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PLANKWALL FRAMING, A MODERN WALL CONSTRUCTION
WITH AN ANCIENT HISTORY

BY
T. RITCHIE

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CHARPENTE EN MADRIERS
UNE CONSTRUCTION MODERNE DES MURS AYANT UNE LONGUE HISTOIRE

SOMMAIRE

Une charpente en madriers, un mur de madriers de 3 p. cloués ensemble, les uns placés verticalement comme poteaux et les autres horizontalement pour servir de remplissage entre les poteaux, est une construction communément employée par l'industrie de la construction de la Province de Québec et un peu moins par les constructeurs ailleurs au Canada. Cette technique de construction de murs, une adaptation de l'âge de la production en masse des clous et du bois de sciage d'une époque encore plus ancienne, s'est développée en utilisant des poteaux rainurés et des billes de remplissage employés en Nouvelle-France au 17^{ième} siècle. Cette construction qui devint courante à travers le continent par les marchands de pelleterie du Québec, avait ses origines au Danemark, dans le temps des vikings; subséquemment elle émigra en France, et ensuite en Nouvelle-France et à travers l'Amérique du Nord. La charpente en madrier est conséquemment un genre moderne de construction ayant une histoire ancienne, et représente une adaptation intéressante et fructueuse aux conditions changeantes de l'ancienne technique de construction.

NOTES

Plankwall Framing, a Modern Wall Construction with an Ancient History

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FORT VANCOUVER, established by the Hudson's Bay Company in 1824 in the fur-rich Oregon Territory, was one of more than 150 trading posts operated by the company throughout the vast lands then under its control. The reason for singling out Fort Vancouver is that a few words, written well over a century ago about the buildings of the fort, describe a type of wall construction of great importance in the history of building in North America. The construction was mentioned in *The Builder*,¹ an English journal, which in 1844 published an article entitled "Life in the Oregon Territory," an American visitor's account of Fort Vancouver. Within the stockaded enclosure of the fort the visitor counted thirty-five buildings, and in the nearby village, fifty-three houses. Except for a brick powder magazine, all the buildings within the fort and the village were built of wood; the construction of these buildings so impressed the visitor that he made special note of it: "Posts are raised at convenient intervals, with grooves in the facing sides. In these grooves planks are inserted horizontally, and the walls are complete. Rafters raised upon plates, in the usual way, and covered with boards, form the roofs."

The wall construction that interested this visitor to Fort Vancouver had been so extensively employed by the Hudson's Bay Company that the company's name was one of several applied to it, and appropriately so, since that name linked it to the fur trade with which it had migrated across the continent from Quebec. This type of construction had first come to Quebec with the settlers of the seventeenth century; its history before that can be traced back, of course, to France, and from France ultimately to Denmark, where it had developed during the Viking Age. When it came to

New France, it took such firm root that it has continued in use to the present time, although in a form (called "plank wall construction") somewhat altered in detail from the original construction.

In his study of the methods of house construction employed in New France, R.-L. Séguin² termed grooved-post construction (that described at Fort Vancouver) as "poteaux et pièce coulissante," signifying posts with grooves into which a log was slipped. A document prepared in Quebec in 1689, quoted by Séguin, indicates the early use there of this construction and describes the wall of a building in the words "... poutraux Encanellés po'Tennir Les madriers En Coulisse . . .," which may be translated, "... posts channelled to take boards in the grooves. . . ." Such grooved-post construction, according to Séguin's studies, was used less extensively in New France than that of horizontally laid logs, which were usually squared and dovetailed at the corners; his studies also show that the latter construction, involving the use of overlapping logs, was termed "pièce sur pièce" in Quebec documents of the seventeenth century.

The terminology for early methods of wood construction is confused. In his study of buildings of the fur traders, M. Barbeau³ employed the term "poteaux sur sole," which he translated as "posts on the sill," to identify grooved-post construction of walls that "consisted of horizontal logs, usually squared, slid in grooves into position between squared uprights, which were planted by means of mortices into heavy squared logs forming a frame or sill for a foundation." In contrast, Kniffen and Glassie,⁴ in their study of early methods of wood construction used the term "poteaux sur sole" to signify a wall of closely-spaced vertical posts resting on a sill, a method of construction employed by the French in some of their eighteenth-century forts and trading posts along the Mississippi Valley. For the grooved-post type of construction, Kniffen and Glassie used the term "pièce sur pièce."

