



Long-term Care Facilities

NORVIEW LODGE & PARKWOOD MENNONITE HOME

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Foreword

Canada's ageing population means an increasing demand for more facilities dedicated to providing care for elderly citizens. Facility operators and residents are looking for accommodations and services that are accessible, safe, cheery, and bright, and yet economical to construct and maintain. Wood construction offers many advantages—for example, wood-frame construction is economical, and wood finishes and exposed wood members offer architectural appeal and warmth. This Case Study provides information for two long-term care facilities recently constructed in Ontario, Canada. Both these projects exemplify the ambiance and features that operators and residents are seeking.

Norview Lodge, Simcoe, Ontario

Located in Simcoe, Ontario, Norview Lodge long-term care facility accommodates 179 residents in a rural setting reminiscent of the farming background familiar to many of the residents. Set on a large site (**Figure 1**) at the edge of a natural Carolinian forest, the building's wood structure and cladding allow it to fit easily into its rustic setting. Low in scale with large, sheltering roofs, the building reflects the modest, agricultural buildings of the area while providing an interior residential atmosphere.

At the conceptual design stage, several options were presented to the client, Norfolk County, including a high-rise of non-combustible construction. It was desired that the new facility reflect the agricultural heritage of the area, be moderate in cost, be low-scale in profile, and make best advantage of the views from the site. As a result, two-storey wood-frame construction was selected.

Architectural inspiration for the design came from a desire to have a strong inside-to-outside connection, as many of Norview's residents have ties to the surrounding farming community. The inside-to-outside design is provided by the use of glazed courtyards, deep porches at the end of each corridor, and shaded terraces on the second level. Large expanses of windows provide open vistas that are interesting and different in each direction.

Building Description

The facility is comprised of a central area that houses administration and central services. The living quarters are situated in two wings that are in turn divided into two home areas. **Figure 2** shows the basic configuration of the administration wing and one of the home areas. The facility has 119 private rooms and 30 double rooms, and all exceed the provincial minimum standard for size. In addition to these rooms, each home area has a dining area, an activity room, and a spa area for grooming and bathing.

