MEMORIAL HALL THE NEXT GENERATION OF REFURBISHMENT

...a landmark project in the heart of Southbridge

Introduction:

The “Memorial Hall” project is an exciting new development in the heart of downtown Southbridge. The coming year will see the completion of the building refurbishment in a sustainable manner and employing the latest thinking in energy and water use, material selection, ecology, health and wellbeing, pollution and waste minimization.

When complete, Memorial Hall will contain a suite of sustainable units; the ground floor will house two commercial units and an office; the second floor will house four affordable units and the third floor will contain three market rate units.

It is intended that the completed project will be a landmark building showing what sustainable refurbishment can achieve. The project will enable the cost of next generation refurbishment to be assessed against life-time operation costs.

We will be updating the blog on a regular basis. Please comeback and follow the progress

History of Memorial Hall

The first phase of the building was completed in 1878 by S.K. Edwards: this building can be seen on the left hand side of the building photographed below. The initial structure, was extended along Main Street 1882, to the corner of Chapin Street, this building was named ‘Memorial Hall’ in memory of a member of the Edwards family that had recently died. A second extension saw the rear of the building extended along Chapin Street resulting in the footprint that we see today.

The building is one of a series, described as “a fine example of American Victoriana.”

Photographs of the building circa 1919 show the configuration of the building with an ornate pitched roof. Later photographs show that this feature was removed, though no date or reason has been found for the removal.

From the photograph we can see that the heating system consisted of a series of open fires supported by a series of chimney stacks. The number of windows along Chapin Street can be used to gauge the length of the building. This photograph was taken before the second extension occurred.

In the 1950's the building façade was remodeled in the popular art deco style.

The building located in the centre of the busy downtown district is fondly remembered by residents to this day.

Memorial Hall still stands proudly on the corner of Main and Chapin Streets; however, time has taken its toll. After remaining vacant for almost a decade, the building had fallen into disrepair; the pitched roof that adorned the building was removed, many doors and windows were blocked or broken; the shop fronts fell into disrepair and the roof had begun to leak; seriously degrading the interior. The building was the subject of several town meetings because it was feared that the building would be lost to the town, leaving a gap in the centre of the town's Victorian row.

SBRC acquired the building in October 2007 with the aim of refurbishing it in a sustainable manner: improving the quality of life of the occupants and community; and reducing the impact of the building and its future operations on the environment. When complete, it is hoped that the building will be a landmark in Southbridge showing what sustainable refurbishment can achieve. The building will contain a suite of ten units; the ground floor will be partitioned into three commercial units; the second floor will be partitioned into four affordable units and the third floor will be partitioned into three market rate units.

All units will be finished to a high level of specification, for example, an elevator for access, a sprinkler system for safety and a high degree of insulation for energy efficiency. The existing shop fronts will be refurbished while a new entrance for the residential units will be added on Chapin Street. The windows will be replaced throughout the building with new openings added as needed. Much of the exterior will be rebuilt, re-pointed or washed brightening up Main Street.

Structural Repairs (January 2009):

Once acquired, it was important to stabilize the building to prevent the further deterioration of the building fabric. The roof of the building was completely replaced in March 2008. This was an urgent part of the work, as water was entering through the roof and running down through each of the floor levels.

A contractor was hired to identify and safely remove all hazardous materials in the building. Significant amounts of asbestos were removed from the original heating system boiler, piping and floor tiles.

Once removed the basement areas were cleaned and certified free of hazardous materials.

In parallel, the demolition work was started; this involved the removal of several skips full of

waste material that was being “stored” around the building. The walls were also stripped back to remove any traces of hazardous materials such as lead paint and asbestos.

