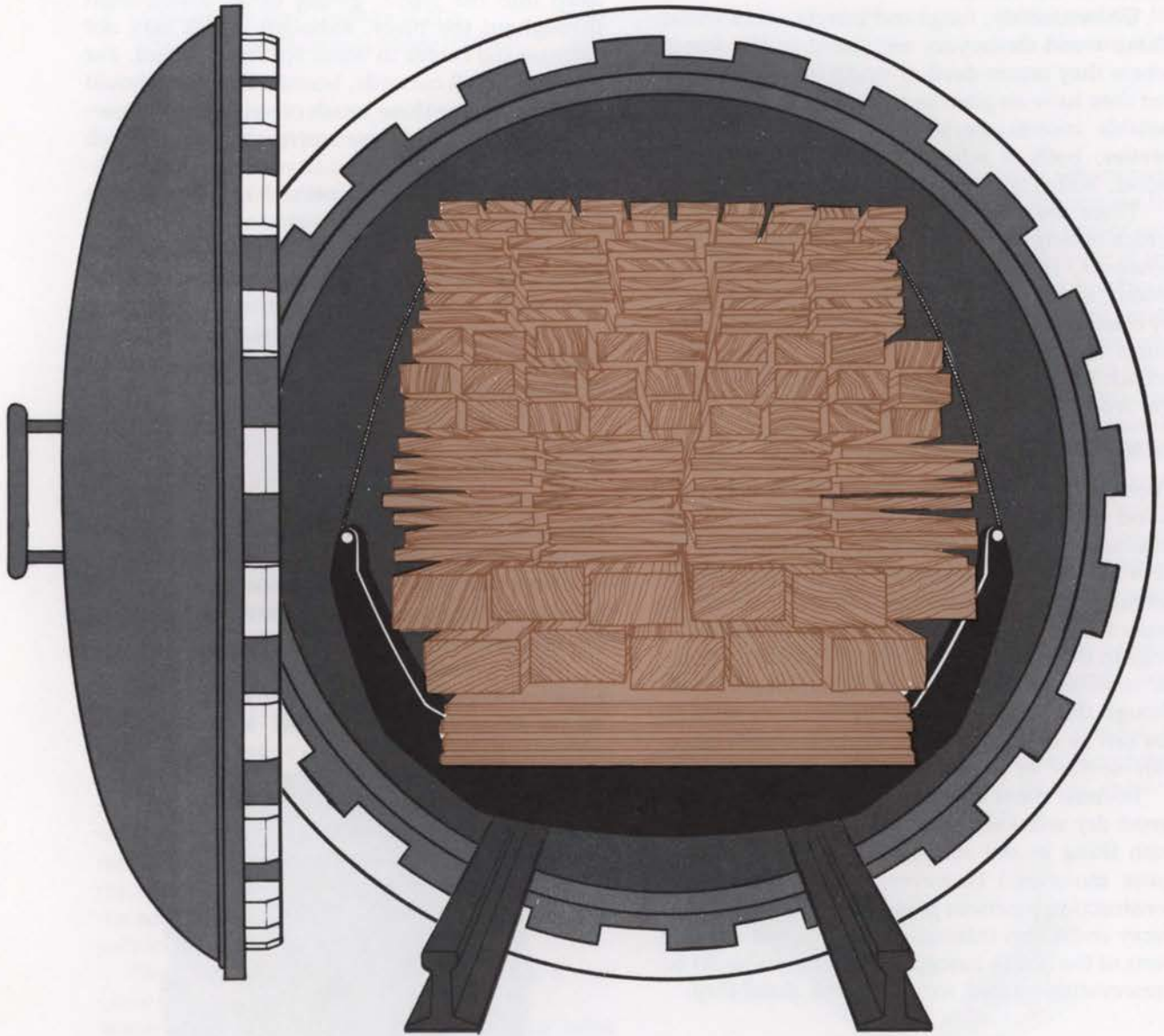


# COUNCIL NOTES



**PRESSURE TREATED WOOD**

Because wood is a prime construction material, it has been used for centuries to build homes. With present-day designs and construction methods, an average frame home will require nearly ten thousand board feet of lumber and five thousand square feet of plywood and panelboards. Forests are one of the earth's few renewable resources, and with proper conservation and harvesting practices, they will continue to provide an adequate supply of lumber products for homes of the future.