FIGURE 1 Site Plan

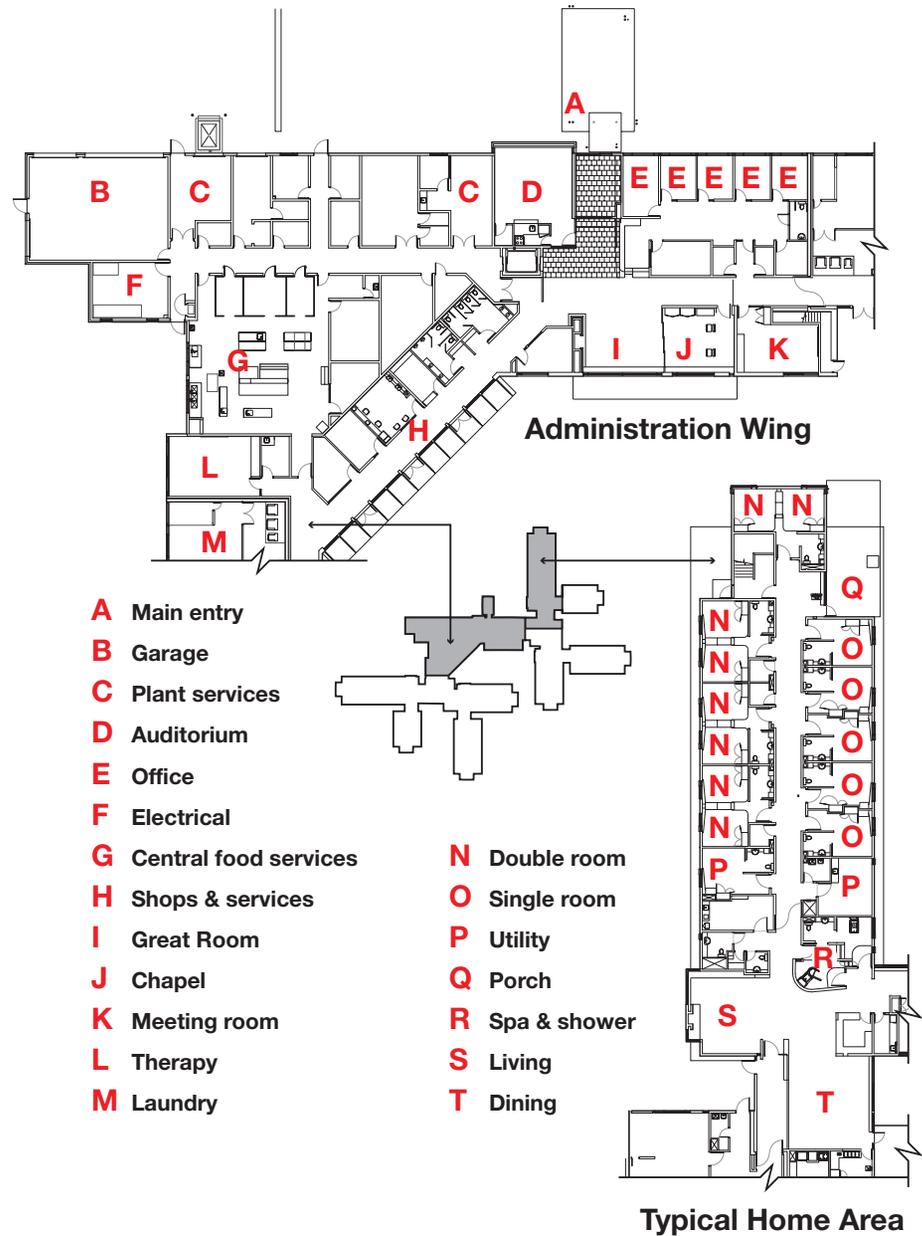
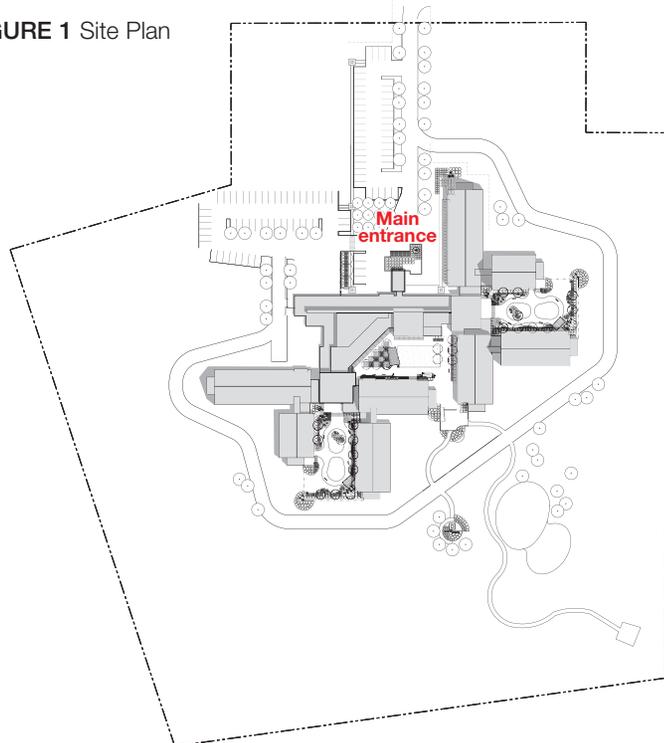
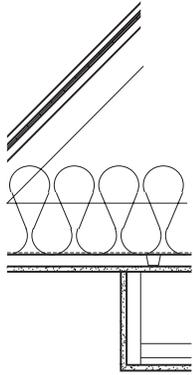


FIGURE 2 Configuration of the central area and a home area



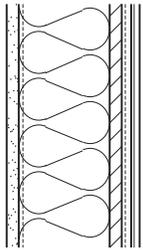
Typical Roof Section

- Metal roofing**
- Continuous metal roofing membrane underlayment**
- 16mm exterior sheathing panel**
- 19mm wood strapping**
- Pre-engineered wood roof trusses**
- 260mm insulation – Type 3 (R=40)**
- Continuous vapour retarder – Type 1**
- 22mm resilient galvanized metal furring channel**
- 13mm gypsum board (Type-X gypsum board at underside of roof trusses above dropped ceilings and concealed spaces)**

