

**REPORT ON THE RED DEER,  
ALBERTA, RENOVATION DEMONSTRATION**

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## **REPORT ON THE RED DEER, ALBERTA, RENOVATION DEMONSTRATION**

### **RED DEER PROJECT '94**

May 30, 1995

PART IX REPORT  
RAPPORT PARTIE IX

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## Executive Summary

At the request of the Canadian Home Builders' Association (CHBA) a partnership between Canada Mortgage and Housing Corporation (CMHC), Natural Resources Canada (NRCan), and CHBA was formed for the purpose of creating a renovation demonstration. The demonstration undertaken during the summer of 1994 was located in Red Deer, Alberta. The local chapter of the CHBA, The Red Deer Home Builders' Association, brought the project to successful completion. This report outlines the Red Deer Reno-Demo, Project '94 and presents an overview of the project objectives, team organization, the renovation itself, monitoring, and an assessment of the project by those who were involved. Specific recommendations are made which the authors believe would improve similar future projects.

## Résumé

À la demande de l'Association canadienne des constructeurs d'habitations (ACCH), on a créé un partenariat entre la Société canadienne d'hypothèques et de logement (SCHL), Ressources naturelles Canada (RNCAN) et l'ACCH aux fins de la mise sur pied d'un projet de démonstration en rénovation. La démonstration a été effectuée à l'été 1994 à Red Deer (Alberta). La Red Deer Home Builders' Association, division locale de l'ACCH, a mené à bien le projet. Le présent rapport expose le Programme de démonstration en rénovation de Red Deer de 1994 et donne un aperçu des objectifs du projet, de l'organisation de l'équipe, des travaux de rénovation et du contrôle effectué. Le document fournit aussi une évaluation du projet du point de vue des participants. On a formulé des recommandations particulières qui devraient, selon leurs auteurs, améliorer les projets semblables réalisés à l'avenir.

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## 1. BACKGROUND

In 1992, at the Canadian Home Builders' Association (CHBA) National Conference, CHBA president, Mr. Bill Strain, challenged government departments to find a method of addressing the concerns of Canadian renovators and the renovating consumer. In response, the Housing Innovation Division of CMHC, in partnership with Natural Resources Canada (NRCan) and the CHBA, determined they would undertake a renovation demonstration project to highlight the Corporation's commitment to the renovation sector. In addition, the project would offer an opportunity to demonstrate environmentally responsible techniques and practices.

A steering Committee comprised of one representative from each of the partners was struck to guide decision making during the project.

In 1993, local Home Builder Associations from across Canada were invited to submit proposals for a 'pilot' renovation demonstration. The project was to:

- be a modest home typical of the neighborhood in which it was located;
- have significant potential for improvement through renovation;
- undergo renovations which would be explained and promoted to the public and to housing industry practitioners.

Before and after the renovation process, the house would undergo an environmental assessment which included indoor air quality and airtightness testing and an evaluation of energy performance and water use. In addition, a waste management action plan would be introduced to reduce, reuse, or recycle products and materials taken from the house.

During renovation, the process would be photo documented and regular reports directed to the media. Open houses and seminars on a variety of topics associated with environmental renovations would be carried out for the general public. The completed home would be on display for a minimum of two months, acting as an information/resource center.

Nine proposals were received from across Canada. A selection committee comprised of two representatives from CMHC, two representatives from NRCan and two representatives from CHBA reviewed the proposals on the following criteria:

- environmental design features;
- visibility and accessibility of the house location;
- house characteristics;
- local marketing plans and opportunities;
- project sponsorship;
- budget requirements; and
- projected start and completion dates.

The three finalists were announced at the annual CHBA Conference at Banff in February of 1994. The finalists included teams from Ottawa-Carleton, Greater Vancouver, and Red Deer.

The selection of the winner, the Red Deer Home Builders' Association, was announced in March 1994.

## **2. OBJECTIVES**

The objectives of the Reno-Demo Project were drawn from goals established by CMHC , NRCan and CHBA, and the goals set by the Red Deer project team. They are as follows:

- To encourage and promote environmentally responsible renovation.
- To promote the proper maintenance and repair of the existing housing stock.
- To encourage energy efficiency in order to reduce greenhouse gas emissions, consistent with the Green Plan.
- To inform consumers and renovators of ways to reuse and recycle project materials from the original house.
- To select environmentally responsible materials for the renovation.
- To demonstrate effective ways to adapt the existing stock to meet the needs of an aging population.
- To inform the public of the availability of information from CMHC / NRCan / CHBA and the role of each organization in the renovation field.
- To promote the CHBA-CRC renovator members as a key force in professionalizing the renovation industry.

"Healthy Housing" as a theme was also introduced to the Red Deer team. Information on the concept was sent to the team and they embraced the theme as it coincided with many of the original objectives.

Healthy Housing principles involve:

- Occupant Health
- Energy Efficiency
- Resource Efficiency
- Environmental Responsibility
- Affordability

A Specification List, which is included in Appendix C was developed and expanded upon as the project progressed. The list detailed:

- Photodocumentation Opportunities which listed specific renovation activities;
- Educational Opportunities associated with the renovation activities;
- The environmentally responsible choices made for the house; and
- The reasons for those choices.

### 3. RED DEER PROJECT '94

#### The Demonstration

The home chosen for this renovation was a two storey, single family dwelling built in 1904. The house is typical of the neighborhood and represents a building form common in the region at that time. It was located in a modest area where neighboring homes ranged in price from \$100,000 to \$450,000. The house was easily accessible from a major artery and had both a front street and a rear lane for access to the site.

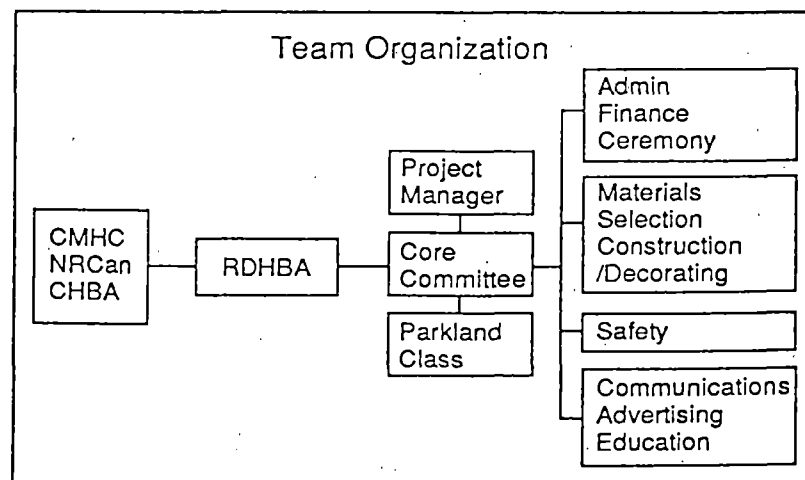
The home was renovated for Parkland Community Living and Support Systems (Parkland CLASS), a non-profit organization dedicated to providing support and assistance in integrating mentally challenged or disabled individuals into the community. As a result, although the future occupants of the building were not themselves physically challenged, parts of the home were made accessible to persons with disabilities who might visit.

The project commenced in April 1994 and was completed in September. It remained open to the public through October, which coincided with National Renovation Month. This provided the Red Deer team with an opportunity to hold a number of open houses complete with tours and seminars. Over 1500 people attended the weekend open houses.

#### The Project Team

The success of the Red Deer Project '94 can be attributed to the hundreds of volunteer hours contributed by members of the community. Red Deer is recognized as a community with an unusually high level of volunteerism. The Red Deer Community Information and Referral Service estimates that in 1989, the last time a local study was undertaken, 27,244 people out of a population of approximately 54,000 volunteered their time in Red Deer. Alberta's participation rate for volunteers is the highest in the country.

The teamwork displayed by the committees set up to manage the project also contributed to its success. A Core Committee, comprised of chairpersons from the subcommittees, oversaw activities such as administration and financing, construction and job safety, materials selection, decorating and communications.





Howell Mayhew Engineering Inc. an engineering consultant from Edmonton, acting as a field representative for CMHC and NRCan, provided technical assistance and project management expertise to the team. Drerup-Armstrong Ltd., an Ottawa based builder with an understanding of Healthy Housing, was also hired to assist the team with product and material selections. In addition, PIR, an Edmonton based public relations firm, was engaged to assist with promotion activities at the local and national levels.

The working committees under the RDHBA directed by the Project manager and responding to the requirements of Parkland CLASS undertook to renovate the building in a manner which would salvage the building structurally and upgrade the structure thermally while incorporating the principles of healthy housing.

#### The Renovation

The guiding philosophy of the project was to demonstrate environmental responsibility through material selection; energy efficiency through increased insulation, airtightness and equipment selection; and healthy housing through ventilation and careful attention to material selection and moisture control.

A complete Specifications List outlining the nature of the changes and the reasons for the choices made can be found in Appendix C. Examples of the changes undertaken include:

#### House Inspection:

The Red Deer Team utilized comprehensive inspections of the existing house as a starting point for the renovation. This is a necessary undertaking for any consumer considering renovation and was done to demonstrate the kind of building assessments which should be undertaken prior to developing a renovation plan. During this inspection phase hazardous materials were identified: asbestos shingles in the gable ends as well as glazing putty which contained asbestos and furnace ducting which had been sealed with asbestos tape. These products, which were going to be disrupted during the renovation process, were removed in an approved manner and properly disposed of. In addition, it was noted that there were some lead water pipes and paint containing lead which would require precautionary measures during the renovation. The inspection revealed a potentially hazardous situation at the chimney. Not only were the flue pipe connections serving the furnace and the hot water tank incorrect, there was no clean-out and the opening into the chimney for the hot water tank flue pipe was almost completely blocked off with debris.