2. R.-L. Séguin, "La maison en Nouvelle-France," *Bulletin* 226, National Museum of Canada, Ottawa (1968).

3. Marius Barbeau, "The House that Mac Built," *The Beaver* (Dec. 1945).

4. F. Kniffen and H. Glassie, "Building in Wood in the Eastern United States, a Time-Place Perspective," *Geographical Review*, LVI (Jan. 1966).

1. *The Builder*, II, London, 1844.

Fig. 1. The Hudson's Bay Company Post at west end of Grand Rapids Tramway, photographed by J. B. Tyrrell in 1890 (courtesy the Geological Survey of Canada).

Many names have been given to a grooved-post construction. As it was almost a standard method of building used by the Hudson's Bay Company for the construction of its trading posts, the name "Hudson's Bay Style"⁵ resulted. Similarly, because of its extensive use in the Red River Settlement, the term "Red River Frame" came into use, as is reported by M. S. Osborne,⁶ who noted in his history of building in Manitoba that grooved-post construction was favored where short and relatively thin logs were available because the posts of a wall could then be spaced as close together as six feet. Also reflecting the use of this type of construction in the Red River area is the term "Manitoba Frame," applied to it

5. Barbeau, "The House that Mac Built."

6. M. S. Osborne, "The Architectural Heritage of Manitoba," *Manitoba Essays*, ed. R. C. Lodge (Toronto, 1937).

Fig. 3. Old house near Oka, Quebec.

by a long-term resident of Northern Canada who has had personal experience in constructing this type of building.⁷

Grooved-post construction is evident in many of the early photographs of Hudson's Bay Company posts throughout western Canada taken by officers of the Geological Survey of Canada, one of whom, J. B. Tyrrell, photographed the company's posts at Grand Rapids and Portage la Prairie in 1890 (Figs. 1, 2). An old house built in the same way and still standing near Oka, Quebec, is shown in Figure 3.

An interesting assessment of the performance of the wooden buildings of the fur traders was provided by Donald Ross,⁸ chief trader of the Hudson's Bay Company at Nor-

7. Angus Sherwood, personal communication.

8. G. P. de T. Glazebrook (ed.), *The Hargrave Correspondence 1821-1843* (Toronto: The Champlain Society, 1938), p. 99.

Fig. 2. The Hudson's Bay Company Post at Portage la Prairie, photographed by J. B. Tyrrell in 1890; note boards covering end wall of building on right (courtesy the Geographical Survey of Canada).

way House. In 1832, writing on this subject to another officer of the company, he claimed that "the greatest evil . . . attending wooden buildings in this country is the necessity of using green and unseasoned Timber, which shrinks to such a degree that the proper bearings of every part of the building very soon gets disordered however well laid at first. This is more particularly the case with such as have upright Posts in the walls, which tho' the general mode in this country is assuredly not the best, as in a very short time the whole weight and pressure from above rests entirely on these Posts alone; as for the walls or filling up logs they very soon part company with the upper frame or wall plates and leave it to support the burden the best way it can."

Barbeau⁹ and others have suggested that grooved-post construction was not invented in New France but was a traditional method of wall construction in France brought to this continent, along with other building methods, by the settlers who started to arrive in the seventeenth century. The European origin of grooved-post construction can be traced back in history through seventeenth-century France to its development in Denmark during the Viking Age. An early version of grooved-post construction can be seen in the National Museum of Denmark, which contains a display of wood construction taken from the walls of a thirteenth-century Danish building. The wall section on display consists of a length of squared-timber sill with two grooved posts, the distance between the grooves of the posts being spanned by thin wide boards placed on edge. That such construction was commonly used in ancient Denmark is shown by M. Clemmensen's detailed account of early Danish wood construction,¹⁰ from which the following information was obtained. The account refers to buildings of such construction by the old Danish term *bulhuse* (bole houses), the name having been derived from the horizontal boards called *bul* or *bulfjaele*, meaning boards split from the stem or bole of an oak tree.