Typical Exterior Wall Section

- 16mm Type-X gypsum board**
- Continuous vapour retarder**
- 38mm x 140mm wood studs @ 400mm o.c.**
- 140mm insulation – Type 3 (R=20)**
- 16mm exterior sheathing panel**
- Continuous air barrier – Type 2**
- 19mm wood strapping**
- Prefinished wood siding**

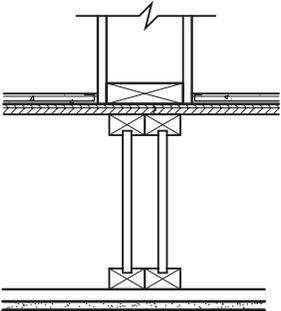
1 hr. fire resistance rating



Typical Floor Section

- Floor finish**
- 19 mm concrete floor topping**
- Galvanized metal-lath**
- Concrete topping moisture retarder membrane**
- 19mm plywood underlayment panel**
- 400mm wood I-joists**
- 22mm galvanized metal resilient furring channel**
- 16 mm Type-X gypsum board**

45 min. fire resistance rating



The central area includes administration offices and workshops, central food services, shops and amenities, an auditorium, a great room with a fireplace, and a chapel. The doors to the Chapel open into the great room to accommodate large gatherings.

The communal spaces, featuring the chapel and the great room, are grouped within a central double-height volume with high windows that face towards the site entrance. When lit at night, the high volume creates a welcoming beacon and a strong visual presence from the main road. Wood is used extensively within the community spaces and is combined with other natural materials to provide warmth and comfort.

There is one elevator located in the central area, and there is an additional elevator for each of the two wings.

Structure

Norview Lodge is a wood-frame building. Parallel strand lumber and glulam members support loads over openings, but these are not exposed to view. The walls are typical wood-frame construction with 2 x 6 stud members (Figure 3). The main floor is a concrete slab on grade. The second floor is comprised of wood I-joists with a concrete overlay, and provides an STC rating of 57. The roof is sheet metal supported by light-weight wood trusses. The trusses were built in two sections with the upper section fastened to the lower section with truss plates (Figure 4). The trusses were manufactured with an inset to provide room for mechanical services. Solid wood posts were used for the porch roofs.

