MAKE HISTORY. Preserve Manitoba's Past.

Historic Construction Materials & Techniques

The evolution of building materials and construction techniques is a fascinating subject. This brief introduction suggests just some of the basic issues involved in this aspect of Manitoba's architectural history.

Before the advent of manufactured building materials, nearly all buildings were constructed from materials at hand: animal skins, wooden poles, bark, tall grass, stone, mud, logs, even the sod underfoot. In Manitoba, all of these materials were employed by Aboriginal groups and settlers before 1880. The actual techniques used to raise these materials into sturdy walls and water-shedding roofs shared a certain underlying consistency. When they were used for a permanent wall, these materials were typically raised as a solid mass. The familiar log wall gives you a good idea of the concept; components were basically laid one atop another. Aboriginal groups employed a different approach. Because of their nomadic lifestyle it was more appropriate to stretch animal skins or bark over a light frame of wooden poles to form a steep tipi shape or a round conical form. The form of the tipi was ideal for shedding water and snow. This kind of sheathed framework was also used by European settlers in the construction of their roofs. Whether thatched with heavy marsh grass or covered with hand-hewn shingles, the underlying support for a roof was a frame of interlocking poles or cut timbers. And to effectively shed water and snow, the shape was likewise a fairly steep pitch.

With the advance of industrial society into Manitoba by the 1870s, these basic materials gave way to manufactured building materials: milled lumber, brick, concrete block, glass block and formed metal. And while the basic principles involved in their construction can still be seen, the sophistication involved in the production of these new materials and the advances in putting them together to form buildings was indeed both impressive and interesting. The following pages highlight the most common materials and techniques.

Tipis, here covered with bark. (Courtesy Manitoba Archives)

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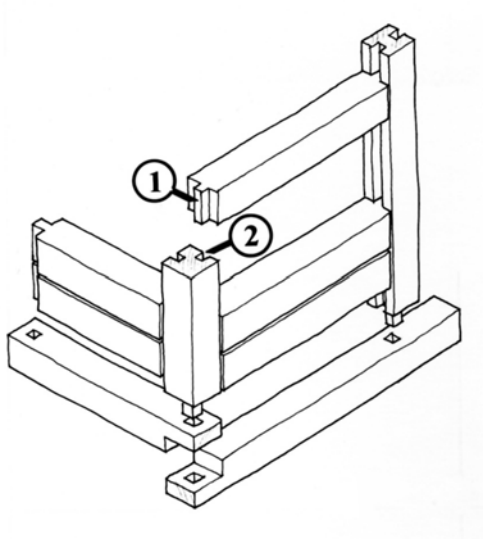
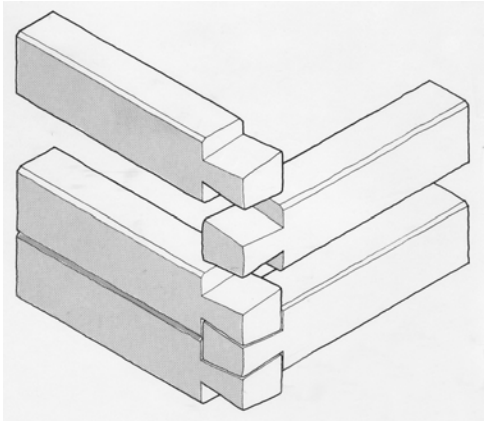
Log Construction

With the arrival of European fur traders in the 18th century, and then settlers in the early 19th century, log construction became the building technique of choice. Over the course of 200 years, three distinct methods of construction were employed in Manitoba. The first, used by the Hudson's Bay Company and then by settlers until about 1870, was called Red River frame. In this technique, short squared logs are mortised and set into upright log posts. The influx of settlers from Ontario and Quebec, and then from eastern Europe, brought two alternative log building technologies to Manitoba. Both techniques are distinguished by their joining procedures. In saddle notch construction, the simpler of the two, logs were usually roughly cut with grooves to accept each other. The other joining technique was called dovetail. In this procedure, which was more sturdy and actually more common, complex notches (shaped like a dove's tail) were cut at the ends of logs and interlocked to form solid joins, especially at corners. Logs were initially used for all building types: houses, churches, stores, offices and of course farm outbuildings. They were often covered with stucco to give a neat appearance. In almost all log-building cases the roofing technology involved the construction of a frame of long poles to which were attached bundles of thatch. As settlers became more affluent they replaced those heavy (and rough-looking) thatch roofs with shingles.

While log buildings were ubiquitous in Manitoba for nearly 100 years, very few have survived into the 21st century – the rough pioneering quality, and small forms allowed by the technology, have meant that most have been lost.



Top: A typical small log cabin. Above: A cut-away detail showing Red River frame log construction (1 is the tongue and 2 is the tenon). Below: A cut-away detail showing a dovetailed corner.