Unfortunately, fungi and insects attack wood. These wood destroyers are useful in the forest, where they return dead or dying trees to the soil, but they have no place in homes. Two of the most notable insects are termites and powder-post beetles, both of which obtain their food from wood, which also shelters them.

There are several wood rotting fungi, all of which belong to the plant kingdom. Each species, however, requires moisture, food (untreated wood), a suitable temperature, and oxygen (air). By controlling one or more of these requirements, fungi cannot survive. The most practical approach is to poison their food supply by treating the wood with a preservative.

### WOOD DURABILITY

There are a few commercially available species of wood with some natural resistance to decay and insects, namely cedar, redwood, and cypress (seldom available). The heartwood of these species contains natural chemicals (extractives) which make the wood resistant to some extent; however, even in these woods *the sapwood is not durable under conditions favorable to decay and insects*. Even though the heartwood may be more resistant, it too can be destroyed if placed in locations of severe service or high moisture conditions.

In most parts of the home, just keeping the wood dry will keep it from rotting. (There is no such thing as dry rot—all decay organisms require moisture.) However, certain design and construction practices present an opportunity for decay and insect infestation. Wood used in those parts of the house susceptible to attack should be preservative-treated for long-term durability.

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### CHEMICAL TREATMENT

The most effective method of applying the chemical treatment is *pressure treatment*, which requires expensive equipment and must be done at the factory. Other methods of superficial treatment are possible, such as hot and cold bath, cold soaking, and brush or spray applications, but these methods are ineffective where permanent or long-lasting protection is desired.

Pressure treatment forces the liquid chemical deep into the wood, giving better distribution throughout the piece, although it still may not saturate the center in some species of wood. For this reason, all cut ends, bored holes, etc., should be given two or three brush or spray coats of preservative to cover any untreated areas which might be exposed.

The least effective method of treatment is brushing or spraying the wood with chemicals. Only a thin surface layer is saturated, and the penetration of the chemicals into the wood is inadequate for long-term protection. The treatment does, however, give some surface resistance to decay and some insects in above-ground use, but offers very little protection against termite attack. See F2.5, *Termite Control*.

### PRESERVATIVE CHEMICALS

Although pressure-treated wood has been used successfully for utility poles, railroad ties, mine timbers, wood bridges, farm structures, pilings, and highway guardrails, only recently has treated lumber and plywood entered the field of residential construction.

The recommended preservatives have been field tested and are approved by the American Wood Preservers Association. Wood that has



Tree Cross-section: Heartwood is generally more resistant to decay than sapwood; sapwood accepts chemical treatment more readily.

## PRESERVATIVES AND PROPERTIES OF PRESSURE-TREATED WOOD

preservative	color	odor of treated wood	paintability of treated wood
Creosote	<i>dark brown to black</i>	<i>strong aromatic</i>	<i>no</i>
Pentachlorophenol	<i>almost colorless to dark brown (solvent color)</i>	<i>same as odor of solvent</i>	<i>depends on type of solvent</i>
water soluble	Acid Copper Chromate (ACC)	<i>yellowish-green</i>	<i>slight</i>
	Ammoniacal Copper Arsenite (ACA)	<i>yellowish-green</i>	<i>slight</i>
	Chromated Copper Arsenate (CCA) (Types A, B, and C)	<i>brownish-green</i>	<i>slight</i>
	Chromated Zinc Chloride (CZC)	<i>brownish-green</i>	<i>slight</i>
	Fluor Chrome Arsenate Phenol (FCAP)	<i>yellowish-brown</i>	<i>slight</i>

been commercially pressure-treated with one of these preservatives is available from some local building material dealers. (The color used to indicate pressure-treated wood in this circular is for illustration purposes only. Pressure-treated wood may range in color from blackish-brown to very light or even unnoticeable.)

The recommended preservatives include:

**Creosote:** Creosote is a mixture of compounds that comes from the distillation of coal tar. It has been used with good results for farm structures, railroad ties, utility poles, and for marine structures, but it has very limited use around the house. It is not recommended for any part of a house, garage, or garden structure because of a long-lasting objectionable odor. It can be used for fence posts and rustic fencing, but it cannot be painted successfully, and creosote may bubble to the surface in hot weather. Do not use it where its odor would be objectionable.