#### Demolition:

As part of the demolition process, the team identified materials which could be salvaged or reused. Both the front and back porches of the existing building were removed as was an exterior chimney. Brick from the back of the building was salvaged and reused to restore the front facade. The vermiculite insulation, which was removed from the attic, was employed as a soil additive. Plumbing fixtures and a variety of other materials were removed and recycled. The asphalt shingles on the main house roof were in good condition and were left untouched.

#### Foundation:

The existing foundation of the main house was structurally sound, however there was a musty odour due to moisture entering from the partial floor slab. Moisture control through sealing the existing basement

floor area prior to pouring a new concrete floor slab, and sealing ground sheets in the new additions reduced the contribution of soil gas and moisture. The existing basement walls were washed with bleach to eliminate any mold growth and drainage was improved by raising the finished grade. Foundation insulation was placed throughout the basement. A new electrical panel was installed and relocated from an exterior wall on the second floor allowing an increase in the insulation levels and reducing air leakage. Oriented Strand Board (OSB) was used for the wall, roof and subfloor sheathing. Made from low grade hardwoods or common softwoods this reduced the environmental impact of the material selection. The floor joists were made of engineered trusses rather than dimensional lumber which provide superior strength using far less material.

#### Windows:

The existing windows were single glazed, some with storms and others without. They were very leaky and were showing signs of deterioration in various locations. New triple glazed, low E, argon filled, energy rated windows were installed to replace the old windows and in the new additions. Large windows were installed to the south facing walls for solar gain and natural light.

#### Structural:

The thermal performance of the existing building was improved by fully insulating the existing walls, which were uninsulated. Two different types of insulation were used in the outside walls. Cellulose, manufactured from recycled newspaper was used in the existing exterior walls and glass fibre batts manufactured from recycled glass was used in the front and rear additions. The roof structure of the existing building was improved by installing collar ties. Airtightening the various penetrations in both wall and ceiling reduced the air leakage. The roof trusses of the additions were high heel in design, insuring space for adequate insulation over the exterior wall plates. The vermiculite insulation in the ceiling was removed to allow sealing of the ceiling and then reused as a soil additive. The ceilings were insulated with cellulose. Metal-clad insulated doors, complete with weatherstripping, were used on all three entrances of the house.

#### Air Barrier & Vapour Retarder:

Spun-bonded olefin was used to wrap the front and back additions on the exterior, and a header wrap enclosed the floor joists. Drywall and acoustical sealant reduced leakage at the sill area of the existing building. Airtightening of electrical boxes was undertaken. The building air leakage was reduced from 18.7 air changes per hour at 50 Pascals to 4.1 air changes per hour at 50 Pascals.

#### Plumbing:

All plumbing was installed with care being given to sealing penetrations to ensure airtightness. Low volume toilets, requiring either 6 or 13.25 liters per flush, (compared with 20 liters for the unit that was removed), combined with inexpensive aerator shower heads save up to 50% of the water used in conventional bathrooms. The main floor bathroom was made fully accessible by installing a 914mm (36") door and a toilet raised to 400mm (16") above the floor. Restricted flow taps were installed in all locations.

**Electrical:**

The electrical panel was relocated. Energy efficient appliances, fixtures and lighting were selected. The exterior porch light is a reused fixture with an incandescent bulb. These bulbs are able to withstand the cold temperatures of Alberta winters whereas halogen or florescent bulbs, used inside, do not. The building was tested for the presence of electromagnetic fields.

**Mechanical:**

A high efficiency natural gas furnace (94%) and induced-draft hot water tank both vent directly to the exterior. A heat recovery ventilator provides tempered fresh air and a central vacuum exhausts outside. Each room was provided with both a supply and return register and the flows were adjusted to create balanced flow throughout the house. Additional meters have been installed to isolate and monitor the water and gas consumption for various uses.

**Painting:**

The building was painted using water-based paints with low or no volatile organic compound.

**Flooring:**

Carpeting was removed. The existing hardwood floor was refinished and recycled hardwood strip flooring, salvaged from a racquet ball court, was used on the second floor. In high traffic areas a natural linoleum product was installed.

**Interior Finish:**

The installation of cabinets, countertops and ceramic tile was done with a selection of environmentally preferred products. Furnishings were selected for low emissions as well as durability and ease of maintenance.

#### **4. MONITORING**

##### **Monitoring Prior to Construction**

##### **Site Inspections and Assessment**

Prior to starting the renovation, an inspection of the house was carried out by a team of project volunteers. The purpose of the inspection was:

- to document the condition of the original house;
- to assess the condition of the mechanical, electrical and plumbing systems;
- to identify hazardous materials, such as those containing lead and asbestos, that would have to be dealt with in a safe and environmentally responsive manner;
- to carry out an energy audit in order to make decisions regarding the upgrades that would be required and to provide the information necessary to conduct a HOT2000 computer analysis of the house. A blower door test was carried out as part of this audit by Howell-Mayhew Engineering.

An inspection report, which includes the airtest results, was prepared by the team's Construction Chairperson, and is included in Appendix A.

In addition to the two house inspections, a Level 1 Environmental Audit was carried out by National Building Inspections of Red Deer. The purpose of this assessment was to provide a general historical review of the property plus visual observations about the site.

##### **Level 2 Environmental Audit**

As a result of the site assessment and Level 1 Environmental Audit, a number of tests were recommended and carried out in the existing house by National Building Inspections. After consultations with a CMHC senior researcher it was decided that the Level 2 Environmental Audit would include tests for asbestos, lead paint, and radon. This audit identified the proper procedures to be followed for handling the asbestos and the lead paint. Radon levels were found to be acceptable.

##### **HOT2000 Computer Analysis**

Using the information obtained during the house inspections, Jim Marke, Stuckey Construction, carried out a HOT2000 computer analysis of the house using HOT2000 Version 6.02 for the Macintosh. The HOT2000 analysis was used to assist in specifying the upgrades that were ultimately incorporated into the design. A copy of the floor plan is included in Appendix B. It should be noted that ultimately, however, some decisions were dictated by manufacturer's donations. The condensing furnace, for example, was a donated product and, for cost reasons, would probably not have been chosen over a medium efficiency unit.

## Monitoring After Completion

### Energy Consumption Monitoring

The electrical, gas and water consumption of the renovated house will be monitored with submeters over the coming heating season. The following consumptions will be determined:

- total electricity;
- natural gas for space heating;
- natural gas for domestic hot water heating;
- domestic hot water; and
- outside water

The meters will be read monthly by a representative from Parkland CLASS and the reading entered into a table prepared by Howell-Mayhew Engineering.

In order to compare consumption data before and after the renovation, the electrical, water and gas bill histories for the house were obtained from the local utilities. A comparison of consumptions for the year prior to renovation and the R-2000 Target are shown below. Electricity consumption of the renovated building is taken directly from the Hot 2000 computer simulation based on 2 adults and one child occupying the building 50% of the time with a base load of 16 KWh per day and does not reflect the existing situation.

Once all of the data have been gathered, an analysis will be carried out to determine normalized consumption figures. In this way, the effectiveness of the renovation in reducing energy consumption will be determined.

### Compliance with R2000 Technical Requirements

R-2000, the Canadian government's energy efficient new house program, establishes a voluntary standard for new buildings. The Red Deer Reno-Demo complies with the R-2000 technical requirements in all aspects except the blower door test requirements and the associated effect on the Estimated Annual Space Heating Consumption predicted by the HOT2000 program. A blower door test of the renovated house indicated that the air exchange rate at 50 Pascals was 4.1 ACH. The air exchange rate of the original house was 18.7 ACH. The R-2000 requirement is a maximum of 1.5 ACH at 50 Pascals.

Although a specific leakage area could not be found, leakage under the baseboards and through interior wall electrical outlets on the second floor suggested that the rim joist area, and perhaps the ceiling, were the major sources of air leakage. Difficulty in sealing balloon framing details of the original house would appear to be the cause of the leakage problems that still exist. This is a fairly typical problem encountered in a renovation or energy retrofit.

### Indoor Air Quality

Indoor air quality measurements were carried out before and after occupancy. The following measurements were conducted:

- passive air infiltration rates (PFT) using the AIMS technology from Brookhaven National Laboratories;
- formaldehyde (HCHO) levels in the second floor hallway and main floor living area using passive dosimeters supplied by Ortech International;
- volatile organic compound (VOC) levels in the main living area using passive monitors supplied by Concord Environmental;
- particulates using equipment supplied by Ortech International; and
- biologicals using equipment supplied by the University of Alberta.

The unoccupied testing was carried out in November 1994 and the occupied tests were conducted in mid-December.

### Electromagnetic Field Survey

An electromagnetic field survey was carried out by National Building Inspections. The purpose of the survey was to provide spot measurements of the ambient 60 Hertz magnetic flux densities of various rooms and appliances in the renovated house. The report indicated that all of the "center-of-the-room" readings, with the exception of the kitchen, compared favorably with the Electric Power Research Institute's report of 0.35 milligauss as the median residential exposure level from power lines.