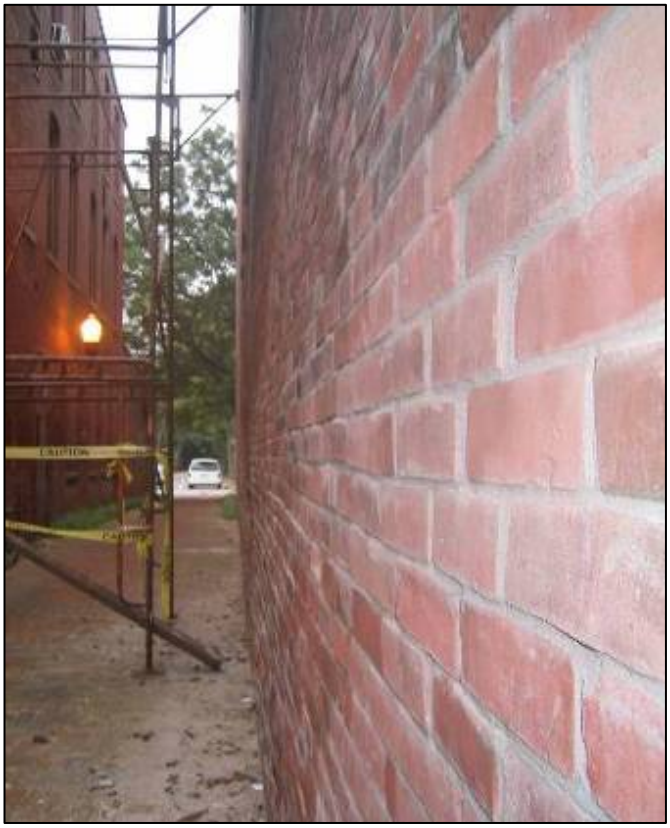
By stripping back the walls it is was possible to carry out a full analysis of the structural condition of the building. In addition, stripping back the walls allows aspects of the buildings history to be observed.

The stripped back walls revealed that the building has survived fire in the past. We don't know when it occurred but it was suppressed and the structure repaired by inserting steel beams into the walls. The fire was quite localized and while it was suggested that fire may have forced the removal of the pitched roof, it is unlikely that this was the fire.

Buildings of this era were prone to fire damage because of the balloon construction, which allowed fire to move rapidly through buildings: in the cavity between the exterior and interior walls. Today, building codes have eliminated such empty cavity walls making the buildings much more resistant to fire damage. In addition, smoke and heat alarm networks as well as sprinkler systems allow fires to be identified and suppressed more rapidly.

The town's fire service took the opportunity to investigate and learn about the internal structure of such buildings by exploring the open walls in Memorial Hall. This is one of the many opportunities for learning that we see arising from our project.

The open walls did not reveal any significant structural faults in the building fabric. One area where significant need for work was required was found on the ground floor.



This was not unexpected, as can be seen in the photograph above, where the wall is clearly bulging out into the alleyway. With access available via the inner and outer side of the wall it was possible to repair the fabric.

There were several other areas around the building where it was necessary to repair and refill the fabric.

The above photographs show how the remaining fire escape rails were removed and the holes repaired. In the refurbished building it is planned to add additional doors to facilitate the need for multiple egress paths from the building. A number of vents and small arches were also filled during this process.

The final stage of securing the outer fabric involved replacing all the windows around the building. This work has now been completed. The new windows are double glazed, argon filled and low e for energy efficiency.

The color of the new windows was chosen to match that of similar buildings on the Main Street, tying this project to others that have been completed on the main street.

To date, the last element of exterior work to be completed involved the restoration of the art deco façade of the building. The façade restoration work was carried out in consultation with the historical commission of the town.

We are particularly proud of this portion of the refurbishment work as care was taken to replace the curved glass front of the shops a challenge when one is using energy efficient double glazing.