Bulhuse construction, probably first used in Denmark during the Viking Age, had come into extensive use there by the early Middle Ages, the abundant oak forests providing the timber for sills and posts which were held together with mortise-and-tenon joints and wooden nails. Because oak is a wood that can be split easily, wide boards for the infilling of the spaces between the posts were readily available. In the early history of *bulhuse* construction the boards were often massive; some found in a twelfth-century house were 15' long and over 19" wide. In *bulhuse* construction the grooves of the posts were usually about 2" wide and 2" deep. Ac-

cordingly, the ends of the boards were 2" thick but the remainder was sometimes much thicker; in the twelfth-century house mentioned, that part of the boards not in the grooves was 8" thick, the boards being flat on the inner surface but shaped on the outer surface in the form of two half-rounds. The top and bottom surfaces of the boards were usually shaped like an inverted "V" so that when a board was brought down against the board below it a weathertight joint was formed. The lowest board of the wall was frequently made wider at its bottom edge than at the top in order to project beyond the sill below, the board thus serving as a watershed to keep the sill dry. Occasionally, vertical instead of horizontal boards were used in *bulhuse* construction; they fitted into grooves in the sill and plate instead of into grooves in the posts.

Denmark's status and influence in Europe during the early Middle Ages was reflected by the spread of its building methods beyond its borders. The Bayeux Tapestry of Normandy, for example, depicts houses that have been identified as *bulhuse* construction;¹¹ the method was also used in early English construction, with slabs of slate sometimes used, as well as boards, to fit in the grooves of the posts.¹² According to Clemmensen the method spread not only to France and England but to Denmark's neighboring Scandinavian countries where, adapted to the use of wood from coniferous trees, it rivalled horizontal log-work construction in popularity. In time the method became used generally throughout Europe from Scandinavia to the Balkans. *Bulhuse* construction was also used extensively in Eastern Europe, particularly in the region around the Gulf of Riga; examples have been found in Czechoslovakia, Rumania, and Bulgaria.

The development of *bulhuse* construction in Denmark was based on the use of oak. With the depletion of the oak forests, considered at various times to be so serious that *bulhuse* construction was prohibited by statute, the method gradually underwent changes and eventually died out. The earliest replacement material for the infilling of the timber frame was wattle-and-daub, followed by brick masonry. Such half-timber construction, consisting of a timber frame and brickwork infilling, was itself eventually affected by the increasing shortage of wood in Denmark, with the result that the timber frame was eliminated, leaving a structure made entirely of brick.

Although a few rural buildings of *bulhuse* construction were erected in Denmark as recently as the nineteenth century, the method had by then almost completely disappeared

9. Barbeau, "The House that Mac Built."

10. Mogens Clemmensen, *Bulhuse Studier over Gammel Dansk Traebygningskunst* (Copenhagen, 1937).

11. Clemmensen, *Bulhuse Studier over Gammel Dansk Traebygningskunst*.

12. C. F. Innocent, *The Development of English Building Construction* (Cambridge, 1916).

from that country. Several buildings exemplifying this type of construction and dating from the seventeenth to the nineteenth centuries have been preserved in Danish museums. A thatched-roof barn of *bulhuse* construction located in Southern Jutland is shown in Figure 4; another barn of the same construction forms a part of the museum of old buildings at Aårhus, Denmark (Fig. 5).

Until about the middle of the nineteenth century, wood buildings constructed in North America had their walls built by three methods of construction: (1) horizontal logs with intersecting corners of various connections such as dovetail and V-notch ("log cabin" construction); (2) grooved-post construction with horizontal boards or logs between the posts ("poteaux et pièce coulissante"); and (3) timber-frame construction, similar to (2) in having a timber framework but with the spaces between the timbers filled with brick or stone masonry and occasionally even with other materials. In the later stages of the development of this third method, weatherboarding was applied over the frame and the infill material was sometimes omitted. All three methods of wood construction could be carried out, if necessary, without the use of iron nails, an important consideration in an age when nails were expensive.