**Pentachlorophenol (penta):** A toxicant that is dissolved in oil. The solvent may be a "light" oil, similar to kerosene or mineral spirits (paint thinner), or it may be a "heavy" solvent with the consistency of salad oil. Wood that has been treated with a solution made with a light solvent such as mineral spirits will be discolored only slightly. If the treated wood is allowed to "season," so that the solvent can evaporate, the wood can then be painted or stained.

Do not use penta-treated wood where it may come in contact with plants.

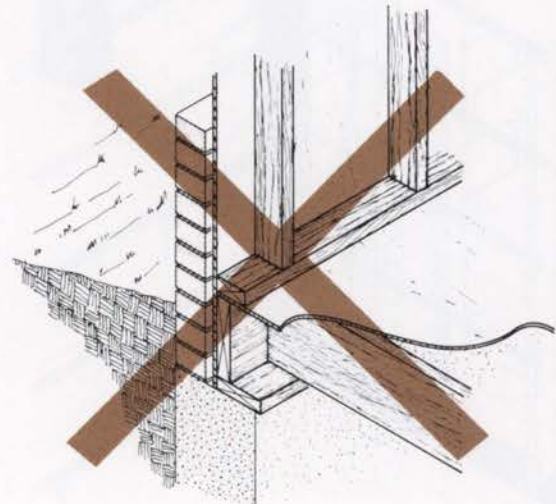
**Water-Soluble Preservatives:** The above table lists five commonly used water-soluble preservatives, which are made of mixtures of chemicals that are sold under various trade names. After treatment with a water-borne preservative, the wood should be redried to a moisture content of 19% or less, unless it is to be used in contact with the soil. Wood treated with these preservatives can be used whenever relatively clear, odorless, or paintable surfaces are desired.

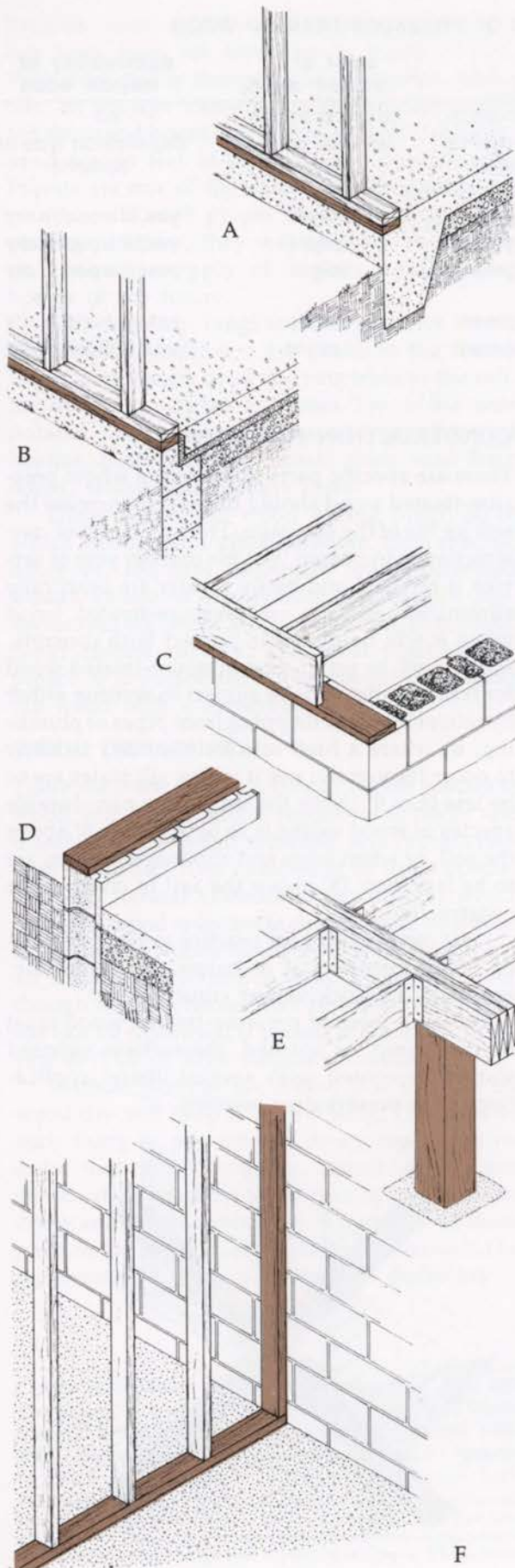
## CONSTRUCTION PRACTICES

There are specific parts of the home where pressure-treated wood should be used to increase the service life of the structure. The initial cost of construction is increased, but the cost per year of service is reduced and costly repairs are practically eliminated. Always use pressure-treated wood when it will be placed in contact with concrete, soil, gravel, or water. Use pressure-treated wood for framing that may be subject to wetting either by rain or by water dripping from pipes or plumbing, or where a high relative humidity is likely to occur frequently; use it where sill plates are to be less than 8" above the soil, when non-durable species of wood siding is to be less than 6" above the soil, or when joists and subfloor members are to be less than 18" above the soil in crawl-space construction.

