# The Design of Multi-Unit Wood Frame Seniors Housing

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## Presentation Summary:

Wood frame construction has a long history in Canada. Over the years its primary advantages have been lower cost and ease of use. As building science has become more complex and as more emphasis has been placed on sustainability, wood frame construction has been found to have many more advantages. These include greater energy efficiency (especially important in Canada, where temperatures range from -35 C to +35 C), lower embodied energy, lower carbon footprint, and greater flexibility for reuse, compared to other systems such as steel or concrete. As a system it has a high level of fire resistance (better than steel), a low level of sound transmission, and effective resistance to earthquakes and high winds. These are all important considerations for multi-unit construction such as seniors housing. As an interior finish, it also creates warmth and comfort, and improves wellness and well-being for users. Following is a description of wood construction details that are implemented by Friesen Tokar Architects as part of their standard wood construction practice. The results from the use of these details exceed current standards, yet result in economical construction costs.

1. Exterior Foundation Walls

Exterior foundation walls are usually concrete and mostly below grade. Bituminous damp proofing is applied to that portion of the concrete that will be below grade. 125mm extruded polystyrene insulation is then mechanically fastened to the concrete. Two layers of high impact and moisture resistant cement board are then installed to protect the insulation during the backfilling process. Cement parging on mechanically fastened metal lath is usually installed above grade.
Main floors are constructed of either solid wood joist or various types of engineered wood joists that rest on metal joist hangars secured to the exterior walls and interior beams.16mm plywood sheathing is placed on top of the joists and gypsum board is applied to the underside.

2. Above Grade Exterior Walls

Above grade exterior walls are built with 38mm x 140mm wood studs @ 406mm on centre with the space between studs filled with batt insulation (formaldehyde free). A polyethylene vapour barrier is installed on the inside face of the studs and then covered with 13mm gypsum board air barrier and painted. 13mm OSB (oriented strand board – formaldehyde free) sheathing is installed on the outside face of studs. 38mm rigid insulation is then mechanically fastened to the sheathing and is then covered with a moisture barrier (a building wrap that that repels moisture but breathes, allowing the wall to dry). Window openings are lined with a self-adhering water/vapour membrane (peel and stick) which overlaps and is caulked to the inner vapour barrier and the outer moisture barrier. Before windows are installed, metal flashing and another layer of moisture barrier are installed above the openings. Once the windows are installed the gaps around them are filled with spray foam insulation. The exterior wall finish of choice is then installed.
Where intermediate floors connect to exterior walls, they rest on double plates at the tops of these walls. The spaces between the floor joists adjacent to the exterior walls are filled with spray foam

insulation in order to avoid cold bridges and to maintain the continuity of the vapour barrier. 16mm plywood sheathing is placed on top of the joists and gypsum board is applied to the underside. In order to improve sound separation a layer of gypcrete, a light weight gypsum and concrete material, is then poured onto the floor .

3. Roof Assembly

The roof structure consists of factory manufactured wood trusses @ 600mm on centre. A polyethylene vapour barrier is applied to the underside of the trusses with special care taken to overlap and seal it with the wall vapour barrier. 13mm gypsum board is then installed and once it's joints have been taped and sealed and paint applied, it becomes the continuation of the air barrier. 16mm plywood sheathing is installed on top of the trusses with metal h-clips holding the edges of the plywood together. Asphalt felt underlay is applied to the sheathing and ice and water shield material is applied to roof valleys. Asphalt shingles are then installed.
400mm of batt insulation is installed in the attic space created by the roof trusses. It is standard practice to use raised heel trusses to ensure that the full depth of insulation extends overtop of the exterior walls. A waxed cardboard form is used above the insulation at this location to ensure ventilation of the air space above the roof insulation. A perforated metal is applied to the underside of the soffits to accommodate this ventilation.

4. Sound Separation and Fire Protection

Where additional sound separation is required (for example, between suites), double stud walls, sound batt insulation, and metal sound bars that separate the gypsum board from the studs are used. Fire protection is provided through the use of fire rated gypsum board and the provision of a sprinkler system. When fire walls are required they are constructed of concrete block.

For more than 35 years Friesen Tokar Architects, with offices in Winnipeg and Calgary, Canada, have been designing various housing and health care projects with special emphasis on seniors facilities, wood frame construction and sustainability. With a staff of 50, including architects, interior designers, landscape architects, and technologists, as well as 14 LEED Accredited Professionals, the firm provides an integrated approach to design. Its office structure is based on an open environment where junior staff sit next to principals. Workstations are grouped in clusters. For each new project the most appropriate team members are selected and relocated to the same cluster. This provides optimum communication and synergy between all team members, resulting in a more successful project.

Friesen Tokar's head office in Winnipeg, Canada, has been LEED Gold certified by the Canada Green Building Council. Factors that contributed to this achievement included water use reduction of 58%, recycling of 98% of construction waste, and daylight and views provided to 90% of workstations. The firm's Integrated Design Process includes workshops involving all stakeholders, at the start of each phase of design work, from an initial visioning workshop to the start of construction workshop.

Mr. Rudy P. Friesen founded the firm of Friesen Tokar Architects in 1975. He holds a degree in Architecture from the University of Manitoba and is a LEED Accredited Professional. He is a Past President of the Royal Architectural Institute of Canada, an Honorary Fellow of the American Institute of Architects, and was the first Practice Committee Chair of the Commonwealth Association of Architects. He is also an architectural historian and author.