



Permanent Wood Foundations

Durable

Comfortable

Adaptable

Energy efficient

Economical



Wood Preservation Canada



A permanent wood foundation (PWF) is a strong, durable and proven construction method that has a number of unique advantages over other foundation systems for both the builder and the homeowner.

The first Canadian examples were built as early as 1950 and are still being used today. PWFs can also be designed for projects such as crawl spaces, room additions and knee-wall foundations for garages and mobile homes. Concrete slab-on-grade, wood sleeper floors and suspended wood floors can all be used with PWFs.

A permanent wood foundation is an in-ground engineered construction system designed to turn a home's foundation into useable living space. A below-grade stud wall constructed of preservative-treated plywood and lumber supports the structure and encloses the living space. PWFs are suitable for all types of light-frame construction covered under Part 9 (Housing and Small Buildings) of the National Building Code of Canada, under clauses 9.15.2.4.(1) and 9.16.5.1.(1). This includes single-family detached houses, townhouses, low-rise apartments, and institutional and commercial buildings. In addition, the recently revised CSA S406 standard, Specification of permanent wood foundations for housing and small buildings, allows for three-storey construction supported by PWF.

The energy-saving qualities of a PWF make them popular. Originally favoured in remote areas where location made concrete cost prohibitive and difficult to obtain, PWFs are now built everywhere in North America. Thousands of PWF homeowners enjoy the comfort and livability of their homes, as well as the cost savings realized by this energy efficient building system.

Batt insulation can be installed in the stud cavities, and rigid insulation can be installed on the exterior of the PWF. Wood's natural thermal resistance, combined with the additional insulation, makes the entire perimeter foundation an extremely efficient barrier to heat loss. Since the foundation accounts for up to 30% of the heat transfer in a home, a highly insulated PWF results in less energy to heat or cool the home, significantly reducing utility bills.

PWF basements are pleasant to live in year round. "Warm", "dry", "comfortable" and "easy to heat" are the comments most frequently made by the people who live in houses with permanent wood foundations. A PWF basement is a totally livable, perfectly comfortable area that is just like the rest of the house because it is fully insulated and built with the same construction techniques and materials.

A permanent wood foundation is suitable for all types of living space, including bedrooms, bathrooms, kitchens, living rooms, recreation rooms, workshops and dens.

WOOD outperforms other major building materials when Life Cycle Assessment is used to compare environmental impacts:

- requires less embodied energy in production
- reduces greenhouse gas emissions
- releases fewer pollutants into the air
- discharges less water pollutants
- generates fewer solid wastes.

Source: Wood Design Manual, Canadian Wood Council, 2010

Finishing a basement is much easier with a PWF. Converting the basement area into finished living space is a far simpler and more economical process with a PWF than with other types of basement construction. Because a PWF is a wood stud wall, it is easily insulated and a variety of wall finishes can be quickly installed. Gypsum board or wood paneling can be nailed or glued directly to the foundation studs without the need for furring strips. Except for some minor exceptions, wiring and plumbing services are installed in the same manner as elsewhere in the house.

PWFs are quickly built in any weather. Time saved is money saved in the construction business, and almost any delay can be both inconvenient and costly. A PWF is a definite time saver over other foundation types because it goes in fast in all weather and can be installed by the framing contractor, thereby eliminating the need for a specialized foundation trade. Wet, muddy or frozen ground has little effect on the installation process, which means that builders using PWF enjoy a longer building season without scheduling problems or weather shutdowns. And owners get to enjoy their home sooner.

A PWF is adaptable to any style of exterior finish. All types of exterior finishes can be used, including wood or other sidings, brick and masonry veneer or stucco. The PWF area can be finished with the same materials used on the upper part of the house for a uniform appearance or accented with contrasting materials.



PWF homes have buyer appeal. Because PWF basement areas are warm, dry and pleasantly comfortable from the moment the house is built, they have immediate appeal to potential buyers.

The livability of the PWF area is instantly apparent whether the basement is finished or simply roughed in. A PWF basement can be easily finished by the builder during construction since techniques and materials are the same as for other parts of the house, or the home buyer can complete the basement area as the space is required. The PWF basement offers more living space than a conventional basement since framing for insulation and finishing is not necessary on the perimeter wall.