It is considered poor practice to place untreated wood members at or below the grade line, especially in brick veneer construction.

When a piece of pressure-treated wood must be cut, bored, or notched, the surfaces exposed should be coated with several liberal applications of a preservative solution.





### Slab Construction A and B

Concrete slabs are often built with a screed plate around the edge of the slab as a nailer for the outside wall. Because the wood is in direct contact with concrete, pressure-treated wood is recommended. Any cuts or drilled holes in the treated wood should get two or three liberal applications of a preservative solution.

### Sill Plates C

Sill plates, which are attached to the foundation and support the floor joists and band joist, should be of treated wood, particularly if the foundation is of hollow masonry. Moisture and termites can move up through the cavities, exposing the sill to decay and termite attack.

Additional termite protection can be obtained by filling the cavities of the masonry with sand, and then treating the sand with a soil poisoning chemical before the sill is installed (see SHC-BRC F2.5, *Termite Control*).

### Wall Sill Plates D

Most frame garages or equipment storage structures are built with the wall extending nearly to the ground. The sill or bottom plates of the wall often rest on hollow masonry blocks, on the edge of a concrete slab, or worst of all, directly on compacted soil. Since there is a good chance of water coming in contact with the wood sill plates, pressure-treated wood should be used.

### Piers and Columns E

In some areas of the country, builders prefer to use wood columns or piers to support the floor beams in crawl space or basement construction. Wood columns/piers should be pressure-treated, even if they are to be imbedded in or will rest upon concrete.

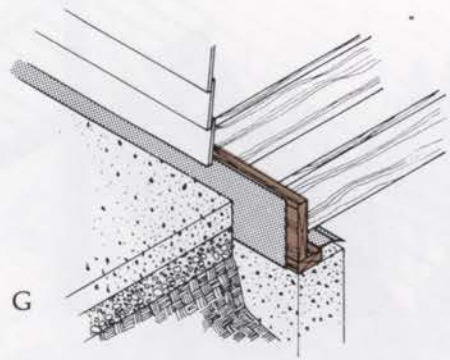
### Below-Grade Partition Plates F

Bi-level houses and many apartment buildings are constructed with the first floor below grade. When wood frame partitions are used, the plates will be in contact with the concrete slab and should be of pressure-treated wood. The same is true of basement partitions or load-bearing walls.

Often, water entrapped in the basement area during construction is absorbed by these plates. If the wall is covered before the plates dry out, the wood remains damp for a long time, and decay can develop.

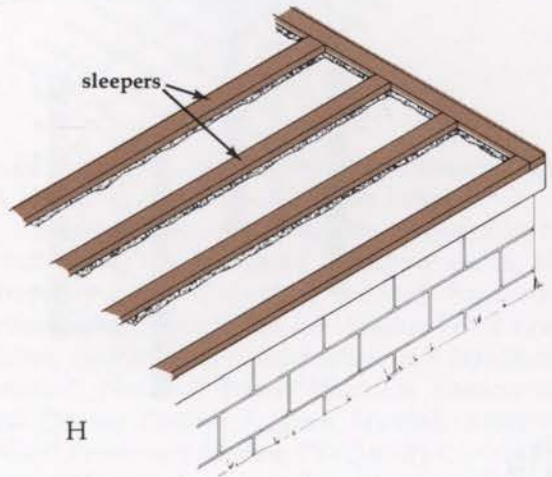
### Concrete Poured Against Wood G

When a concrete slab for a walk, patio, or porch is poured along an exterior wall, pressure-treated wood should be used for the band joist as well as the sill plate. Otherwise, water that finds its way between the slab and band joist will cause decay. A metal flashing should also be installed between the concrete and the wood to prevent the water from entering the structure.