### Site Observations and Occupant Survey

In addition to recording monthly meter readings at the house, a representative of Parkland CLASS has agreed to record observations on a monthly basis regarding the operation of the house. This record will also include comments from the occupants regarding living in this house. Parkland CLASS maintains all of its properties and is very interested in the house and its systems. Howell-Mayhew Engineering took a maintenance supervisor from Parkland CLASS through the house and reviewed the operation of each of the systems and the building features. System operation and maintenance guidelines were prepared and given to Parkland CLASS.

## **5. PROJECT ASSESSMENT**

### **Introduction**

In order to capture the essence of this project, interviews were carried out with key members of the Project '94 core committee and some additional contractors and suppliers as listed below. Their comments on this project and their suggestions for future projects were compiled, reviewed and then used to develop the following assessment.

- the Core Committee chairperson;
- the project manager;
- the project administrator and executive officer of the Red Deer Home Builders' Association;
- the project coordinator and administrative assistant;
- the Decorating Committee chairperson;
- the Communications and Promotions Committee chairperson;
- the Construction Committee chairperson;
- a representative from Parkland Class, the client;
- a window supplier;
- the heating and ventilating contractor;
- a representative from the Red Deer Coop, a materials supplier; and
- the contractor producing a video on the project.

When judged against the goals and objectives set out in the Red Deer proposal, the project has succeeded in meeting the majority of them and has surpassed all expectation in many cases. Those objectives which were not addressed in any form include:

- The demonstration of radiant heating.
- The construction or provision of a compost bin.
- The 'sanctuary room' for a chemically sensitive individual, air filtration and water filtration.
- School participation and student volunteerism.

Several of these were not attempted at the recommendation of the technical advisors. Some simply could not be done within the context of a modest renovation. When the entire set of goals and objectives, some twenty six in all, are considered; many of a very complex nature, it must be recognized that the Red Deer Home Builders' Association certainly met the objectives of the project and deserve the highest congratulations for their dedication and commitment.

## Home Builder's Association Perspective

The most compelling evidence of the success of Red Deer Project '94 is to be found in the genuine pleasure taken by the team in each others support and company. Many respondents refer to the spirit or unity which was generated. One interviewee stated that from the Home Builders' perspective "Red Deer is no longer just a city on the road between Calgary and Edmonton, it's Red Deer". The objective of promoting the CHBA-Local Association and their renovator members as a key force in professionalizing the renovation industry has been met as the following comments illustrate.

### Was this project good for Red Deer?

The individuals interviewed agreed unanimously that the project had been good for the city of Red Deer. They cited the following reasons:

"Red Deer is a very community minded city and the project served to draw the community closer together. They thought it was wonderful that the renovation was being done for Parkland Class and would help those less fortunate than themselves."

"It reinforced the community spirit of volunteerism. Red Deer has the highest per capita volunteer hours in North America."

### Was this project good for the Home Builders' Association?

The following comments seem to confirm that the project had a tremendous impact and succeeded in raising the profile of the Red Deer Home Builders' Association (RDHBA) with both the membership and the general public.

"Red Deer '94 got so much publicity for the Home Builders' that I feel this should be done again. Even though the annual Home Show, with an attendance of 30,000 in 1994, is sponsored by the Home Builders' , people don't realize it. It's this project that brought the Red Deer Home Builders' to the forefront with the general public."

"It gave them a vehicle to learn how to carry out a project of this type and the opportunity to show the consumer what is important in healthy housing."

"This project has provided an impetus for the executive - enthusiasm skyrocketed."

"We have received not only local, but also National recognition. Interest in the Home Builders' has increased by 25 percent."

"More people are calling and asking for advice in solving problems."

"I belong to the Association so I can learn. Some people complain about the cost of the Association but projects like this add value to the individual and value to the membership."

In total, 105 companies contributed to the success of this project. The individuals interviewed marveled at the spirit of the project, everyone working together, the contacts, and the friends that were made. The following comments best reflect the overall feelings of this dedicated group:

"It was amazing to see such a large number of companies, many of them competitors, working together to make the project a success. Normally you might have, maybe, thirty. Working together on projects such as this may turn out to be a great way to raise the professionalism that we want associated with our industry."

"Even competitors worked very well together. Most of us usually work on our own and it's nice to have the support."

"Being involved in such a diverse group was a tremendous opportunity to learn and grow."

"Those who were not involved missed out on a golden opportunity."

"Where else can you get this kind of hands-on opportunity to learn and develop new skills?"



The majority of consumers going through the house were in the house-buying age group and in six months to a year we expect to see a significant increase in renovations and/or new home sales that will effect all of the companies involved.

"The best thing was the committee I worked on. We are actually looking to form some kind of ongoing association, maybe the RDHBA Decorators Council. Our dreams would be to buy the Red Deer railroad station and turn it into a designer's walk. It could maybe even house the RDHBA."

Was this project good for the consumer and the general public?

It was not only the Home Builders' Association that benefited from the educational experience provided by this project. Newspaper and magazine articles, mall and bank displays and television videos all provided learning opportunities for a genuinely interested consumer. Their keen interest in this renovation, and perhaps their concern with healthy housing issues, was reflected in the four open houses in October that drew close to 1500 inquisitive individuals. A volunteer at one of the open houses stated that, "Two gals showed up, excusing their work clothes, and saying that they had heard about the open house on radio while working on their own renovation and had rushed right over."

Many comments, drawn from the visitors guest book reflect the surprise and pleasure of the general public in the RDHBA's ability to resurrect the old building. For example:

"Love the restoration and renovations."

"Many changes combining the old and new safely."

"Great job. Wonderful. Excellent."

"Fantastic! Love the brick."

"Beautiful. Love the stenciling"

"An eye opener."

"Lived 19 years in this house. Big change."

Many other visitors, as well as the Home Builders' members, commented on the absence of odor normally associated with building interior containing new paint, flooring and extensive renovation. The importance of healthy building material selection was reinforced in many conversations and highlighted in the signage throughout the building.

Of the 750 guests that signed the guest book, only one negative comment was entered. A visitor from North Battleford commented, "Don't like the colours." The only skepticism about the project, came from Home Builder members at the start of the project when they stated:

"When I saw the house, I said if they can do anything with this they are miracle workers."

"I would have bulldozed that building. Now I'm glad we didn't knock it down."

Should the Red Deer Home Builders' undertake a similar project in the future?

Having witnessed the tremendous amount of time and effort required by the Project '94 team, one might think that such a project would never be undertaken again. The interviews revealed that nothing could have been further from the truth. Those interviewed displayed their enthusiasm and commitment;

"With a little bit of a break, definitely!"

"We need to build a Red Deer Project '95 or people will soon forget."

"I hope that they don't wait a year for the next project. We should do this again definitely."

"We have never done anything like this before but we really wanted it."

"Nobody else should do it!"

"I was almost sorry to turn the building over because so much of us went into it."

their pride in what they had accomplished;

"The official opening was such a high, you want to carry on."

"This is improved accommodation and we provided a good home."

"It offers National recognition for Red Deer and community networking. No question we should do it again."

their realization of the educational value of a demonstration house;

"Literature doesn't have a practical aspect to it, whereas demo-projects are good for people to better visualize such things as marmoleum or a ventilator."

and their creative ideas for next year's Red Deer Project '95.

"Renovate a building to house the RDHBA and showcase healthy house concepts."

"The Association needs another fund raiser and a renovation or new home would be it."

"There will be a Project '95. I don't like the idea of only one home because how do you choose who the contractor will be?"

You cannot bring the association together with only one house. Perhaps we could do 3 - 4 homes in a crescent and showcase different things in each home. We now have the option to consider doing this also with a parade of renovations."

"The key is to use the momentum of Project '94 as a springboard for an additional project in the area of renovation. The Home Builder's have perhaps a 2 year window to build on their success."

#### Contractor and Suppliers Perspective

Another objective of the project was to encourage environmentally responsible renovation, proper maintenance and repair, energy efficiency and the relationship between housing and occupant health. The interviews suggest this objective has also been achieved.

Would you personally undertake a similar project again?

The enthusiasm for having the Home Builders' undertake another project was rivaled by the enthusiasm of the contractors and suppliers to once again become involved;

"I don't regret it at all and would do it again tomorrow."

"I could use some rest, but definitely yes!"

"It was a great time and I really enjoyed it."

"That last week I really had blood coursing through my veins."

to continue to learning and expand their knowledge of healthy housing;

"A tremendous learning experience."

"I learned things I would never have learned in my life about insulation and furnaces for example."

"The project has given me an avenue to acquire additional learning."

to become a part of the camaraderie and spirit that united the Project '94 team;

"It was nice to meet all the people, witness the tests, follow through from beginning to end."

"The best part was meeting and working with all the new people."

"I get something out of working with people I haven't worked with before."

"My agenda was that people in Red Deer are really talented and I wanted to show that and to develop the strength of their businesses."

"The networking was great."

"This is business development, for everybody."

"We got a number of jobs while assisting at the open houses."

"Our company promotes itself more as a result of this project."

Will what you learned during this project affect the way you do business?

The learning experience was frequently commented upon and spans a variety of issues from the practical to the philosophic. More importantly, it became apparent that the information gained transferred directly into the workplace.

"This project actually changed the way I look at houses."

"I gained knowledge of different suppliers, products, and issues."

"I was never before aware of the connection between heating systems and windows."

"I learned things I would never have learned in my life about insulation and furnaces."

"I learned how to choose proper underlay for flooring. I did not know that plywood could have gaps in it that a high heel could go through."