PWFs are durable and safe. Wood treated with preservatives is not harmful to human health when used in the proper application, such as PWF. Chromated copper arsenate (CCA) is the only wood preservative registered by the Pest Management Regulatory Agency (PMRA) of Health Canada for the treatment of lumber and plywood used in PWFs. It is fixed in the wood and resistant to leaching even in extreme moisture conditions. Tests conducted in below-grade levels of PWF structures indicate that air quality in the PWF area is equal to the air quality found in other foundation systems.

WOOD is the best environmental choice to conserve energy and minimize the environmental impact of buildings:

- reduced energy and resource use in extraction and processing
- reduced energy consumption in processing and end use
- minimized external pollution and environmental damage throughout the life cycle
- minimized internal pollution in the built environment.

Source: Wood Design Manual, Canadian Wood Council, 2010

Materials

All lumber and plywood used in a PWF, except for specific components/conditions, must be treated with chromated copper arsenate (CCA) wood preservative and identified as such by a certification mark stating conformance with CSA Standard 0322, Procedure for Use in Preserved Wood Foundations.

PWF treated lumber shall not be cut lengthwise or notched. Foundation wall studs, structural blocking and basement floor joists shall not be cut, notched or bored to accommodate electrical or mechanical utilities or for any other reason. Foundation wall studs may be cut to length and installed with their treated end down.

Where it is necessary to field cut PWF lumber, all cuts, holes, and injuries to the surface of treated materials must be protected by two applications of preservative conforming to CSA O80.3 (copper naphthenate preservative solution containing a minimum of 2% of copper metal).

Nails for fastening treated material must be hot-dipped galvanized or stainless. Staples must be stainless steel. Framing anchors and straps must be galvanized.

Moisture and vapour barriers must be at least 0.15 mm (6 mil) in thickness. Dimpled drainage board is often specified as an exterior moisture barrier (see photo below).

PWF Design and Construction

The CSA S406 standard, Specification of permanent wood foundations for housing and small buildings, provides design and construction requirements and includes many selection tables aimed to increase design efficiency. This standard also contains information on site preparation, materials, cutting and machining, footings, sealants and dampproofing, exterior moisture barriers, backfilling and site grading.

The standard is based on specific design assumptions regarding installation procedures, soil type, clear spans for floors and roofs, dead and live loads, modification factors, deflections and backfill height. If any of the design conditions are different from or

more severe than the assumptions, the PWF must be designed by a professional engineer or architect and installed in conformance with the standard.

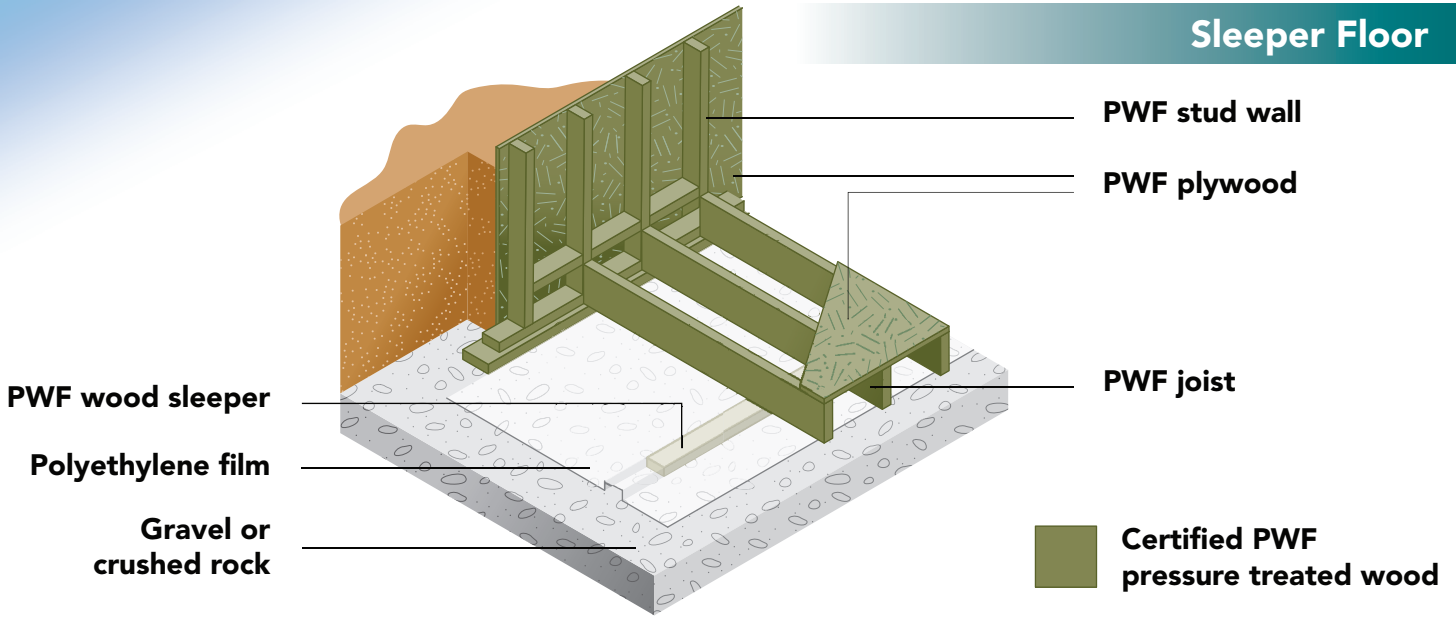
Anyone undertaking to build a PWF should obtain a copy of CAN/CSA-S406 from the Canadian Standards Association (visit www.csagroup.org/store or call 1-800-463-6727).