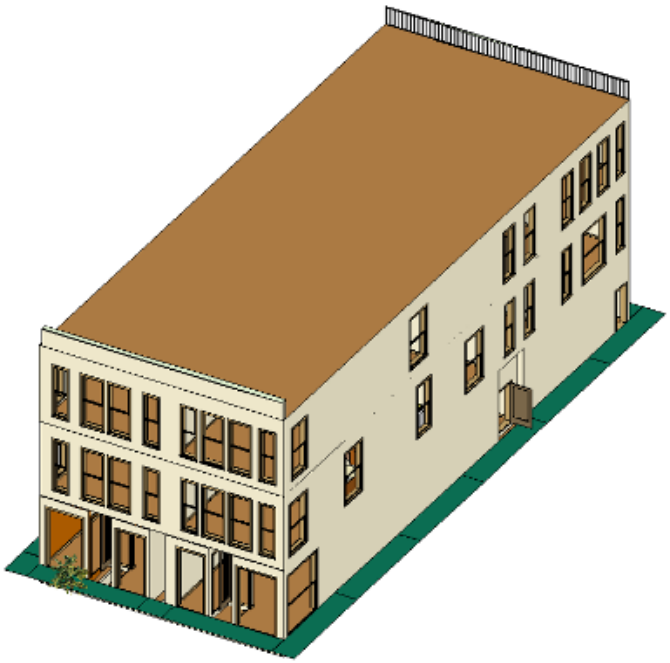
Projects like this are not without minor setbacks but these setbacks can highlight some of the challenges that developers are likely to encounter.

During the spring thaw the work was halted and the building cold. This allowed ice to build up on the rainwater drains on the roof. Once blocked, water built up on the roof and finally overflowed the glass roof hatch and entered the building.

Other problems that seem to arise with projects such as ours are vandalism and dumping on site. We continue to pick up abandoned furniture items and repair glass.

Refurbishment Plans (June 2008):

With the outer fabric of the building secured, our attention moved to the internal design of the building. A 3-D model of the building has been developed allowing the floor plans to be investigated. The model allows different layout scenarios to be explored and the living/commercial space to be optimized.

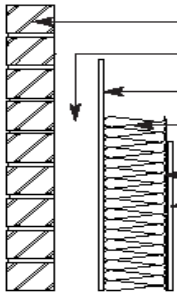


The 3-D model facilities the development of an access plan: the current plan calls for the installation of an elevator in the centre of the building. The elevator can be accessed from every floor and each unit. Access is also provided via stairs to the front and rear of the building. Hence residents can access the building from Main Street and Chapin Street.

LEED Registration (July 2008):

Yes	?	No			
5	4	5	**Sustainable Sites**		**14** Points
Y			Prereq 1	**Construction Activity Pollution Prevention**	Required
1			Credit 1	**Site Selection**	1
1			Credit 2	**Development Density & Community Connectivity**	1
		1	Credit 3	**Brownfield Redevelopment**	1
		1	Credit 4.1	**Alternative Transportation**, Public Transportation Access	1
1			Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
		1	Credit 4.3	**Alternative Transportation**, Low-Emitting & Fuel-Efficient Vehicles	1
	1		Credit 4.4	**Alternative Transportation**, Parking Capacity	1
1			Credit 5.1	**Site Development,** Protect or Restore Habitat	1
	1		Credit 5.2	**Site Development,** Maximize Open Space	1
	1		Credit 6.1	**Stormwater Design,** Quantity Control	1
		1	Credit 6.2	**Stormwater Design,** Quality Control	1
		1	Credit 7.1	**Heat Island Effect,** Non-Roof	1
1			Credit 7.2	**Heat Island Effect,** Roof	1
	1		Credit 8	**Light Pollution Reduction**	1

Energy Model (October 2008):



Wall construction (inside to outside)

Layer	Description	d (mm)	λ layer	λ bridge	Fraction	R layer	R bridge
	Rsi					0.13	
1	Plaster (lightweight)	13	0.180			0.072	
2	Rock Gypsum Blueboard	16	1.130			0.014	
3	Vapour barrier						
4 -->	insulation	300	0.040			7.500	
5	Brick outer leaf	105	0.770			0.136	
	Rse					0.04	

Total thickness: 424 Resistance (upper/lower limit): 7.992 / 7.992

Water Model (December 2008):