"I never realized that superspacer made such a difference to the performance of the window even though my supplier made a big deal out of it. I just didn't trust him or think it was so important."

"Now, when I see an article on occupant health or VOCs, I zero in on it."

"In the back of my mind, I now want to make a door out of recycled plastic"

"I was pretty red neck about environmentalists. Thought they were 'tree huggers'. This project has really changed the way I look at things. We are not in this just for ourselves but to make a difference."

"I'm working on a project right now where I replaced all windows, put in ventilation system, used marmoleum and low VOC paints."

"On one job, I went out to advise on decorating and ended up involving Boman and Wil to advise on why the house was so cold and drafty."

"All I have learned is now part of my business and allows me options to offer to my clients."

"The project provided a wealth of information and gave me a basis for what to look for in the future."

"I am much more safety conscious now."

"I will be more conscious of occupant health at our workplace now."

"I learned skills related to management and administration which I can use in my business."

"I'm going to make my office healthier."

Having had this experience what type or level of pre-purchase building inspection do you think is necessary for a future project or if you were to buy an older home?

In addition to looking at the process of contracting renovations in a new light, those involved in the initial stages of the project, when the house was inspected and hazardous materials were effectively dealt with, realized that the selection and purchase of a home may involve a more intensive inspection process than they had envisioned before their involvement in the project.

"This project actually changed the way I look at houses. My company has never done an assessment of a building in this way before. I usually walk through with the client and add up all the small changes. I ask them what problems caused them to call me. I want to sit down and get some prices."

"If the law is going to change to require inspections you had better make damn sure the inspector knows what he is doing. If I were buying I would get a qualified inspection firm to look at the house. Look for air leakage. Is the house safe? Don't just say you're a professional, be one."

"I'd phone a professional engineer/architect and say, 'come and check this puppy out.' I would not have done that before this project."

"Eight years ago yesterday I moved into my house. I had an electrician, plumber, and checked city permits. That's all. Now I would check air quality, depending on the age of the house. Look at the furnace, power bills, usage, get the water tested. I would be concerned by the materials that were used, shag carpet. I would take a much closer look through before purchasing."

"If you really love the place you'll buy it. Asbestos, I'd check that out. Lead doesn't worry me so much. Cost is always an issue. I always wanted to fix up an old house. I would have bulldozed that building. Now I'm glad we didn't knock it down."

"I have bought many houses so I feel confident I could do it myself. But if I found any reason for concern I would avail myself of the inspection services. Home inspection should be mandatory for all homes. Now I know about local inspectors."

Do you have a better understanding of what is available from CMHC and NRCan?

Another of the objectives was to inform the public and renovators of the availability of information from CMHC and NRCan in the renovation field. As the following comments indicate, this objective has been accomplished. The number of respondents with similar comments appears in parentheses.

"See both as a source of literature (4), expertise, video (3)"

"I have a new respect for the quality of the brochure information unlike sales brochures."

"Very impressed with the support."

"Discovered that these are real people trying to make a difference and the consumer is not listening to the story they are telling."

"Contacts have been valuable.(2)"

"CMHC is a resource that I did not know to call before (2)."

"I realize CMHC is involved in more than mortgages (3)."

"Oh yes - are you kidding."

How would you change the process to improve it?

It is of paramount importance to recognize that the Red Deer Project '94 was, by all accounts, a remarkable success. This success required the collective effort of a large number of individuals and government agencies, private contractors and most importantly local volunteers. Suggestions from the team of ways in which the project could be improved are many and varied. They may be grouped into those things which could be improved at the time of the proposal call, sponsor behavior, building selection, committee organization, client group selection, training needs, communications and timing.

Changes to the proposal call:

Several respondents identified a lack of definition or focus arising from changing expectations as the project began. Several felt that what had started out as a demonstration of energy conservation and environmental responsibility, recycling and waste management had expanded to include healthy housing issues. This reflects the changing understanding of the Red Deer team as they undertook to learn about these issues and is not seen as a serious criticism. Two concerns dominated early discussions. First that the Reno-Demo be as environmentally responsible as practical and second that no attempt to design exclusively for the chemically sensitive should be made. Recent information necessary to produce clean housing is drawn from work with the chemically sensitive and that may also have created the perception that the project mandate was altering.

In our interviews we asked respondents, "Can you define what makes a house healthy? energy efficient?" and "What does the term 'Healthy Housing' mean to you today? the term energy efficient?" We received a widely varying response to these questions. We were unable to solicit comprehensive answers and believe that the desirability of a workshop to conclude the project is underscored as a result (see: Training Needs, below) We were told such things as:

What does the term 'Healthy Housing' mean to you today?

- air quality (3 respondents)
- low maintenance
- accessible-well designed
- airtight and proper ventilators
- the three R's
- cost effective
- recycling
- environmentally friendly
- occupant health
- resource efficiency
- product selection
- energy efficiency

What does the term 'energy efficient house' mean to you today?

warm and comfortable  
sealing  
windows  
R-Value

Some respondents also spoke to the concept of environmental responsibility and mentioned:

recycling  
energy efficient, natural materials

None of the respondents were able to identify all five discrete areas of healthy housing as defined by CMHC: 1. energy efficiency 2. occupant health 3. resource efficiency 4. environmental responsibility 5. affordability. Although cost effectiveness was mentioned none recognized affordability as germane to the discussion. At the same time most identified issues pertaining to the other four areas. This should not be surprising. Rather it is symptomatic of our changing understanding of the implications of building and renovating houses, however, it places the onus of responsibility to be as clear as possible on any Agency soliciting proposals. In this regard Healthy Housing, or Advanced Housing or R-2000 Housing or Resource Efficient Housing or Sustainability are slogans which, while challenging industry and the public to better understand, also confuse.

Fundamentally, the task must be made clear. As a means of accomplishing this goal it was suggested that a sample specification might accompany the proposal call indicating the type of materials and the scope of work anticipated. Further the concept of a directory clearly spelling out the role of everybody with whom the local team may expect to deal during the project and their decision making authority would be helpful.

"Greater clarity on the definition of what is to be demonstrated (i.e. Healthy Housing vs. Environmentally Friendly Housing)."

"The definition of the project changed. We were supposed to build an environmentally affordable renovation. Healthy Housing is what the public understands."

"Include a sample specification in the proposal call."

"Now that we have done it we would have more questions. At times I felt that we were second guessing CMHC."

"There should be a book. Here are the people you will be dealing with and what they do. A handbook on how to deal with this project."

Changes in selecting the building:

Some respondents felt that the property was expensive and required too much work, however, most respondents felt that more research and planning should have gone into the project. The frustration arose from a feeling that the renovation represented a moving target. Some of this is typical of any renovation which uncovers additional work as work progresses yet many voiced this concern. Not all the skills necessary to assess the project were available at the time the proposal was submitted. It was suggested that a brainstorm session which had representatives of the sponsors and the organizing committee, possibly linked to a course on energy conservation / healthy housing / sustainability would be useful in clarifying expectations early in the process. This would enable the production of comprehensive construction documents. This activity would improve the chances of accurate budget development.

"Research the house better."

"The people who originally sent in the proposal lacked some of the skills necessary to assess the project."

"Find a house that did not require so much work."

"Find a house that cost less."

"Brainstorm the possibilities for the renovation as part of the process of developing the specifications with all parties present (CMHC, NRCan, local committee)."

"We never really had a set of drawings that meant anything."

"There must be proper analysis of the budget at the outset. We were not clear what was available for construction as a result of the uncertainty of donated material. The construction needs a person who can afford to be more committed to the project. We could have had a more knowledgeable administrator to pull the project along."

#### Changes in committee organization:

Two comments typify the changes suggested in the Core Committee structure. 'Too many bosses and not enough workers', and 'More information reported by fewer people.' A shortage of some desirable equipment to make the job easier and management by goal and objective were also mentioned. It is necessary to remember that the committees were staffed by volunteers, however, it was pointed out that even volunteers need job descriptions and deadlines.

"A smaller Core Committee and more emphasis on sub-committees as well as more on-site committee meetings would have been better. Empower the sub-committees."

"We also needed equipment: a computer, dedicated phone line, cellular phone and more office space."

"There was the need for specific goals and landmarks."

"Once a month have a full reporting to all the committees from the sub-committees to keep everybody up to date in all areas of the project. Fewer people reporting more information."

"A job description for each person at the table. Even volunteers need a job description."

"Deadlines to work towards."

"Once a month the Core Committee could have gotten together and graded themselves. Each person could have indicated what level of completion their task had achieved. I am so much complete, I need help, etc."

"What would have happened had 'God forbid' the project manager become unavailable to us. The committee was under-utilized. Spinning their wheels."

#### Changes in the client group:

Several respondents pointed out shortcomings in working for a client who, by the nature of their mandate, were only able to accept limited changes. It was felt that advantages would be found if the Home Builders' could own the property and sell it after project completion to a previously identified charity.

"Don't use a group or charity. Get the Association to buy the building and then bring a charity on board. Let the Home Builders' reimburse themselves for the administration costs and return any profit to the charity."

"Need a more flexible client."

"A client with a higher profile could support the marketing effort."