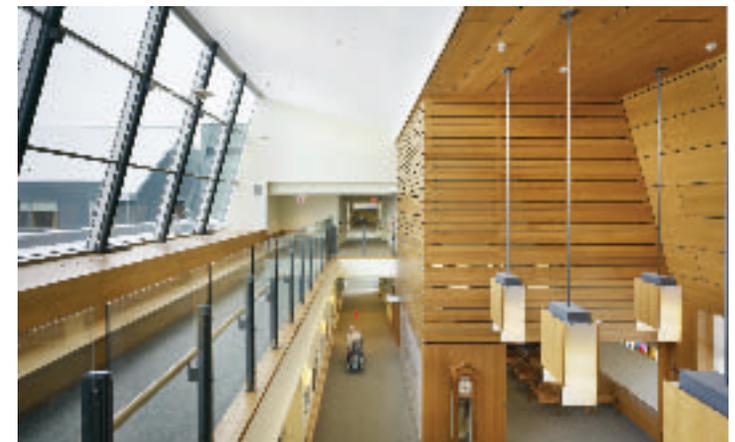


FIGURE 3 Typical Roof, Wall and Floor Sections

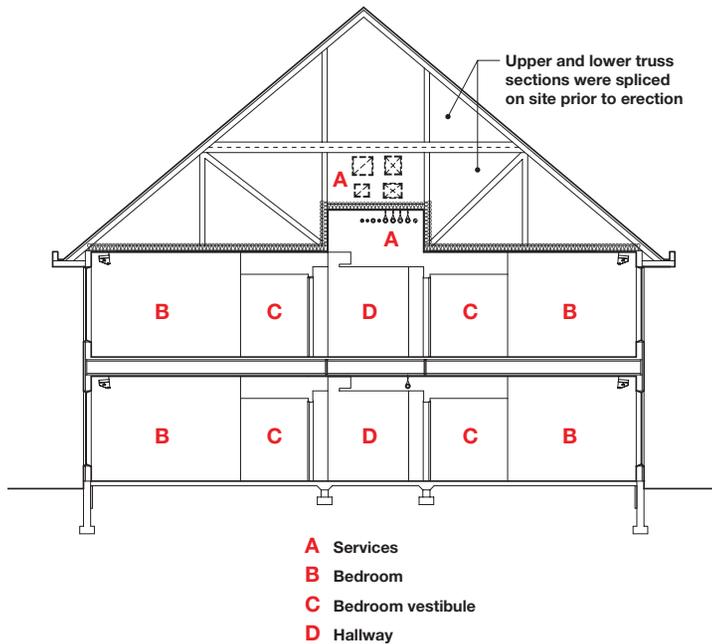


FIGURE 4 Section through a typical home area

Finishes

Interior

Acrylic-impregnated wood floors are used extensively to provide a surface highly resistant to moisture and scratches. Wood is used extensively for trim, light fixtures, doors, handrails and furniture to provide an upscale appearance. The millwork throughout the facility is solid-core red oak veneer.

Exterior

Pre-finished wood siding was used for the exterior except for a few locations where fibre-cement board was used. To provide visual interest, several patterns of wood siding were used (horizontal V-joint, vertical V-joint, and board and batten). Western red cedar was used for trellises and soffits, and for the main entrance canopy.



Fire Safety

The facility is separated into five buildings by means of 2-hour firewalls. This provided the option of using light-frame combustible construction by reducing the building area from that of the facility as a whole to that of each separated area. The five buildings have a footprint area of 6,087 m² (65,500 ft.²) and a gross floor area of 11,424 m² (122,900 ft.²).

Each of the four home areas is Group B2 occupancy and the Administration Wing is Group D occupancy. The building is sprinklered throughout. A separate dry sprinkler system is provided in the attic space. Access is provided from all sides of the building by means of a ring road.

Special Features

Norview Lodge has several defining features. The client wished to make the Lodge visible despite being set back from the main road. As a result, the skylight in the great room was designed to serve as a lantern or beacon. The heating and cooling in the residents' rooms is provided by the movement of air over pipes concealed behind a valance, resulting in reduced drafts – an important feature for senior residents. Natural light is maximized in each room, the chapel and the



great room. The windows in the residents' rooms are large and operable. Storm water retention ponds on the site manage rain-water and the migratory birds they draw create an attraction. The facility uses the unbeatable combination of natural light and the honey-richness of nicely finished wood surfaces.

Based on energy-saving features that improved energy performance beyond the requirements of the Model National Energy Code for Buildings, the building owner was awarded a Commercial Building Incentive Program (CBIP) grant.

Environmental Considerations

In addition to the cost and appearance advantages of building with wood, there are several environmental advantages. Life cycle analysis (LCA) tools like ATHENA® (<http://www.athenasmi.ca>) and BEES (Building for Environmental and Economic Sustainability) (<http://www.bfrl.nist.gov/oa/software/bees.html>) software can be used to compare the environmental implications of construction techniques.

Many comparisons have been made analyzing the life cycle implications of using wood, concrete or steel structural materials. LCA analysis shows that wood construction has a lower embodied energy than other structural systems. More detailed information about LCA and the significant benefit of using wood products is available in the Canadian Wood Council's

publication *Energy and the Environment in Residential Construction* (www.cwc.ca/Publications).

A recent European study concluded "Specifying wood in public procurement can help fulfill national and local climate change programs... Substituting a cubic metre of wood for other construction materials (concrete, blocks or bricks) results in the significant average of 0.75 to 1 tonne CO₂ saving." (*International Institute for Environment and Development, Using Wood to Mitigate Climate Change, 2004*). A typical home area wing at Norview Lodge is comprised of approximately 165 m³ of wood products. This means each wing reduces CO₂ emissions to the environment by 125 to 165 tonnes.

In addition to lower CO₂ emissions during manufacturing and use, wood products also store carbon that would otherwise be released to the atmosphere as CO₂ when over-mature trees die and decompose. Harvesting trees in a responsible, managed fashion removes mature trees that are less able to capture carbon than younger, faster growing trees.

Because embodied energy can represent about 22% of the energy a building will use over an 80-year service life, as the science of building rating systems evolves, there will be increased emphasis placed on embodied energy and carbon storage. This will make the environmental advantage of using wood products even more apparent.