Material Reuse Plan (February 2009):

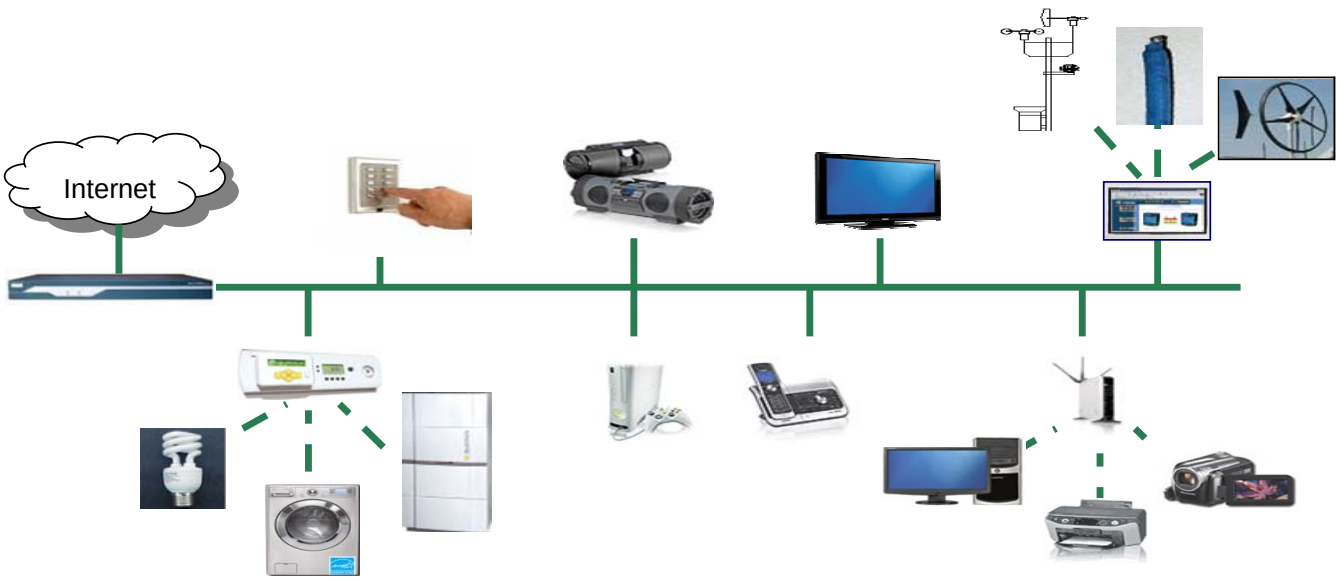
The most sustainable materials for us to use in our project are those that are already there. Hence, we plan to reuse the timbers in the walls floors and ceilings. We will use the exterior fabric and much of the ordinate structures.





Where possible new materials we use will be locally, sourced and rapidly renewable. Attention will also be paid to the out gassing from all epoxies, paints and sealers used on the project.

Sensor network backbone:



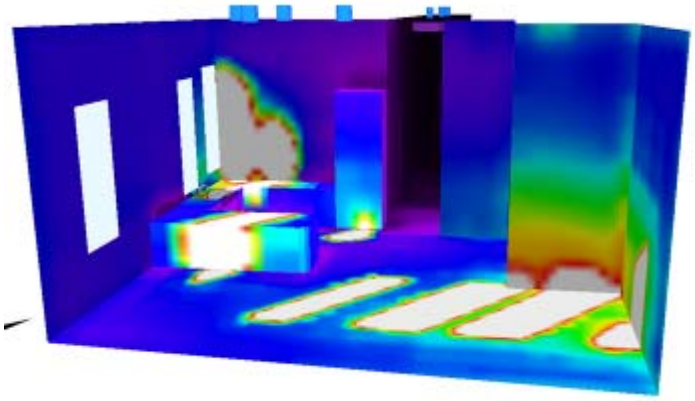
Lighting Design (November 2009):

An important aspect of our sustainable vision is sensitivity to the living environment and important part of which is the lighting strategy. We have opened up several windows that were closed over the life of the building. We have also added several new windows to meet the adaptive reuse of the building.