A revolutionary change in wood construction took place in North America with the development in Chicago, in the 1830s, of balloon-frame construction, which involved the use of strips of sawn wood of relatively small cross-section (2" x 4" and 2" x 6") held together by nails instead of mortise-and-tenon joints, made possible by mechanization of the sawmill and of the nail-making industries. This mechanization meant that because sawn lumber and nails could be produced in vast quantities they were now cheaper. By the early decades of the twentieth century, balloon-frame construction had become well established in Canada and had almost entirely replaced earlier methods of wood construc-

Fig. 4. Barn of *bulhuse* construction, Southern Jutland, Denmark (courtesy the National Museum of Denmark).

Fig. 5. *Bulhuse* barn, now part of the museum of old buildings at Aårhus, Denmark.

tion, except in northern and frontier regions where, on a small scale, early construction as described by Barbeau was still used occasionally.¹³

Balloon-frame construction was not, however, the only development resulting from the widespread availability and cheapness of sawn wood and nails. Another such development, which adapted the grooved-post method of wall construction to sawn wood and nails, took place, appropriately, in Quebec, where the old construction method had first been used in North America. The new version of this type of construction, which has been termed "plank wall construction"¹⁴ and "plankwall framing,"¹⁵ has been called "probably the only method of construction that can be described as truly Canadian"; information is not given, however, to indicate when the method came into use.

Plank wall construction makes use of sawn planks that are usually 3" in thickness. Some of the planks, placed upright and spaced about 8' apart, correspond to the posts in the earlier form of construction; the spaces between them are spanned by horizontal planks of the same thickness as the posts. Instead of providing grooves to hold the ends of the horizontal planks in the posts, a butt connection is made between them and is secured by spikes driven through the two adjoining planks. Where a horizontal plank must span an opening (over a window or door) a simplified form of the

13. Barbeau, "The House that Mac Built."

14. "Plank Wall Construction," Canadian Lumberman's Association, Ottawa, Canada.

15. "Plankwall Framing," Canadian Lumbermen's Association, Ottawa, Canada.

Fig. 6. Plank wall construction of apartment building in Montreal (courtesy Central Mortgage & Housing Corp.).

mortise-and-tenon connection is used. The bottom edge of such a horizontal plank is made longer than the distance between the posts, but its length along the top edge is equal to the width of the opening; the slanted ends of the plank fit similarly slanted cuts made in the posts on each side of the opening.

A comparison of the two types of construction clearly indicates that plank wall construction, as illustrated in Figure 6, was derived from the early grooved-post construction of Quebec. In its modern use, however, the wood wall is usually covered with a veneer of brick masonry, as shown in Figure 7.

*

French settlers of the seventeenth century brought to Canada a type of wood construction employing a timber framework with posts grooved to receive horizontal boards or logs which filled the spaces between them. Such construction, extensively used in the early settlements of New France, migrated from Quebec with the fur traders, and eventually was used in the building of their posts over a vast area ex-

Fig. 7. Plank wall construction of building in Montreal, showing use of veneer to cover wood construction.

tending from Labrador to the Pacific Ocean and from the Yukon to the Mississippi Valley. Prior to its use in New France, and in France, the origin of grooved-post construction has been traced to the Denmark of the Viking Age, where, known as *bulhuse* construction, it had developed as a result of the abundance of easily-split oak wood. From Denmark it spread throughout Europe becoming a part of the building tradition of many countries where its use was adapted to other woods.

The introduction of "balloon-frame" construction in North America largely displaced the early forms of wood construction. A modified form of the grooved-post wall, called plank wall construction, which employed nails instead of grooves to hold the horizontal members in place, and used a simple mortise-and-tenon connection of vertical and horizontal structural members, continued to be used in Quebec and to some extent further afield. Thus an ancient European building method, transferred to Canada and later adapted to building in the machine age, continues to be used, providing an interesting example of the migrations and technical development of a building technique.