Cost

At the outset of the project, several building configuration options were examined including steel, concrete and wood. Based on the building owner's desire to provide a residential atmosphere (low-scale, sloped roofs etc.), a two-storey configuration was selected. For this building scale, wood-frame construction provided the best value. According to Project Architect Ed Applebaum,

“ A preliminary cost comparison was made for several building systems based on one residential wing of the complex. Wood construction provided the best value for the money. ”

The cost comparison indicated a 10 to 15% cost advantage for wood-frame construction, and included in the cost advantage was the design flexibility to provide features such as sloped roofs, cathedral ceilings, and the residential character desired for Norview Lodge.

Conclusion

Norview Lodge is a large, long-term care facility that has been carefully tailored to provide essential services in a central administration area, and accommodation in living areas that are communal and residential in scale, form and function. The selection of wood-frame construction for the facility provided cost effectiveness and on-going environmental advantages compared to other structural materials. The residential scale desired by the client is appreciated by the residents. The careful application of wood finishes throughout the interior and exterior resulted in an uplifting, non-institutional atmosphere.





Norview Lodge Project Team

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Parkwood Mennonite Home, Waterloo, Ontario

Located on the north-east outskirts of Waterloo, Ontario, Parkwood Mennonite Home is comprised of the recently-completed long-term care facility, and existing unassisted living accommodation for seniors (**Figure 1**). The design of the Parkwood home long-term facility reflects its aim of providing emotional and physical well-being in a home-like setting. The building houses 96 residents in three resident “home areas.”

The home’s residents are strongly rooted in the rural landscape of the surrounding farming communities. Therefore, heavy timber framing, which was frequently used for barn construction in the area, was employed in key areas of the facility to provide a link to the rural roots of many of the residents. These areas of the building are oriented to provide views of an adjacent heritage farm property that has been saved from redevelopment.

The clients for this project sought a warm and welcoming atmosphere that would meet budget limitations. Right from the conceptual design, wood was favoured for both structural and decorative applications. Analysis showed that wood construction provided the best value and allowed the client to realize all its functional program requirements within the established construction budget. The use of wood for many finishing and decorative applications created a rich, bright atmosphere at moderate cost.

Elaine Kilburn





Elaine Kilburn

Building Description

Beginning right from the vehicular drop-off area at the main entrance, exposed timber frame roof elements and clustered timber columns create an organizing design element that leads residents and visitors through the front door to the 'interior streets' that lead to the administration wing, Fellowship Hall and to the home areas (Figure 2).

The smaller ground floor houses the main kitchen and other service areas as well as one home area. Each of the three home areas has 32 bedrooms. Some pairs of rooms share a bathroom and most have private bathrooms. Each home area has shower and bathing rooms, a dining room, activity rooms and a small den.

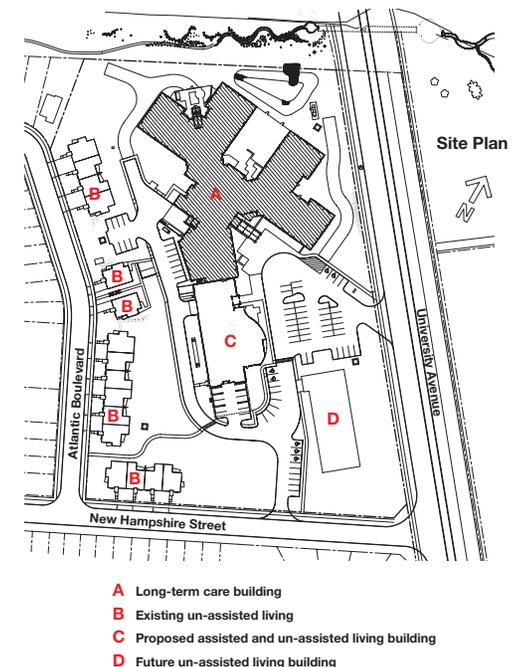
Located near the main entrance, Fellowship Hall and the adjoining chapel is the heart of the long-term care facility, where residents and visitors meet informally and for special occasions. The rooms are separated by a set of six custom-made sliding hardwood doors that can be positioned to adjust the configuration of the rooms to suit special events.

Structure

The home areas are constructed with conventional wood-frame walls (Figure 3). The first floor is comprised of wood I-joists, plywood sheathing and a 25-mm-deep concrete topping. Resilient channels and absorptive material in the floor cavity provides a sound transmission class (STC) rating of 57 and an impact insulation class (IIC) of 24. The flat roofs are comprised of wood I-joists supporting 16 mm plywood sheathing, 76 mm rigid insulation, a 23 mm fibreboard sheet overlay, and four-ply built-up roofing. The sloped roofs are metal roofing and waterproof membrane supported by wood trusses or wood rafters.