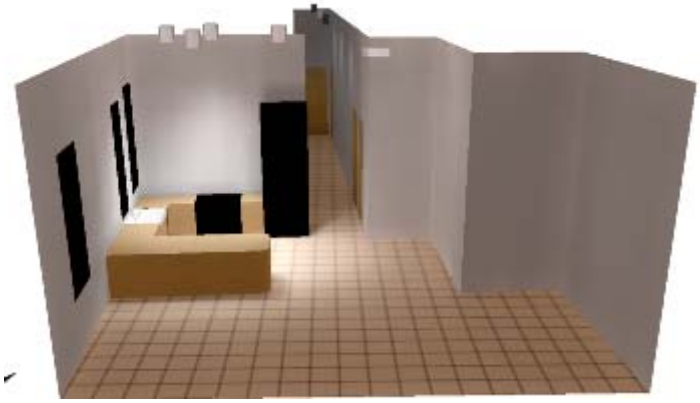
Each room in the building has been modeled for its optical performance. By correctly orientating each new room in the building we can model the propagation of daylight into the building over the course of a day or date. The model allows the irradiance across each surface in the building to be calculated for both natural and artificial light.

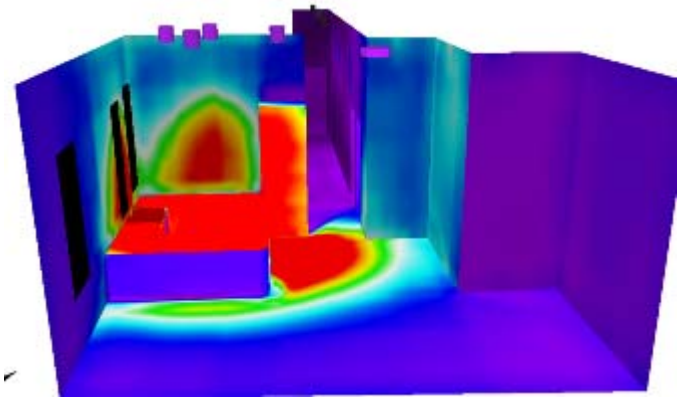
The pictures below show the irradiance as a visual effect and as measured for daylight for one room in the building. Each room of the building has been optimized for use of natural light by the addition of new windows and the reopening of existing windows. We have also been developing technology to collect daylight and bring it into the building. Of course there are limits to what can be done when refurbishing a building for example it cannot be reoriented to optimize light collection. We are further restricted as we wish our refurbishment to respect the heritage of the building and the context in which it stands on Main Street.

One aspect that we are exploring is the introduction of a light shelf on some of the rear windows of the building. The shelf will reduce the amount of heat radiating into the building during the peak mid-day summer months reducing the heat load on the air conditioning. In the winter months the low level sun will still illuminate the apartments providing critical heat and lighting.



The sustainability agenda also places restrictions on the artificial lighting to be used in the building. Our plan sees the building being illuminated by energy efficient compact fluorescent lights. The pictures below show the irradiance as a visual effect and as measured for one configuration of artificial light in one of the kitchens.





These are living models that will be adjusted as our work progresses/

Future of Southbridge Window Display Project (November 2009):

As part of its efforts to revitalize the town, Southbridge has started a window display project. The project will see many of the vacant shop fronts revitalized as display centers. This removes the impression of the town as vacant, brings people to the town, supports local business and lifts the spirit of the community.

Memorial Hall is currently displaying optical hardware. This is appropriate given the history of the owner as an expert the field of optics.

Status of work January 2010

The refurbishment work is moving along at a great pace. The following images show how much progress has been made to date.

The floors have been repaired on the third floor and the roof has been insulated. The elevator shaft has been cut out and can be seen on the right hand side. The apartments will be well illuminated by natural light when the building is complete.