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Early Stone Construction

As the Red River Settlement grew and prospered, some settlers and institutions undertook the construction of stone buildings. In comparison to neighbouring log buildings, these new stone edifices must have been an impressive sight. Stone was usually used for the homes of the well-off and for churches and large institutional buildings. Compared with the skill necessary to build with logs, the labour and skill required in raising a stone building were impressive. First, stones had to be quarried. Then cut and formed. Then raised. Then placed and levelled. Of course with such efforts it was not likely that any such building would be topped with a thatch roof. Typically squared timbers were raised in a truss shape and boards and shingles were applied.

Not many of these buildings were built (at least compared with log and later wood frame buildings), given the cost and skill required. But they are sturdy and many have survived. Any community should be justifiably proud of containing such fine examples of the building trade.

Above: A pioneer home near Brandon constructed using stones collected from the fields (and thus called fieldstone). Below: A detail view of Kennedy House near Lockport (1866) shows the kind of finish required for early stone buildings – thick mortar was used to cover and overlap oddly-shaped stones, ensuring a solid wall.

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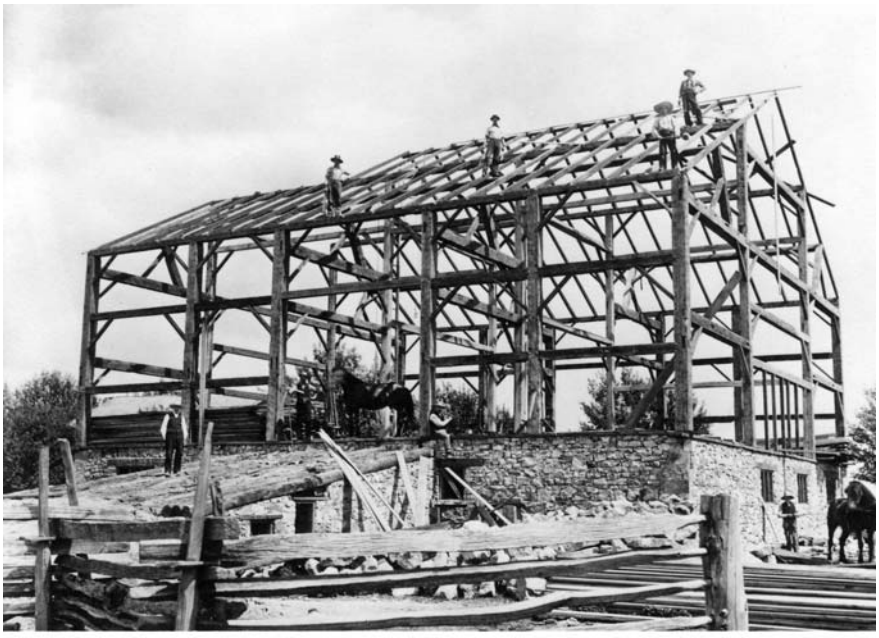
Timber Frame Construction

The log construction technologies used for the erection of small buildings were not practical for larger structures. Thus when it became possible in the late 19th century for settlers to consider upgrading their farm buildings, especially their barns, a different technology had to employed. Timber frame construction was that choice. In this procedure long squared logs were lifted to form a large frame system joined by mortise and tenons and secured with wooden pegs. The technique was used wherever a large barn was required. Thus in nearly every settlement group that undertook extensive farming operations—southern Ontarian, Quebecois, Mennonite—the timber frame barn became an icon. Between each group there were distinctive differences in the realization of the building, especially in the framing and joining techniques. These barns were gradually replaced during the first decades of the 20th century when new construction techniques became popular (see next page for light wood frame). Construction with heavy timber frame was also used in warehouses, where the heavy loads of stationary goods required good support.

Above: A detail of the distinctive timber framing details of a Franco-Manitoban barn.

Below: An archival view (from around 1900) of a barn going up in the Rapid City area shows the impressive complexity associated with timber frame construction.