The communal wing also utilizes wood-frame walls and engineered wood roof joists. The entry canopy and connecting interior street, Fellowship Hall (Figure 4) and the chapel are framed with Douglas fir heavy timber columns and tied beams for the roof. Structural insulated panels (SIPs) provide a bright, reflective highlight for the roof's heavy timber framing. These areas are roofed with a waterproofing membrane covered with metal roofing.

FIGURE 1 Site Plan



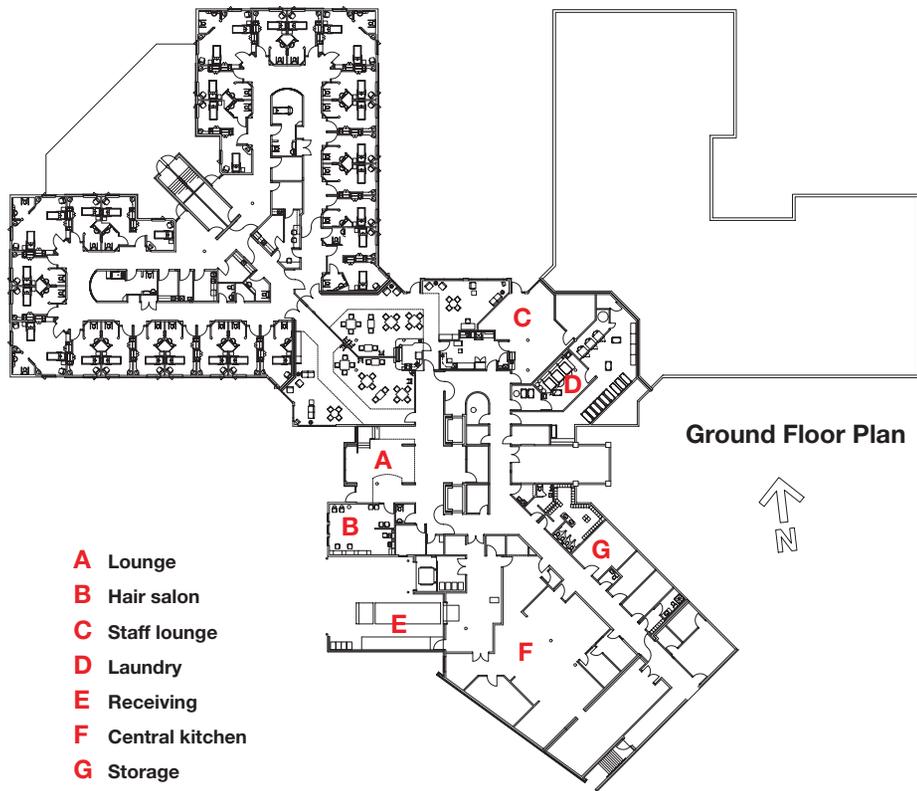
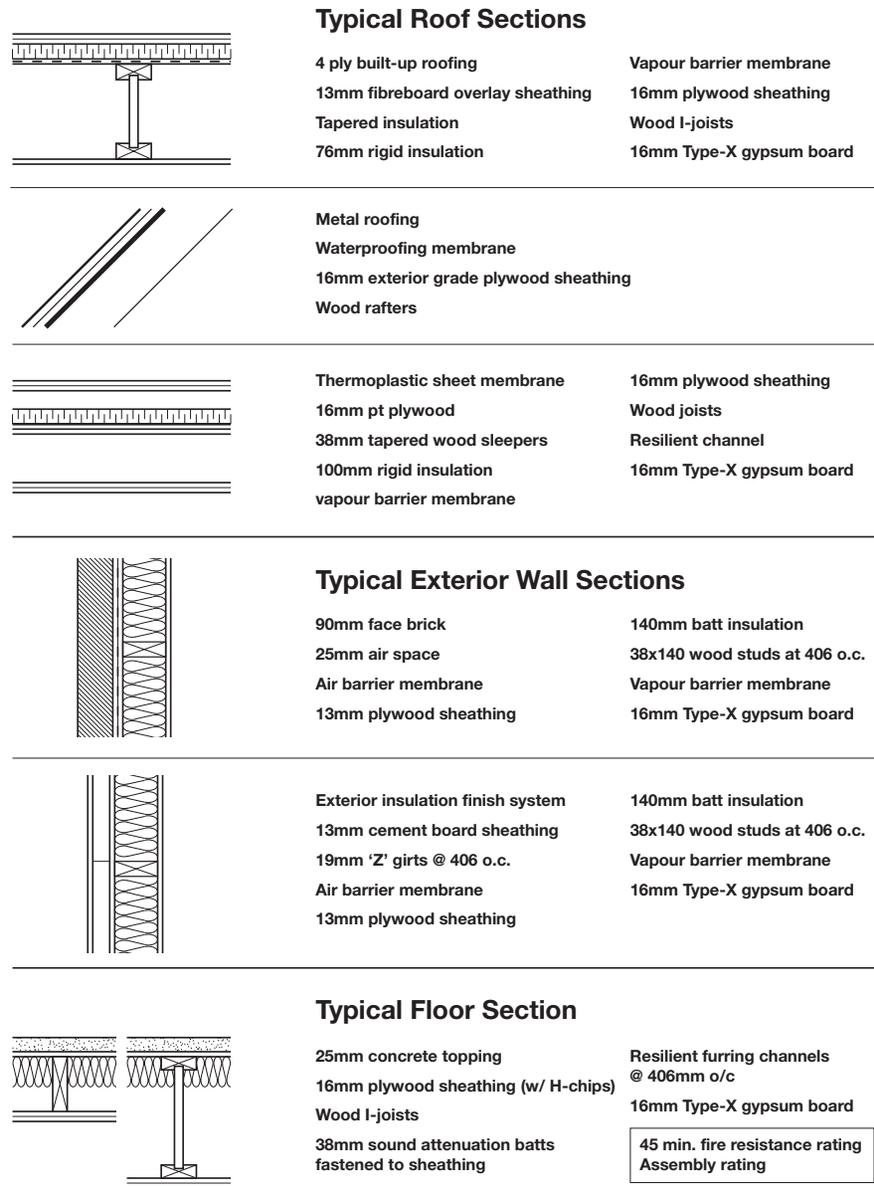