Work has started on the second floor laying out the rooms. Steel frames will be used throughout the building both for internal walls and to frame the outer walls. The floors have been repaired and sanded ready to finish. The pink paper is in place to protect them during the final construction.

Status of Work March 2010

Construction of the elevator shaft has started and it has already cleared the basement level. Over the coming months it will reach to the roof.

Great progress is being made with the walls and the first fix plumbing. You can also see much of the duct work has been installed as has the sprinkler system on the third and second floors. Also clearly noticeable is the insulation on the roof.

Status of Work April 1010

The elevator shaft has reached the third floor and work has started on the mechanical room, located in the basement.

We have also started to procure material for the sensor network. We plan to start testing of the monitoring system in June 2010. We are now planning to install a wireless network in place of the Ethernet system initially proposed. This will offer a much higher degree of flexibility. I have a student working towards a masters project working on the project.

Status of work May 2010:

The internal frames are now up on the second and third floors. The layout of each room can be seen. The photograph shows one of the handicap accessible units.



From the photograph above you can see that the external walls are being insulated. It would have been great to leave them exposed, however they would dramatically reduce the thermal efficiency of the building so we have to insulate and cover the.

Status of work June 2010:

First and second fix plumbing and electric, has been completed and approved on the second and third floors. We are ready for the insulation to be sprayed in.

The photograph above shows one of the ten mechanical rooms. We have been busy taking photographs of each area before the walls are closed in. It should be a real help if we ever wish to change the walls around.


Electrical wiring has been completed as has the cable TV and the CAT-6 for the broadband sensor network that will monitor the performance of the building.

The photograph above shows one of the bath tub units that have been installed. Notice all the window area. Another example of first-fix plumbing.

The town continues to develop the main street. The most recent addition, beautiful arch way lights spanning the alley ways. The lights are ornate in keeping with the character of the towns existing street furniture and add to the security by eliminating any dark areas along Main Street.

Status of work July 2010:

We continue to make good progress in July.

The photograph shows the third floor ceiling with one of the kitchen vents installed.

Status of work August 2010:

We have applied for a façade grant through the town to help fund the restoration of the shop fronts. Our aim is to make one of the shop units appear in the style of 1890's when they were first built. The photograph shows the design that we have proposed to the town. The unit being proposed is shown on the left hand side of the drawing.

The drawing above also shows the proposed copper shelter to be installed over the new side entrance. We will likely lower the sign board to avoid interference with the granite detailing over the windows. This is an important characteristic of these 19th century buildings.

Internally we have insulated all the external walls and started putting the sheet rock in place. The sheet rock makes it easy to appreciate the space and light in the apartments.

The interior spaces of the apartment units is really starting to take shape. The photograph shows one of the kitchen islands that have been prepared ready for sheet rock.

Some of the plastering work has been completed on the third floor, will have a big push in this area over the next few weeks.

One of the biggest challenges has been to sheet rock and plaster the curved ceilings in the third floor apartment. However, the final effect is great and we are delighted to have preserved this original feature of the building. The ceilings are 14’ high on this floor giving a great sense of space, while the curved walls add to the form.

The building is really starting to take shape now as we complete the sheet rock on the top two floors.

The elevator shaft has been completed and ready for hardware. We will be holding off the installation of the full elevator until after the electrical supply has been connected. But we will start installing some of the initial hardware.

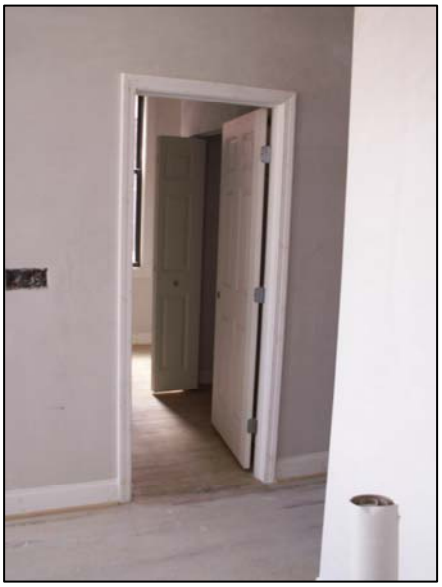
Status of work September 2010:

We have started adding some of the elevator hardware.