Expert technical assistance is also available via the Canadian Wood Council Help Desk (cwc.ca/helpdesk).

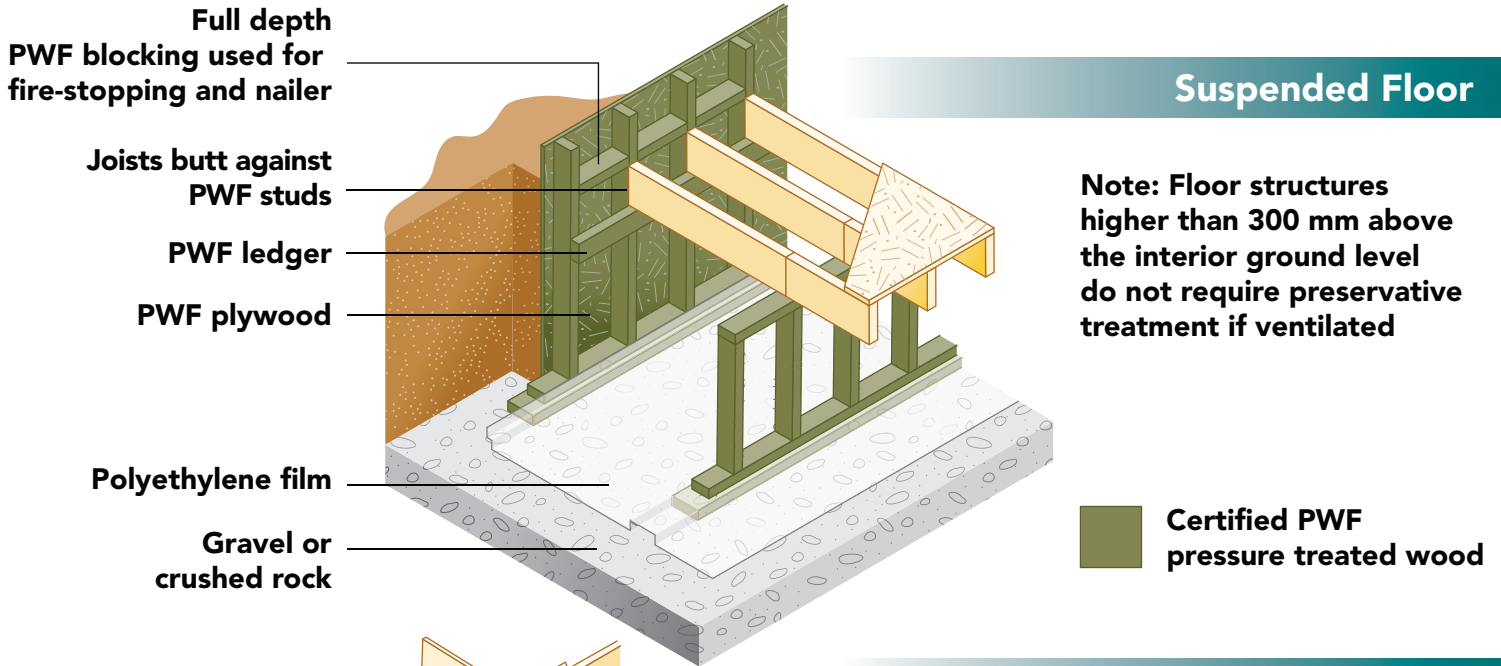


PWF Floor Options

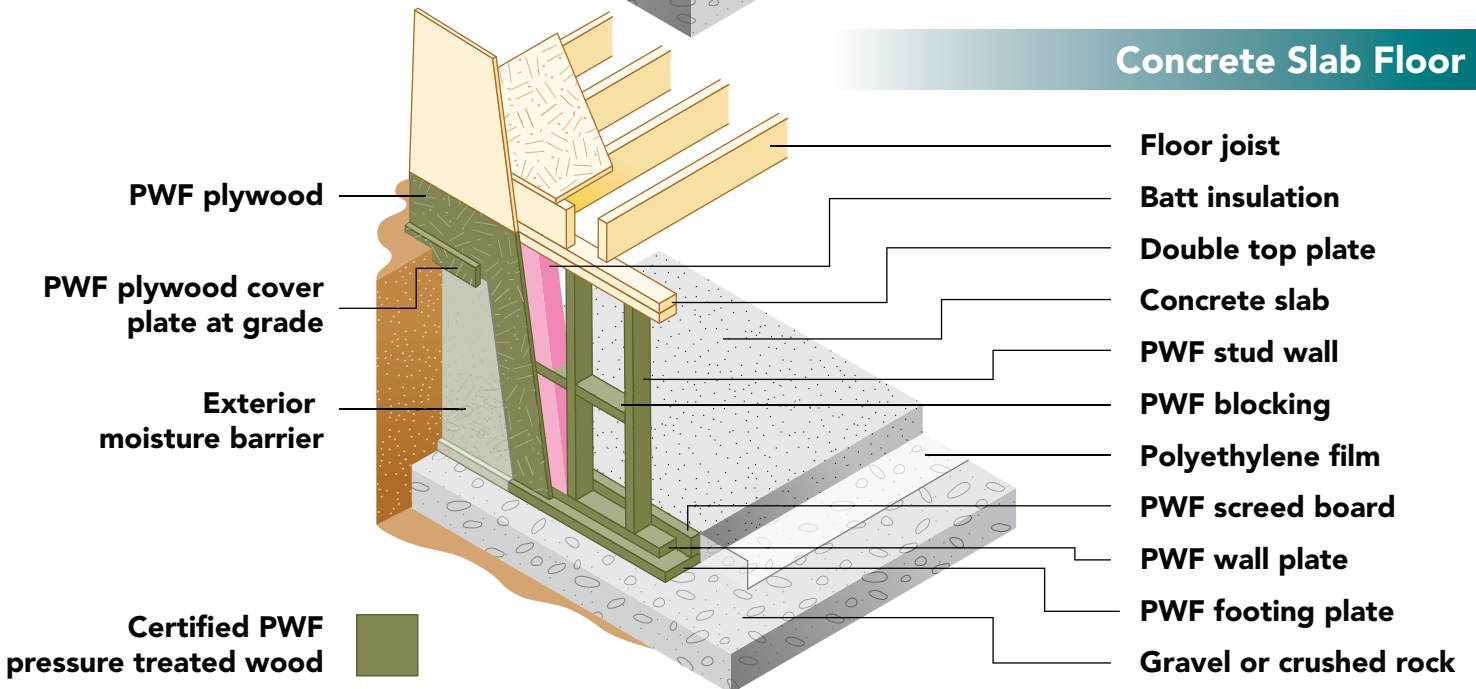
Sleeper Floor



Suspended Floor



Concrete Slab Floor



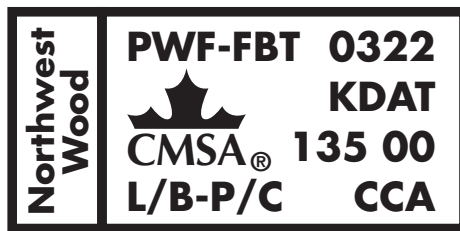
Certification Mark Key



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