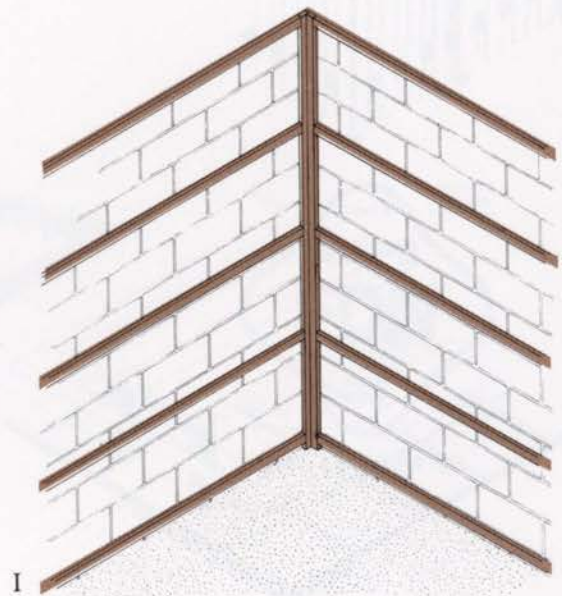
### Converting a Concrete Slab to a Wood Floor H

It is sometimes desirable to convert a garage or concrete slab porch to a living area and install a wood floor. Pressure-treated lumber should be used for sleepers since they will be in contact with the concrete (see SHC-BRC Technical Note # 4, *Converting a Concrete Slab to a Wood Subfloor*). The treated sleepers should be set in mastic and fastened to the slab with concrete nails. A vapor barrier is placed over the sleepers and the subfloor nailed to the sleepers.



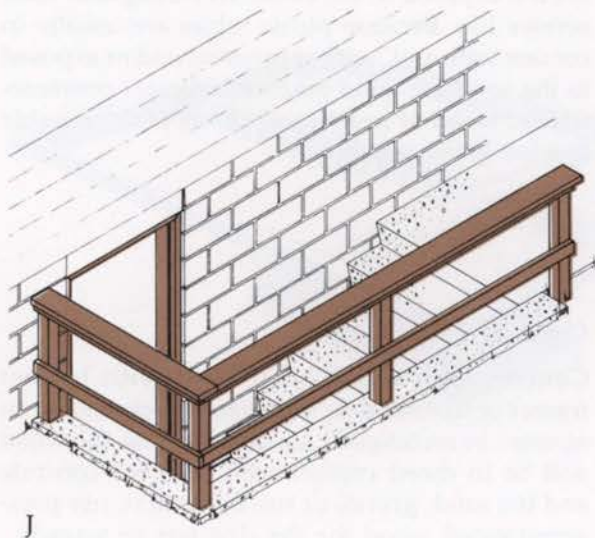
### Basement Furring Strips I

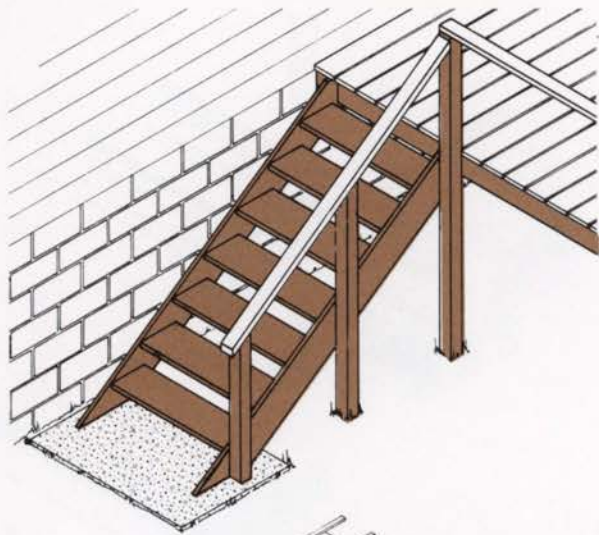
It is good practice to use treated wood for furring strips when applying an interior finish to a basement wall to resist moisture which may pass through the wall and termite infestation through wall cracks.



### Millwork Below Grade J

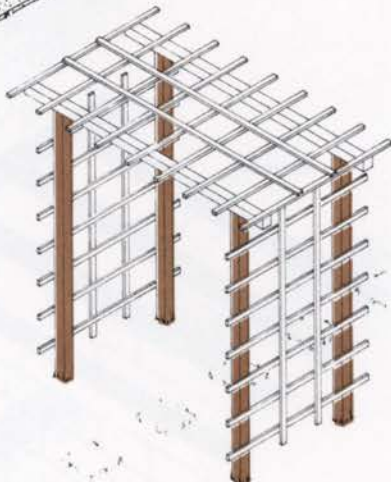
Pressure-treated millwork should be used for exterior doors or windows leading to a basement or room below grade. If wood steps are used, build them of treated wood even if the entry is concrete.