The railing for the elevator shaft has been installed ready for the carriage.

Status of work October 2010:

The last of the flooring has been installed. We managed to save 90% of the existing timber floor. This was achieved by taking timber from one section to fill in areas of damage around the building. The section used to fill the gaps is pictured above and shows how it has now been filled in. This is the only area of new flooring that we needed. Once it has all been polished and varnished it will look great.



We have started to do the finish work and install doors.

Window trim and window sills have been installed. While it is difficult to see in the photograph, the curved ceiling worked really well.

The rear opening from the office unit emergency egress has been cut, next is the ramp, trip and door.

Status of work November 2010:

We continue to finish off the second and third floors. We have been delayed with issues over the electrical supply. This has finally been resolved so we will be starting the final big push now.

The island kitchens are great and really add to the character of the apartments. There is a great sense of light in the building. Note the tin ceiling over the kitchen island. This ceiling has been cleaned and is ready for painting. It is a magnificent tin metal ceiling another feature of the original building that has been preserved.

December 2010

The façade grant came through and paid for the façade refurbishment for one of the shop units. We tried to be faithful to the original Victorian design. Of course we used double glazing in all of the transparent panels to improve the energy performance.

New shaped columns were added around the entrance to the shop to match the remaining green column. The green column is an original and it has been protected.

There is a new door to the right of the façade and its entrance was finished to match the shop façade.

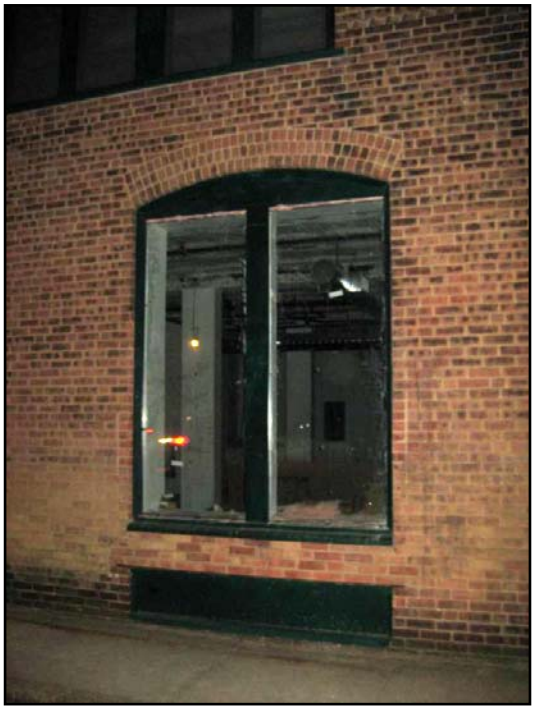
The block work on the right hand side was cleaned, restoring the brick column and granite stonework to its original glory.

January 2011

The weather has been terrible but we continue to make progress. We are close to completion, but there are still a few months of work to be completed.

The new door at the rear has been installed. This work was supported by the façade program and we are grateful to the town for their continued support. This door is the second entrance to the back commercial space. The brass overhang is a nice detail and adds to the overall character of the building.

To the side of the building the remaining windows have been added as has the main entrance to the apartments and elevator. The building is finally closed in on all four sides and the roof. This is a significant milestone as it will allow the heating system operate without dumping the heat outside.



There is lovely detail above some of the windows such as that shown above, so it is great that they have been reopened after been bricked up for so many years. The work on Memorial Hall has really added to the quality of the Chapin Street.

