown themselves or sourced locally. But, the things that individuals do need not be confined to the housing that they live in. People can make a difference by changing the way and amount that they travel, by buying fewer things and being ethical about the things that

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renovations. "LEED gives building owners and operators the tools they need to have an immediate and measurable impact on their buildings' performance."

(<http://www.usgbc.org/DisplayPage.aspx?CategoryID=19> March 11, 2007). The LEED Green Building Rating System™ has also moved into the Canadian market and is being administered by the Canadian Green Building Council.

([http://www.cagbc.org/building\\_rating\\_systems/leed\\_rating\\_system.php](http://www.cagbc.org/building_rating_systems/leed_rating_system.php). March 11, 2007).

The USGBC is promoting a new Neighbourhood Design program through their LEED certification and there are others who are focusing more on communities than just individual buildings (<http://www.usgbc.org/DisplayPage.aspx?CategoryID=19>, retrieved March 11, 2007). In 2003 Dave Wann and Dan Chiras, also the author of *Natural Building*, published a book called *Superbia*. This book has a number of suggestions for and examples of more sustainable communities. They focus both on environmental and social sustainability and their suggestions include establishing an edible landscape, creating a car-share program and creating a neighbourhood mission statement.

they do buy.

Individuals can even get involved by encouraging their municipal and provincial governments to incorporate legislation that addresses some of the issues mentioned above. Individuals can lobby universities and community colleges to teach more about sustainability and they can take advantage of some of the opportunities in the green building industry that are listed below.

#### 6.2.6. COMMUNITIES

Communities can get involved by educating the people in their neighbourhoods about how to make their homes more energy efficient. Communities can try to create ways for people in the neighbourhood to have their needs met in the community so that they don't have to travel far outside the community for work, shopping or entertainment. Communities can start car-sharing programs, community gardens and may even begin producing local alternative energy. Communities also have the power to lobby government and to try to provide sustainability resources for their members.

#### 6.2.7. UNIVERSITIES

Universities currently do not do an adequate job in supporting community or advocacy based research. These kinds of research endeavors do not necessarily provide academics with the kind of outcomes that earn them more prestige, such as publications in scholarly articles or presentations at conferences. This is potentially due to the fact that publications in scholarly journals often are the least helpful form of communication for communities because they do not help distribute information to those in the community and are often written in language that is inaccessible or the journals themselves are inaccessible to people outside of the academic community. Not only that, but real world research is often more complicated and messy than other forms of research and is therefore not as easy to write about in a typically academic way.

There is no funding available through the university for ways of communicating things that may be more important in the real world. In terms of communicating findings to the community or advocating on behalf of the community there is very little funding available to support those kinds of endeavors.

The ethics reviews in Universities can also be a problem. The ethics board would often like to treat all community members and people that are participating in a project as participants rather than as experts in their own right. In much real world research it is not possible to be as rigid about the way that information is collected. When many of the important interactions that take place are outside of a formal interview or discussion group, where signed consent would be given, it becomes difficult to use those ideas and experiences within the current context of academic ethics. But these are probably the most important interactions to include because they are the ones that are often directed by the community members as opposed to the ones that are directed by the so-called academic researcher.

It is also true that professors do not always have the skills and information needed to help guide community based or real world sorts of projects through the academic process.

### 6.3. OPPORTUNITIES

There are recommendations of what people should be doing, but there are also a number of opportunities for people to create work, organizations and resources in order to facilitate the process of growing sustainable buildings, communities and cultures. There are not a lot of contractors who are aware of sustainability issues and who can help homeowners navigate the process of construction or renovation while providing information about energy efficiency and sustainability. Having a contractor who can provide some of these services could make it far easier for homeowners to consider sustainability in their construction projects. There is also a large demand for contractors who are willing and able to do energy audits and then the repairs that are associated with improving the energy efficiency of a house.

It is also sometimes difficult to find people who are willing to do salvage work on small-scale buildings such as houses. There would most likely be a lot of work available for a crew who were willing to do deconstruction. This is also a good opportunity for training workers who are not skilled in the trades.

Not only is there a need for salvage workers, but there is also a need for appropriate and organized large-scale salvage storage. It is often difficult to find material for a project and it is easy to see by going to the dump that there is a lot of material going there that could be re-used. The salvage storage in the area is either too large scale and disorganized or too small scale with not enough capacity for large-scale storage.

There are a number of places where there are information gaps that will soon need to be filled. Hopefully more of these opportunities will be identified so that people can create an infrastructure that will help to meet some of these needs.