#### Training needs:

In addition to the pre and post brainstorming / training presentation mentioned above, it is clear that a full blown training seminar, held immediately prior to the open houses and offering the opportunity for each committee to exchange information, is mandatory. Such training was delivered in Red Deer while the building remained available for filming during the month of November. One respondent said, 'I have been so busy running the project from my perspective that I feel I have all the pieces of the puzzle but have not

yet put it together'. The purpose of this closing workshop was to provide an overview as well as the basic building science needed to justify the approaches selected for Project '94. Clearly this training should be provided earlier in the process. NRCan did offer the RDHBA an Advanced Houses Workshop early in the process. There was little enthusiasm for such a presentation partly due to the activity surrounding the project start-up and partly due to a lack of understanding of what value such a workshop might offer. Finally, the video program offered through Shaw Cable can generate further promotional activity and possibly a documentary of the process.

"We should have trained the open house staff to answer questions. A workshop held for everyone just before the project opened to the public."

"I would like to see a presentation to the builder-renovator members to really summarize what we did."

"Have Shaw Cable do a repeat further down the road - a documentary on the process."

### Changes in Communications:

The Communications committee had several different chairpeople during the critical start-up phase of the project. A communications consultant was hired to offer suggestions to the local committee and to develop the national communications plan.

"Radio was handled with an honorarium. TV advertising was paid for by co-op ads with the various companies who promoted their logos in association with 'Project '94'. CMHC did buy several spots. In a community the size of Red Deer the press will pick up items even if you have paid ads. We failed on several fronts. We did not put together seminars. We did not involve the high schools. We did not involve the elementary schools. Although our members are also members of the Kinsmen, Elks, Legion and others we never made public announcements at their meetings and did not get their assistance in promoting the project. Too much effort was absorbed by the effort to put rudimentary advertising in place. If you want to do a project like this again bring others here to Red Deer to experience working on a project."

"Advertising should have been done sooner."

"If we had a budget of \$5k we could achieve all of our local promotion objectives."

A fall supplement with a distribution of 800,000 nation wide is complete and a spring supplement with a distribution of 1.7 million is underway.

### Changes in timing:

Timing is thought by some to represent the source of all the project shortcomings. It is pointed out that from the time of the CHBA National Conference at which Red Deer was identified as one of three proposals short listed until the final award of the contract in March, precious time needed in planning and conceptualizing the project, was lost.

The desirability of increasing the lead time available for projects of this type is obvious. The relationship of time to the level of pre-planning and the subsequent accuracy of the budget is also obvious. Less obvious is the impact that the timing of the Red Deer project had on the contributors. The project manager and the volunteers would have found early spring an easier time to devote to the project while they were firming up summer projects. The statement below, from a supplier to the project, echoes a concern for tying employees up in mid-summer.

"From a suppliers perspective the project " hit" at a very unfortunate time because in the mid-summer we did not have the people to "tell the tale" at any open houses. A home show would have had more bang for the buck. Viewing in November and December is better for suppliers. Seeing the product in context is, however, very desirable."

"More time on planning"



"More time is needed."

"This is not a part time job once the momentum picked up. Maybe if there was more lead time."

## **6. RECOMMENDATIONS:**

### **Specific Changes:**

The following recommendations should be implemented to insure the success of any future project.

- A formal communication network between staff and consultants hired by the Partners and the project teams, should be established to eliminate confusion and frustration of the project team when attempting to obtain decisions.
- A handbook should be developed which identifies all the people the project team will be expected to work with and defines the decision making ability of each person.
- The national communication strategy should be handled by a professional independent party. Local communications strategy should be handled by the local project team. Proper reporting procedures should be in place for both groups.
- The proposal call which is developed for the next round of Reno-Demo activity should be more precise as to what is expected of the team. A sample specification, drawn from the Red Deer Project, should be added to the proposal call to more clearly define the sort of renovation requested.
- The contract should be in place early enough to secure donations and permit the scheduling of volunteer time.
- The partners should be prepared to provide the expertise necessary to supplement the skills of the members of the project team, and to oversee the project to ensure that the objectives and interests of the partners are satisfied.
- Formal meetings with representatives of the partners and the project team should take place at the renovation to clarify opportunities and expectations early in the process.
- Training should be put in place early in the project to insure that the project team understands the implications of the decisions they are making and remains informed of all the various aspects of the project.
- The partners should promote regular communications between the renovation team and any future project team.
- The timing of the project should permit volunteers to maintain their own businesses while participating in the Reno-Demo.

The recommendations which are made in this report, coupled with a host of interesting ideas gleaned from the minutes of the National Steering Committee meetings and supported by suggestions from many CMHC staff have led us to suggest that more Reno-Demo initiatives be undertaken. We feel that the opportunity offered by this approach is worth developing further.

The partners future efforts to address the renovation industry in Canada should be coordinated and linked to a multi-year plan.

If it is felt that the objectives themselves are in the best interest of Canadians then demonstration projects like Red Deer Project '94 may well be appropriate to accomplish them. To undertake these demonstrations without substantial effort being devoted to the dissemination of the information generated by the demonstration, however, is limiting.

Further activity in this area requires two separate but closely related thrusts.

- A demonstration project to provide the 'hands on' field experience and generate the regional point of interest and
- A comprehensive information dissemination program which feeds the information obtained in the renovation to the community and region, if not the entire country.

This is exactly what 'Project '94' undertook to pilot. Future projects should profit from our improved understanding of the relative importance of these undertakings. A more fully developed communications strategy and improved operations procedures should lead to still more successful projects in the future.

APPENDIX: A  
Inspection Report

APPENDIX: B  
Floor Plans

APPENDIX: C  
Specifications List

RED DEER PROJECT 94  
INSPECTION REPORT  
INSPECTION 9 MAY 1994

PRESENT:

JIM MARKE  
PHILLIP KWONG  
SANDRA EVANS-NEWTON  
BERNIE DESROSIERS  
(WILL MAYHEW)

ITEMS RECORDED:

ACTION

General building appears several decades old with several additions / alterations. Back porch east and west parts may be 2 additions. There was probably an earlier back porch construction as evidenced by indications of (Interior) lath and plaster on both sides of the adjoining house wall. The extreme east wall of the porch shows lath and plaster, whilst all the other walls show gypsum board. Several potentially hazardous materials are likely to be present.

**EXTERIOR:**

- 01 Probable asbestos tile siding in gables.
- 02 Possible lead putty in old single pane glazings.
- 03 Old painted surfaces may contain lead.
- 04 Single car garage at SW corner of property appears old and may contain environmental problems viz Paint, Asbestos in roofing components, Contaminated soil from oil.
- 05 Roof has been reshingled recently. Check for old roofing materials underneath should the roof be redone. Possible asbestos hazard in old felts.
- 06 Existing Deck is partly built from pressure treated lumber.
- 07 Note to be aware of possibility of on site occupant buried wastes.

**INTERIOR - GENERAL**

- 01 Old paint - lead hazard probability.
- 02 Old floor tiles (existing on stairs and backing remains only in kitchen) may be vinyl asbestos type.
- 03 Asbestos tape appears to be present on ductwork parts that were not replaced during new furnace renovation. (probably 1991.)
- 04 Basement smells musty. Sheet materials placed over old boards in one corner of basement (Old sheet goods), dampness and dryrot evident.
- 05 Loose lay bricks (floor configuration) noted.
- 06 80% +/- of floor covered with concrete. Suggest checking balance of area for buried materials (Treasure unlikely)
- 07 Reported that main water supply pipe to street could be lead. Water test indicated. Concrete slab removal at entry needed to verify physical.

- 08 Gas meter in basement noted as being an older model. Relocation to exterior?
- 09 Noted that HW tank venting into masonry chimney is below furnace venting (Code prohibition).
- 10 Electrical wiring. Some evidence of Knob & Post wiring - test for ELF radiation indicated.
- 11 Copper plumbing can be expected to have high lead content solder.
- 12 Structurally the walls of the main house were 'balloon framed'.

#### ENERGY AUDIT (WIL MAYHEW & JIM MARKE)

- 01 Wall insulation review. The only wall insulation found in the walls is along the south wall of the kitchen, where old, paper enclosed rockwool batts were found. (Sample taken). Paper enclosure appears to have asphalt coated paper (Fire spread hazard?). Walls were opened at 6 locations on main floor - insulation only found in south wall of kitchen. On the second floor the walls were opened at 4 locations - no insulation found.
- 02 Sloped ceiling on second floor - insulation review. The sloped ceilings on the east & west sides of the house appear filled with zonolite.
- 03 Flat part of second floor ceiling has 1" - 2" of zonolite plus a layer of R20 fiberglass batts of recent vintage.
- 04 There is no evidence of vapor barrier in the house.
- 05 The header area in the basement is partly filled with old, paper enclosed rockwool batts.
- 06 House was measured in detail by J MARKE for input to HOT 2000.
- 07 The front porch was found to have no insulation in it.
- 08 The front porch has no heat supply means.
- 09 The back porch has a supply air and a return air supply provision.
- 10 All windows are single glazed, divided light, double hung type.
- 11 All lights in the house are incandescent ceiling or wall mounted style.
 

Kitchen	1	100w ceiling.
Rear Porch	1	60w ceiling.
	1	100w ceiling.
Dining Room	1	60w ceiling.
Living Room	1	ceiling.
Corridor on main	1	ceiling.
Upper Corridor	1	ceiling.
Bathroom	1	wall.
Bedrooms 1,2,3	Nil	
Front Porch	1	ceiling.
Front exterior Soffit	1	ceiling.
Basement	4	60w ceiling.
- 12 Basement - 5" 'Fresh air' of recent vintage connected to furnace return air. No 'combustion air' provided.

<sup>1</sup> No light fixtures - wall plugs only.