FIGURE 2 Ground Floor Plan / Main Floor Plan

FIGURE 3 Typical Roof, Wall and Floor Sections



Finishes

Interior

Wood is used prominently in Parkwood Mennonite Home because it adds richness and texture to the living space. Fellowship Hall and the chapel area have exposed Douglas fir timber framing, wood cladding, windows, and sliding partition doors that create an inviting and hospitable atmosphere. The large windows and reflective ceilings above the timber framing allow natural light to flood the interior. The wood furniture and fireplace hearth with hand-hewn timber mantle create a focal point for Fellowship Hall. Other special wood features include:

- a donor wall made of hand-carved wood
- wood-clad stair railings
- a timber ridge beam exposed through the chapel skylight to form a cross
- the reception desk
- the bookshelves in Fellowship Hall

In the home areas, the corridors are fitted with clear maple bullnose bases, wood handrails and backer boards, and clear maple doors.

Exterior

The entrance canopy protects residents and visitors from the elements, and offers an invitation to enter. Clusters of Douglas fir columns at the main entrance clearly identify the entrance and provide a stately welcome. The exterior cladding is brick veneer used in combination with cement board.

Fire Safety

To meet the requirements of the Ontario Building Code, the facility was subdivided into four separate buildings by the use of 2-hour firewalls. This provided the option of using light-frame

combustible construction by reducing the building area from that of the facility as a whole to that of each separated area. The home areas are Group B2 occupancy and the communal central wing is an A2 occupancy. The total floor area of the facility is 7,330 m² (78,860 ft.²) and it is sprinklered. There is fire department access to the principle access of each of the four building areas.

Special Features

This project has several interesting design features. The use of heavy timber columns and trusses in the entrance, chapel, and Fellowship Hall provide strong visual appeal. Throughout the facility, the careful use of wood millwork and trim adds to the agreeable atmosphere of the facility.

Food delivery between the ground floor kitchen and the dining rooms occurs through discreet service entrances near the elevators that eliminate disruption to the public areas.