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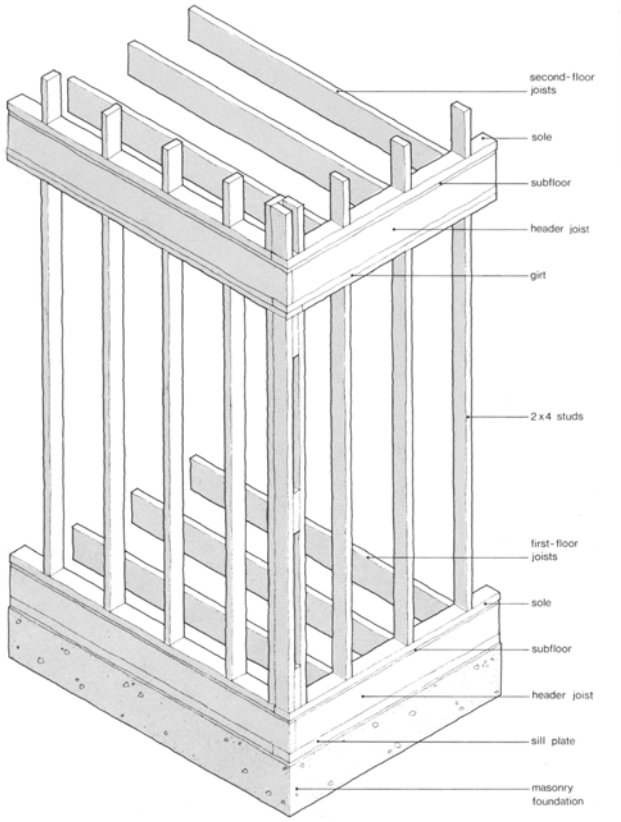
Light Wood Frame Construction

Industrialization of Manitoba in the late 19th century brought a significant new material to building construction: milled lumber. This material and the various technologies that have been employed in putting it together transformed the building trade and architecture itself. The flexible joining and manipulating properties of light wood frame permitted greater complexities of planning. Advances in insulating technologies and heating also permitted the light wood frame to be sheathed with all sorts of different materials: horizontal wood siding, stucco, brick (see next entry). The actual framing procedures involved with this material evolved. The first method, used until about 1890, was called balloon framing. In this technique long members were raised first and horizontal joists were set in later. Balloon framing was replaced by platform (or Western) framing by about 1890. In that technique each floor of a building was erected as a unit and set atop each other. Platform framing is used to this day (although now more commonly of metal construction). Construction with light wood frame could be carried out without the kinds of skills required in stone and brick construction.



Above: A cut-away detail shows the character of light wood framing construction. Right: Light wood framing allowed for elaborate and intricate building forms and details, as exhibited at St. Michael's Ukrainian Catholic Church near Olha.

Brick Construction

New manufacturing possibilities in Manitoba brought masonry to the architectural landscape. Brick plants sprang up all over the province, wherever the necessary raw materials were available (most importantly clay, of which the province has an abundant supply). In Manitoba, buff-coloured brick was the most common (and least expensive) with red brick used on more stately buildings. The construction of these kinds of buildings required significant skill. As a technique, bricks could be laid as a solid wall, a cavity wall or as a veneer onto a light wood frame (see above). It was common for houses and all public and commercial buildings especially after 1890.

Above right: Eye-catching effects were possible with brick details. Below: A building like the White House (also known as the Gingerbread House) in Carberry, used brick to its full potential.

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Concrete Block Construction

Concrete block, also called “imitation stone,” has an interesting history in the province. From about 1890 to 1905 itinerant block-makers with metal forms ranged across the countryside. They set up shop in an area or community, and over the course of about 15 years erected scores of buildings. The potential for decorative surfaces permitted by the block molds made the technology very desirable.

Above: An impressive concrete block detail on Tenby School. Below: A house in Birtle boasts exquisite concrete block walls.

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Later Stone Construction

Stone continued to be used as a building material and the finishes and connecting procedures became increasingly sophisticated. By the turn of the 20th century, carefully cut stone (called ashlar) was used in large and expensive projects. Big quarries at Garson, where the famous Tyndall stone was cut, provided excellent quality limestone for some of Manitoba's finest buildings.

Left: Detail of the Bank of Hamilton Building in Winnipeg (1916-18) shows the wide range of surface effects possible in sophisticated stone construction. Below: The Morden Court House (1904-05) exhibits exquisite workmanship in the selection and placement of granite fieldstones.

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Metal Frame Construction

The principles seen in heavy timber and light wood frame construction were also employed when applied to metal. Iron and then steel were used as the underlying structural frame in many large buildings. These could then be covered with any number of facing materials: stone, terra cotta, even large expanses of glass.

Left: The steel frame for the Union Bank Building rises in 1903 in Winnipeg. Above: The Merchant's Bank Building (1901-02, demolished) was the first Manitoba building to employ steel frame. (Both images courtesy Archives of Manitoba)

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Later Concrete Construction

The first use of reinforced concrete (concrete with steel bars embedded in it) for a whole building in Manitoba occurred in 1906, for a Winnipeg warehouse. The acceptance of the technology was quickly recognized and a welter of applications for concrete, besides in foundations, was readily identified. A collection of bridges constructed in the 1920s demonstrated the structural and aesthetic potential of the material, which could be poured on site using a host of different forms for aesthetic and structural effect.

The construction of bridges in the 1920s, by Manitoba's Good Roads Branch, saw the creation of a host of exquisite structures (like this one in the R.M. of Lansdowne) that exploited the potential of construction with reinforced concrete.