13 Appliances found.

Fridge	Hotpoint w automatic icemaker (interior) Mod RT 146-BLT 2 Ser MN 034514
Range	Westinghouse, 30", 4 burner, 120/240v, 10.2 kw Mod KF9 ?????? -2. <sup>2</sup>
Clothes Drier <sup>3</sup>	Hotpoint, Coin operated attachment. Mod CD 411 CW 3181 Ser KR 5 10302
Clothes washer	Hotpoint, Coin operated attachment. <sup>4</sup> Mod CW 311 DW 1191 Ser KR 5 06792
Furnace	RUUD, Nat Gas, 2,000-4,500ft, Rated Output 85,508 BTUHR Rated Input 112,500 BTUHR Mod UGDA-1 2 EA8 EA Ser AR 30184 F 3491 8621
HW Tank	John Wood, Alt 0-4,500 Mod JW C 40204 Ser 633974-7705 Capacity - 33.3 USG

14 Gas Meter Type A225, 1961, 304450

North Western Utilities 100705

15 Air test performed by Wil Mayhew based on volume calculations by  
Jim Marke. See report from Wil Mayhew.

House only. 15.45 ACH

House and both porches. 18.73 ACH

16. Basement Temp 16°C

RH 5 40%

Outside Temp 20°C

17 No insulation on 8" concrete walls. (May be more than 8".)

18 No insulation noted under basement slab. (Slab is partial +/-80% of area)

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<sup>2</sup> Mostly Illegible.

<sup>3</sup> Vented into house, no vent port found.

<sup>4</sup> Canadian Appliance Mrg Co

<sup>5</sup> Measured with electronic Temp/RH meter after 30 Minute wait, 48" above floor.

19 Air leakage significant leaks found:

Header areas in basement. (Ballon framing)

From rear porch hole to under porch floor?

Electrical outlets.

Outside Doors (Very Little weather stripping)

Interior wall switches & Small holes in plaster (Picture hangers)

Windows

Electrical Panel

Soil Stack area in NW corner of house.

Heating supply air duct outlets (within balloon framing in stud space

Attic Access Hatch

AIR LEAKAGE TEST REPORT

May 6, 1994

 Name: Red Deer Renovation Address: Red Deer

 Technician: W. Mayhew Project Project '94

 Volume = 395 m<sup>3</sup> Envelope Area: na m<sup>2</sup>

House pressure:	Comments on the wind speed:	<u>10</u> km/h
Initial = <u>0</u> Pa	Barometric pressure	= <u>92.92</u> kPa
Final = <u>0</u> Pa	Indoor air temperature	= <u>16</u> °C
Backgrnd = <u>0</u> Pa	Outdoor air temperature	= <u>16</u> °C

Measured		Corrected				
house		Fan	# holes	Corrected	Maximum	Error
Reading	pressure	pressure	plugged	Flow	(must be < 6%)	
#	(Pa)	(Pa)	(Pa) (-1=open)	(cfm)	(%)	
1.	<u>51</u>	<u>51.0</u>	<u>112</u>	<u>-1</u>	<u>3717</u>	<u>1.9</u>
2.	<u>46</u>	<u>46.0</u>	<u>90</u>	<u>-1</u>	<u>3352</u>	<u>1.6</u>
3.	<u>40</u>	<u>40.0</u>	<u>75</u>	<u>-1</u>	<u>3075</u>	<u>.9</u>
4.	<u>36</u>	<u>36.0</u>	<u>65</u>	<u>-1</u>	<u>2874</u>	<u>.7</u>
5.	<u>30</u>	<u>30.0</u>	<u>50</u>	<u>-1</u>	<u>2538</u>	<u>1.1</u>
6.	<u>26</u>	<u>26.0</u>	<u>43</u>	<u>-1</u>	<u>2364</u>	<u>1.3</u>
7.	<u>22</u>	<u>22.0</u>	<u>34</u>	<u>-1</u>	<u>2115</u>	<u>1.3</u>

Air Leakage Test Results

 C = 269.1 r = .997 (must be > 0.990)

 n = .663 (between 0.5 and 1.0) RSE<sub>10</sub> = 3.2% (must be < 7%)

 C<sub>50</sub> = 3599 cfm

 Air Change<sub>50</sub> = 15.48 per hour

 C<sub>20</sub> = 1961 cfm

 C<sub>10</sub> = 1238 cfm

 C<sub>5</sub> = 782 cfm

 Normalized Leakage Area = na cm<sup>2</sup>/m<sup>2</sup> (must be < 0.7)

 Equivalent Leakage Area = 364 in<sup>2</sup> at 10 Pa

 Equivalent Hole Diameter = 21.5 in

Comments: (Major leakage sites, recommendations...)

This test does not include the front and back porches.



AIR LEAKAGE TEST REPORT

May 6, 1994

 Name: Red Deer Renovation Address: Red Deer

 Technician: W. Mayhew Project Name: Project 94

 Volume = 440 m<sup>3</sup> Envelope Area: na m<sup>2</sup>

House pressure:	Comments on the wind speed:	<u>10</u> km/h
Initial = <u>0</u> Pa	Barometric pressure	= <u>92.92</u> kPa
Final = <u>0</u> Pa	Indoor air temperature	= <u>16</u> °C
Backgrnd = <u>0</u> Pa	Outdoor air temperature	= <u>16</u> °C

Reading	Measured		Corrected		Fan pressure	# holes plugged	Corrected Flow	Maximum Error
	house pressure	house pressure	house pressure	house pressure				
#	(Pa)	(Pa)	(Pa)	(Pa)	(Pa)	(-1=open)	(cfm)	(%)
1.	<u>49</u>	<u>49.0</u>	<u>200</u>	<u>-1</u>	<u>4890</u>		<u>2.2</u>	
2.	<u>44</u>	<u>44.0</u>	<u>160</u>	<u>-1</u>	<u>4400</u>		<u>1.4</u>	
3.	<u>40</u>	<u>40.0</u>	<u>140</u>	<u>-1</u>	<u>4131</u>		<u>1.6</u>	
4.	<u>36</u>	<u>36.0</u>	<u>125</u>	<u>-1</u>	<u>3915</u>		<u>.1</u>	
5.	<u>32</u>	<u>32.0</u>	<u>105</u>	<u>-1</u>	<u>3606</u>		<u>.8</u>	
6.	<u>26</u>	<u>26.0</u>	<u>80</u>	<u>-1</u>	<u>3170</u>		<u>.3</u>	
7.	<u>19</u>	<u>19.0</u>	<u>55</u>	<u>-1</u>	<u>2655</u>		<u>2.2</u>	

Air Leakage Test Results

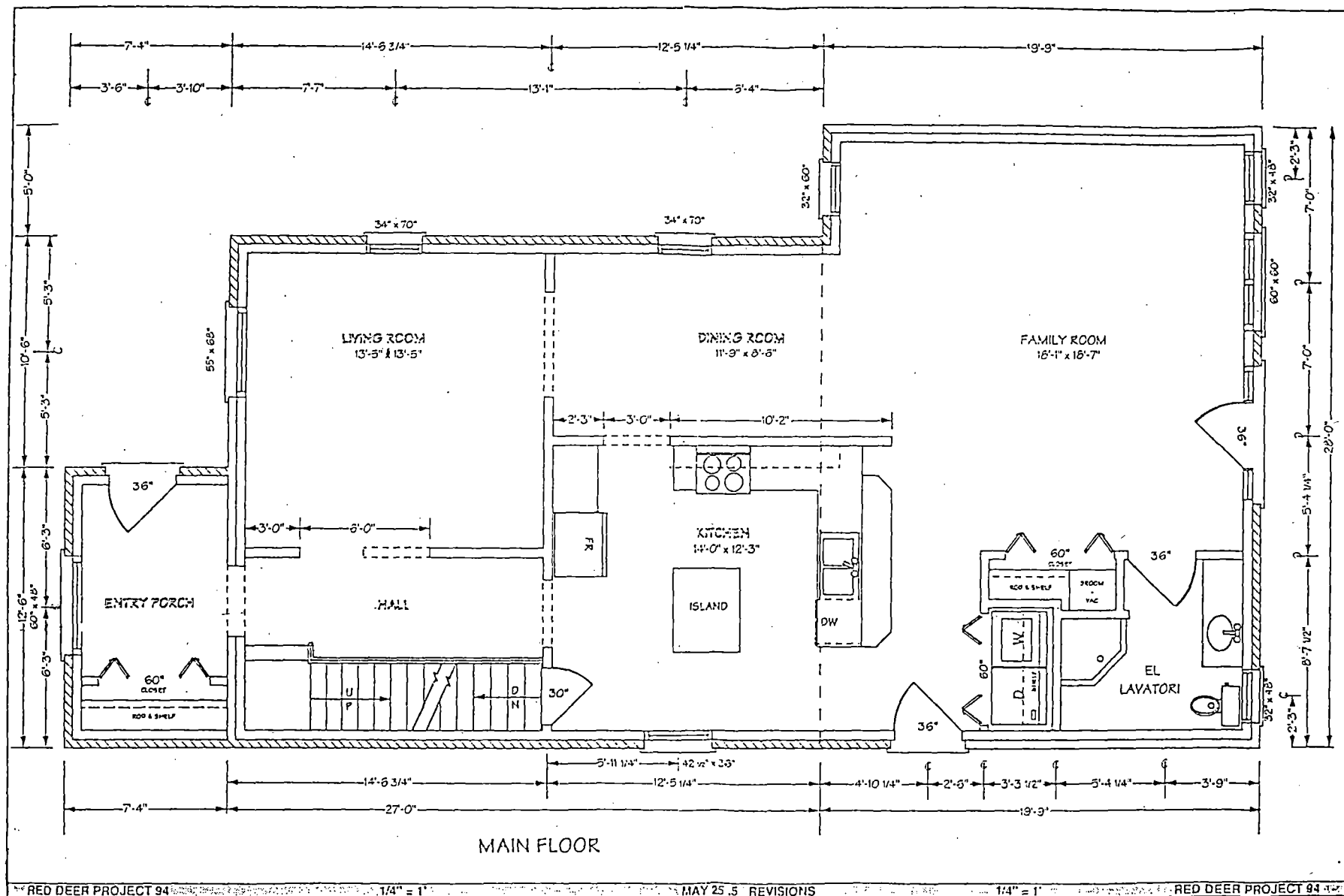
C = 388.8 r = .996 (must be &gt; 0.990)