Elaine Kilburn

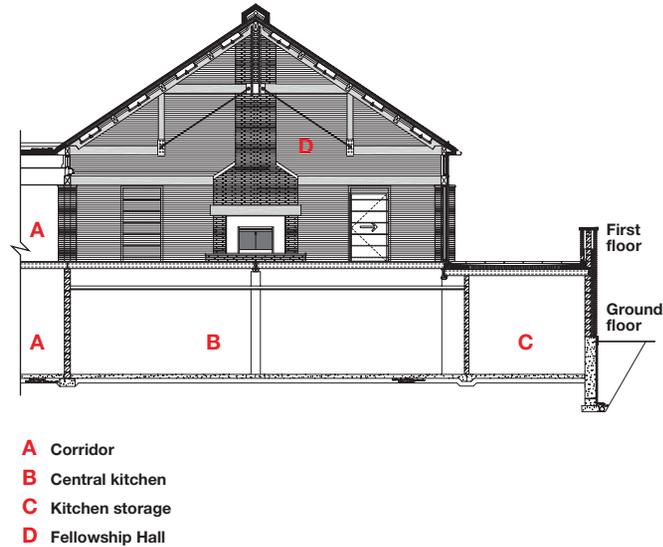


FIGURE 4 Section through Fellowship Hall

Environmental Considerations

In addition to the environmental advantage of building with wood products explained in the Norview case study, Parkwood Mennonite Home benefited from the environmental advantages of wood, and also scored well when assessed using the Green Globes Eco-Rating Program (<http://www.greenglobes.com/>). This rating system was designed to evaluate efficiency and rate the energy and environmental design of buildings. In order to guide environmental performance integration in the design of buildings, the Green Globes program also helps to identify opportunities to save energy and water, reduce waste, and prevent water, air and land pollution in the management and operation of a facility. Parkwood Mennonite Home received a rating of **“3 Green Globes”**, indicating “excellent progress in achieving eco-efficiency results through current best energy and environmental design practices.” This is roughly equivalent to **LEED™ Silver**.



MMMC Inc. Architects

The project rated particularly highly in the areas of Energy and Indoor Environment. Some of the features and benefits are listed as follows:

- The thermal resistance of the envelope meets the Model National Energy Code of Canada for Buildings recommendations.
- The amount of daylighting is optimized through building orientation and window-to-wall-size ratios. Large windows have been provided in public areas to increase daylighting and views to the exterior.
- The building's energy efficiency is increased through energy-efficient lighting fixtures, lighting controls, HVAC equipment, high efficiency boilers, radiant perimeter heating panels, building automation systems, and high efficiency motors.
- Floor areas were optimized to efficiently fulfill the building's functional and spatial requirements while minimizing the amount of space that needs to be heated and cooled. A high ratio of net program area to gross building area was achieved through careful planning. Bedroom corridors were configured to provide optimum width in conjunction with suite entry alcoves. This allowed sufficient maneuvering space in width with a minimum of total circulation area.

- The building was situated to optimize the effect of microclimatic conditions for heating or cooling and to provide shelter from wind and snow.
- The building design maximizes opportunities for natural ventilation. For example, windows in the resident rooms, dining and lounge spaces and the offices are operable.
- Low-VOC emitting, non-toxic materials were specified.
- Solar shading devices were specified to enable occupants to control brightness and glare from direct daylighting.

Cost

Cost was a critical consideration for the building owner. Once the general layout of the building was established, the cost consultant made a rough cost comparison of various building systems. The most cost-efficient building systems were wood-frame construction and a steel stud panel system. Project Architect Dwight Lander notes,

“ Wood-frame construction was selected because it met all the building science and client requirements at the lowest cost. ”

Conclusion

Parkwood Mennonite Home is an excellent example of designing top-quality, long-term care accommodation and services on a limited budget. Environmentally-friendly wood-frame construction was employed to provide comfort and security for the home's 96 residents and their visitors. Exposed timber framing was used structurally to infuse visual appeal, and wood finishing materials contribute additional warmth and beauty. This project clearly demonstrates how wood products can keep the cost of upscale construction modest as we continue to meet the growing demand for long-term care facilities.



Parkwood Mennonite Home Project Team

Owner

Parkwood Mennonite Home, Waterloo

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