## 6.4. PERSONAL ACTIONS

As a person who has been involved in researching sustainable urban residential design and construction I acknowledge the fact that I have a responsibility to share what I have learned and to try to implement some of the recommendations and opportunities that have been pointed out by my research. I acknowledge that my responsibility does not end with the writing of my thesis, as it is not the best or only way to communicate my findings. I would like to point out that I take this responsibility seriously and that I am doing what I can to try and live up to this responsibility. I am currently working on a website that will make much of what I have learned public. I have published articles in *Streets*, my community newspaper, as well as in *Geez* magazine and *ReNew* magazine, a magazine which focuses on urban infrastructure. I will continue to seek out opportunities to publish the things that I have learned.

I also use the house as a place to give presentations to both community members and others who are interested in sustainable design and renovation. I was recently voted to the Spence Neighbourhood Association board of directors by acclamation and I will be serving as a member at large who brings the relevant expertise of sustainable renovation to the board. The hope is that the Spence neighbourhood will be able to ensure that the housing in the area continues to be affordable housing through implementing energy and water efficiency that will allow for the lowering of monthly utility bills in both the

homeowner and rental sectors.

I am also working with the city to hopefully put into place some of the recommendations for municipalities listed above. I am also currently working at the University of Winnipeg to try and initiate a community-university research coalition, which will help community organizations to have access to students to do research for them and it will give students that opportunity to receive course credit for helping with community lead research.

I am working towards getting my LEED accreditation and I have started to consult on sustainable residential construction jobs. I have also become involved with other campaigns that promote reduced consumption, wealth distribution and justice as a way of striving for sustainability.

## 6.5. SUMMARY OF CONCLUSIONS

Throughout the entire process of involving different individuals and organizations in the project to purchasing the house and renovating it and now finally to living in it I have acquired much first hand knowledge about how difficult it can be to create a community, a house and a lifestyle that approach sustainability. I know that I am not the first person who has tried something like this; there are many demonstration houses and individual sustainability projects. I did this project in order to determine what is getting in the way of more widespread sustainability in the housing industry. There are many things that make creating a sustainable house difficult and it is important to focus on these difficulties in order to figure out ways in which these difficulties can be avoided in further projects.

To begin with, even near the beginning of the project I began to realize that the concept of sustainability needs to be operationally defined for each individual project and an attempt needs to be made to ensure that all aspects of sustainability are considered. Considering environmental, social and economic issues in each decision that is made can be difficult, but it is necessary to make sure that these three issues are always being considered. Also, without the ability to set goals and to operationally define sustainability it is a difficult construct to use and it is easy for the many agendas of different players in a project to take over. In operationalizing the definition of

sustainability it becomes possible to set specific project goals that can then be more easily monitored and attained. I also learned that it is sometimes easy to focus solely on the environmental part of sustainability, but the human aspect is so very important and without acknowledging that part of sustainability it becomes possible to ignore the very important aspect of community.

Through interaction with different communities during the construction of the house I began to realize that aesthetics is often a large part of the design of a house, but that it cannot be the only driving force behind design. Focusing on aesthetics does not leave enough room for sustainability. In fact, it may be necessary to create a new aesthetic that will accommodate a more eclectic, functional and organic sense of beauty otherwise many decisions that would be for the good of sustainability and function will be ruled out because of aesthetics. The design process needs to use creativity and imagination in order to come up with design solutions that may have otherwise been missed. We will not be able to help solve current design problems unless we identify the problematic assumptions on which they are based. We currently have a culture where many of the decisions that are made about city planning and building are based on assumptions that are problematic for the environment.

For so long we have created housing based on problematic assumptions; because of this there is a lot of infrastructure that is not in place that needs to be in place in order to encourage sustainable building and sustainable living. It is difficult to find people who can help builders or homeowners to make more sustainable decisions. There are not enough contractors and trades people who are trained to know about sustainable systems. Trades are often not available or charge far more in order to cover the research cost of working on novel projects. Labour is expensive and often more of it is needed in order to make second hand, reclaimed or new and innovative materials possible to use. Policy at many levels has not caught up to the new environmentally sustainable technologies, so it is often necessary to educate city officials and others in the process of construction and this also takes more time and energy. There are gaps in the infrastructure and also in the information needed to do a good job of sustainable construction. Often in more typical construction the municipality can be a source of information, but that is definitely not always the case with more sustainable construction. The fact that this supportive

infrastructure is not currently in place means that pro-environmental solutions are often more expensive and more difficult to implement and are therefore not equally accessible to all segments of the population thereby making it difficult for them to be both environmentally and socially sustainable.

All of these barriers to sustainable construction need to be dealt with in order to make sustainable construction more prevalent and more available and it is my hope that the recommendations and opportunities outlined above can help to remove barriers to sustainable design and construction.



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