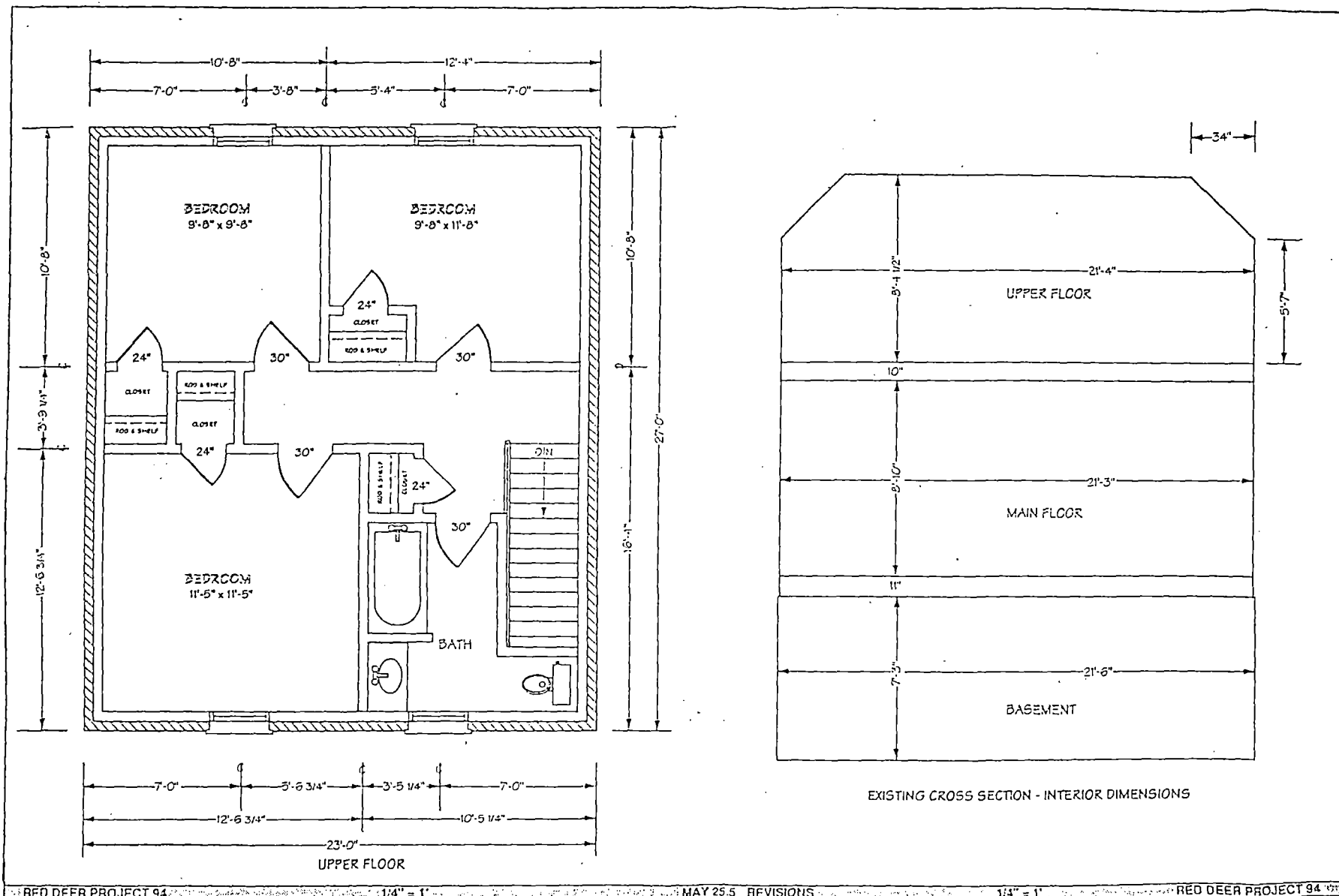
 n = .645 (between 0.5 and 1.0) RSE<sub>10</sub> = 3.5% (must be < 7%)

Q <sub>50</sub> = 4846 cfm	Air Change <sub>50</sub> = 18.73 per hour
Q <sub>20</sub> = 2684 cfm	
Q <sub>10</sub> = 1716 cfm	Normalized Leakage Area = <u>        </u> cm <sup>2</sup> /m <sup>2</sup> (must be < 0.7)
Q <sub>5</sub> = 1098 cfm	Equivalent Leakage Area = <u>504</u> in <sup>2</sup> at 10 Pa
	Equivalent Hole Diameter = <u>25.3</u> in

Comments: (Major leakage sites, recommendations...)

This test includes front and back porches.





## Red Deer Project '94 Specification List

Photodocumentation Opportunity	Educational Opportunity	Product	Location	Manufacturer or Contractor	Type/Model	Reason for Choice
<b>HOUSE INSPECTION</b>		<b>HAZARDOUS MATERIALS</b>				
Walk through of existing house Testing and monitoring for hazardous materials	Identification and removal of hazardous materials	Asbestos shingles	Bump-outs at each end of house	National Building Inspections	Not Applicable	To determine what testing and monitoring should be carried out
		Asbestos tape	Furnace ducting			
		Asbestos putty	Windows			
		Lead	Interior paints			
		Radon	Easement of existing house			
Removal and disposal of hazardous materials		Asbestos shingles, tape and putty	As noted above	Connolley Insulation	OHS guidelines	Strict guidelines regarding the removal and disposal of asbestos
<b>DEMOLITION</b>		<b>MATERIALS RECYCLED</b>				
Removal of front and back porches	Demonstrate the type of demolition that is often necessary and explain why it is required Demonstrate recycling of existing house materials	None	Front and back of house	Not Applicable	Not Applicable	To allow for additions to front and back of house
Removal of brick chimney		Brick from front and back of house	Chimney			No longer required due to installation of high efficiency space and domestic hot water heating system
Removal of brick from front and back of house			Front and back of house			To rebrick front of house (the remainder of the house is in stucco)
Gutting of bathroom, kitchen, etc		Bathroom	Upstairs bathroom			To allow for interior renovations and addition to back of house
Removal of existing plumbing, electrical, mechanical		Furnace	Existing basement			To allow for upgrades in these areas
Removal of existing insulation from attic		Fiberglass insulation	Attic			For use in crawlspace of new addition
		Vermiculite insulation				For use in landscaping and/or garden
Interior cleanup - removal of carpeting, plywood etc		None	Entire house			To allow for interior renovations
<b>FOUNDATION</b>		<b>FOUNDATION MATERIALS</b>				
Construction of footings and foundation walls	Using products made from recycled materials	Rebar	Front and back additions	Western Canada Steel	Rebar	Produced locally from 100% recycled products
Application of exterior dampproofing	Keeping basement dry	Dampproofing		Elsro Construction Products	Elsro 520	Water based emulsion product
Installation of weeping tile		Weeping tile		Sig O	Weeping tile	Produced locally with 20% post consumer waste content
Installation of plastic covered sump pits		Sump pits	Crawlspace		Sump pits	Recommended product for this application
Installation of teleposts and footings	Replacement of rotting wooden supports	Teleposts and cement	Existing basement	Not available	Not available	Existing wood supports were set in cement and had rotted
Installation of under slab moisture barrier	Keeping basement dry	Polyethylene - 6 mil	Existing basement	Layfield Plastics	CGSB certified	Recommended product for this application
Installation of interior foundation moisture barrier	Preventing soil gases from entering basement		Front and back additions			
Installation of crawlspace floor moisture barrier						
Installation of slab		Concrete	Existing basement	Burnco	Not applicable	Not applicable