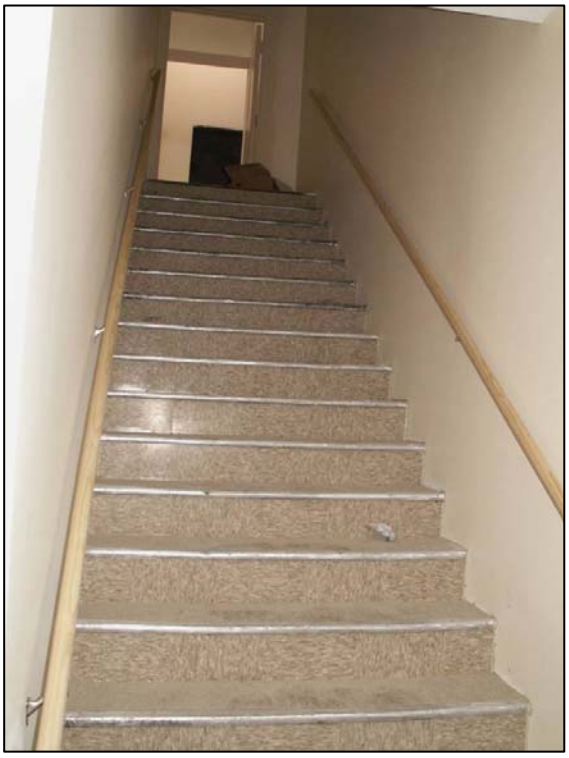
The gas and electrical services have been installed and we are now heating the building. The weather is cold outside but we have a well insulated building and can continue to work inside. Tasks like painting can commence once the plaster has fully dried.

The Gas Company has also completed the hookup to the building so we are ready to go.

The electricians have done all the work that they can. Each floor is wired for electrical, cable TV and Ethernet. All that remains now is for National Grid to connect the three phase power to the building and install the meters. This is now the gating item as we can't complete the elevator with the current temporary electrical hookup. We had a concern that one of the electrical boxes was too close to the ground and but this has been resolved by adding a new meter slot and the lowest meter will be left empty and unused. We have approval now for the electrical power, all we need is national grid.

February 2011

I had really hoped we would be finished by the end of the month, but it does not seem possible now. This is a dissapointment, but we continue to make progress. The biggest issue now is the electrical hookup. We have been unable to get National Grid to connect the three phase power to the building and so the elevator is on hold. We are completing work on the floors, and installing kitchens. It certainly looks great, we are so close now.



The stairway from the mainstreet entrance has been completed and looks great. We kept the original stairs, reusing the timber. Ofcourse the stairs has been fully insulated to ensure that there is minimal heat loss and a protective tile has been installed. The banasters are in and its is ready to go.

The baths have been in for many months now but the bath rooms have now been tiled. We are still waiting to install the final plumbing fixtures such as toilets and washhand basins. But the cabinets are in.

This work is progressing well and causing no delays.

The kitchens have been installed and also look great. We have went with a cherry finish throughout the building and over the coming weeks we will be installing all the units with equipment including; Stove, hob, fridge, freezer, dish washer as well as laundry.

The floors have been finished a number of times, we are leaving the final coat until the remainder of the work has been completed.

You can see just how much natural light there are in these units. This is an affordable unit that is also fitted out to met the needs of a disabled tenant. The photograph also shows how the original tin ceilings have been preserved and restored. This has been an important aspect of the project: demonstrating that affordability and sustainability can be achieved in a cost effective manner.

In addition to preserving we have tried to add details around the building such as the fan and window trims.

There is also a sprinkler system throughout the building to ensure the safety of the residents.

We have kept the colours neutral so that we preserve the brightness of the space and can accomidate the needs of a wide variety of tenents.

March 2011

I havnt had a chance to get good pictures of the outside of the building yet, but as soon as I do I'll get them up on the blog. Keep an eye on our progress. I'll update again in March.

We are starting to collect data from the sensor network, we have moved to an all wireless system. I am delighted to have the ethernet backplane as that will make the units great as home offices and we will still be able to collect data using the sensors. I put up some sensor data in thye next few months.