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<b>STRUCTURAL</b>		<b>STRUCTURAL MATERIALS</b>				
Construction of floor	Use of environmentally preferred products	Wood-I Joists	Front and back additions	Trus-Joist Macmillan	Silent Floor	Reconstituted product produced from aspen and poplar which are fast growing to reduce the use of dimensional lumber
		Oriented strand board sheathing	Subfloor, walls and roof of front and back additions	Sturdwood	Weyerhaeuser	
Construction of roof system	Reducing building envelope heat loss	High-heel trusses	Front and back additions	Home Truss, Red Deer	High-heel truss	Allows for increased insulation levels over the wall
Installation of windows	Selection & benefits of high performance windows	High performance windows	Existing house	All Weather Windows	Super Edge Plus	Triple, Low-E, Argon, vinyl frame, super spacer ER rating = -3.82
			Front and back additions	Caradon (formerly Indal)	Advantage	Triple, Low-E, Argon, vinyl frame, swiggle bar ER rating = -3.82
Installation of doors	Selection & benefits of high performance doors	Steel insulated door	Existing house and additions	All Weather Windows	Not available	Foam core doors provide relatively high insulation levels
Installation of asphalt shingles	Efficient use of existing house materials	Shingles	Front and back additions	IKO Industries	Gard Seal 15	Allowed roof of existing house to be used
Installation of insulation stoos	Attic ventilation issues	Insulation stoos	Existing house and back addition	Not available	Not available	Readily available
Installation of the cellulose insulation system	Reducing building envelope heat loss	Cellulose fibre insulation	Existing house - walls	Can-Cel Industries, Edmonton	Wal-Bar	Produced from 100% post consumer recycled material
	Reducing building envelope air leakage		Existing house and back addition			
Installation of the fiberglass insulation system	Recycling of product from existing house	Recycled fiberglass insulation	Front and back additions	Fiberglas Canada	From attic of existing house	Allows to reuse existing materials
		Fiberglass insulation	Front and back additions - walls	Manville Canada	Gold	Contains recycled glass material
			Existing house - basement			
Installation of stucco finish	Recoating and existing stucco surface	Stucco cement plus white glue	Existing house and additions	Not available	Not applicable	Eliminated need to remove existing stucco
Installation of brick finish	Recycling materials from existing house	Existing brick	Front and back of house	Not applicable		Allowed use of brick from existing building
<b>AIR BARRIER AND VAPOUR RETARDER</b>		<b>AIR BARRIER AND VAPOUR RETARDER MATERIALS</b>				
Installation of main floor joist air barrier system in the new additions	Reducing building envelope air leakage	Tyvek	Front and back additions	Dupont Canada	Tyvek	Acts as an air barrier and not a vapour retarder so that it can be used with conventional framing techniques
	Proper installation of air barrier systems	Acoustical sealant		Tremco	Acoustical sealant	
Installation of main floor joist air barrier system in the existing house	Use of environmentally preferred products	Drywall and acoustical sealant	Existing house	Stanley Bostich	SB 500	Prevents air leakage through rim joist area from the outside and down through the balloon framed wall
Installation of second floor joist air barrier system in the existing house		Plywood and acoustical sealant	Existing house	Tremco	Acoustical sealant	
Installation of window air barrier and vapour retarder system		Polyurethane spray foam	Existing house	Abisko Manufacturing	Foamit	Provides an easy to apply, insulative sealant that ensures a continuous air barrier
			Front and back additions			
Installation of wall and ceiling air barrier and vapour retarder system		Polyethylene - 6 mil	Front and back additions	Layfield Plastics	CGSB certified	Provides continuous air barrier and vapour barrier retarder
		Polyhats	Crawls spaces			
		Acoustical sealant	Existing basement	Tremco	Acoustical sealant	Seals joints in air barrier and does not dry out over time
Sealing and insulating attic hatch		Gasket	Existing house	Not available	Not available	Prevent air leakage and heat loss between the attic and the house
			Back addition			

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PLUMBING		PLUMBING SUPPLIES				
Installation & air sealing of new and existing plumbing	Advances in plumbing such as plastic vs copper	Plastic poly-B pipe	Existing house and back addition	Plasco Manufacturing	Not applicable	Product typically used in Alberta
	Air sealing plumbing penetrations	Polyurethane spray foam	At exterior walls	Abisko Manufacturing	Foamit	Provides an easy to apply insulative, air barrier sealant
Installation of backwater valve and trap primer	Keeping basement dry	Backwater valve	Existing basement	Not available	Not available	Readily available
Installation of floor drains for HRV and furnace	Providing drains for condensing appliances	ABS pipe				
Installation of low flow plumbing fixtures	Water conservation	Low flow toilet	Main floor bathroom	American Standard	Cadet - AF-2605	13.25 Liter or less water consumption
			Ensuite bathroom	American Standard	Cadet - AF-2164.135F	Barrier free with 16" high for handicapped
		Low flow showerhead	Main floor bathroom	Moen	3127/97466	6 Liter or less water consumption
		Low flow faucets	Kitchen	American Standard	Not available	9.8 L/min (2.15 Imp. GPM) at 5.5 kg/cm <sup>2</sup> (80 psi)
			Ensuite bathroom	Moen	4570/97376	8.3 L/min (1.84 Imp. GPM) at 4.15 kg/cm <sup>2</sup> (60 psi)
Installation and sealing of water heating system	Selecting energy saving hot water heaters	Power vented hot water heater	Existing house - basement	John Woods	Superflue JW 520 PV	To achieve maximum efficiency from heating system
	Air sealing exterior vents	Polyurethane spray foam	Existing house	Abisko Manufacturing	Foamit	Provides an easy to apply, insulative, air barrier sealant
	Health issues regarding proper installation					
ELECTRICAL		ELECTRICAL SUPPLIES				
Relocation of electrical panel to interior wall	Minimizing air leakage around electrical panel	Electrical panel	Existing house	Square D Company	Not applicable	Readily available
Installation of energy saving appliances	Selecting energy saving appliances	Stove	Kitchen	Maytag	CRE95009DE	Energuide Rating = 840 kWh/year
		Refrigerator	Kitchen	Maytag	RTS1900DAE	Energuide Rating = 695 kWh/year, 68% CFC free
		Dishwasher	Kitchen	Maytag	DWU9400ABE	Energuide Rating = 684 kWh/year
		Clothes washer	back addition	Maytag	LAT7304ABE	Energuide Rating = 840 kWh/year
		Clothes dryer	back addition	Maytag	LDE7304ADE	Energuide Rating = 937 kWh/year
		Power vacuum	Throughout house	Dynovac	Not applicable	Manufacturer in Red Deer
Installation of built-in vacuum system	Proper venting of unit to outside					
Installation of recycled light fixtures	Tasteful use of recycled products	Existing light fixtures	Entrance, hall, upstairs bath	Not available		Supplied by local recycling company
Installation of energy efficient lighting	Electrical conservation through lighting	Fluorescent lighting	Kitchen, bedrooms, upstairs hall dining room			Reduces energy consumption
		Halogen lighting	Por lights in family/kitchen area			
		Dimmer switches	Family and living rooms			
		MECHANICAL		MECHANICAL SUPPLIES		
Installation of exterior weatherhoods	Proper air sealing techniques	Rubber gasket	Throughout house	Not available	Not applicable	Readily available
Installation and sealing of ductwork	Ensuring efficient space heating and ventilation	Duct tape				
Installation & air sealing of high efficiency furnace	Selecting higher efficiency furnaces	High efficiency furnace	Existing house - basement	Lennox Industries	G26Q3 - 100	90% fuel efficient eliminating need for combustion air line
	Reducing potential for backdrafting				Condensing	Electronic ignition eliminating continuously burning standing pilot
Installation & air sealing of heat recovery ventilator	Ventilation and indoor air quality	Heat recovery ventilator	Existing house	Venmar Ventilation Inc.	Flair 5585	High efficient, compact unit

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PAINTING		PAINTS, STAINS, REFINISHING PRODUCTS, PAINT STRIPPERS				
Spraying underside of existing floor	Reducing basement odours in existing houses	Sealant	Basement	Glidden	Lifemaster 2000	Contains no VOCs and is water-based
Stripping paint from banister and newel post	Proper safety precautions for corrosive product	Paint stripper	Banister and newel post	Circa	Not applicable	Highly effective and least expensive although toxic
Sealing underside of countertops	Reducing formaldehyde offgassing	Paint	Kitchen and bathrooms	Glidden	Lifemaster 2000	Contains no VOCs and is water-based
Painting interior	Selection of environmentally preferred products Products for chemically sensitive individuals	Paint	Main floor walls & ceiling	Benjamin Moore Latex	Regal	Contain less than 250 g/L of VOCs and is water-based Easy to apply decorative finishes to
			2nd floor	Glidden	Lifemaster 2000	Contains no VOCs and is water-based
FLOORING		FLOORING MATERIALS				
Refinishing hardwood floors	Efficient use of existing house materials Selection of environmentally preferred products Products for chemically sensitive individuals	Hardwood	Existing house except kitchen	Existing hardwood	Not applicable	Preserve existing hardwood
		Wood filler		Bona	Pacific Wood Filler	Contain less than 350 g/L of VOCs
		Sealer		Bona	Pacific High Bond Sealer	Contain less than 250 g/L of VOCs
		Curing agent		Bona	Pacific Ultra Cure	Contain less than 350 g/L of VOCs
Finishing stairs		Texture	Stairs to 2nd floor	Bona	Woodline Texture	Contain less than 350 g/L of VOCs
Installation of new flooring	Selection of environmentally preferred products	Marmoleum	Main floor other than hardwood Existing house - second floor	Not available	Not applicable	Natural raw materials; biodegradable and durable; production waste reusable
INTERIOR FINISH		INTERIOR PRODUCTS				
Installation of cabinets	Selection of environmentally preferred products	Vinyl wrap cabinets	Kitchen and bathrooms	WestEdge Cabinets	Not applicable	No emissions because sealed with vinyl wrap Water based contact cement
Installation of countertops		Laminate	Kitchen and bathrooms	Pionite		Durable and cost effective Supplier recycles shipping cardboard
Installation of ceramic tiles		Ceramic tiles	Around tub and shower	Not available		Low emissions, easy to maintain, durable