### Porches and Wooden Steps

If porches or exterior wooden steps are added to the house, use pressure-treated columns and support beams, especially if they are to be in or near the soil. If the flooring is to be exposed to the weather, make it of pressure-treated wood. The areas of contact with adjoining members trap water, leading to decay. In exterior wood steps, water can become entrapped where the steps join the side rails (stringers), with decay eventually resulting. Termites can also enter the framing of the house through untreated wood steps.



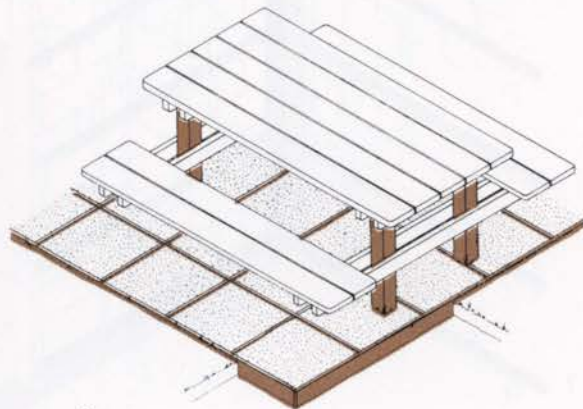
### Fences

Many termite infestations start in yard fences where untreated wood posts are used or where other parts of the fence are in contact with the soil. Decay develops in the posts, rails, and slots. Long-lasting fences can be built by using pressure-treated wood for both the posts and the rails. Lot-line fences which might be attached to the house or garage, or privacy fences in apartment complexes are examples. It is also good practice to use pressure-treated wood for all outdoor garden and landscape projects. Be sure to use wood treated with water-soluble preservatives, since wood treated with penta or creosote may harm plants that contact it.



### Outdoor Furniture

Many picnic and outdoor wood furniture pieces are left exposed to the elements throughout their service life. Because picnic tables are usually in contact with soil, sod, or concrete and/or exposed to the weather, good practice indicates pressure-treated wood or heartwood of one of the durable species listed previously.



### Concrete Patios

Concrete patios are often built with lumber frames or divider strips between blocks that form squares or rectangular shapes. Because the wood will be in direct contact with both the concrete and the sand, gravel, or soil beneath it, use pressure-treated wood for the dividers or screeds.

## POLE-FRAME HOUSES

Pole-frame houses have become popular in some areas of the country, usually as an outgrowth of pole-type construction used for farm buildings. They are also built in areas where unusually high winds or hurricanes are common. The poles not only tie all parts of the house to the ground but also allow the winds and floods to pass around and under the structure, resulting in less damage. This system of construction may be advantageous on hillsides or rough terrain (see SHC-BRC Technical Note # 7, *Applications of Treated Poles and Posts for House Construction*).

The basic framing members for the pole house are the pressure-treated wood poles or squared posts. These "construction poles" have special structural quality requirements more restrictive than those commonly applied to utility poles.



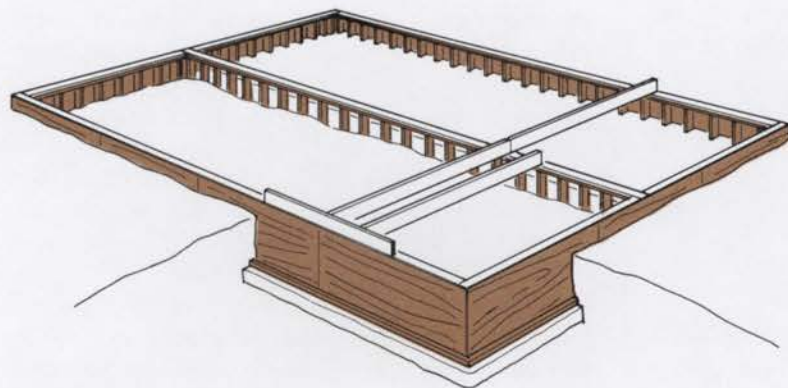
## WOOD FOUNDATIONS

A recent development is the construction of pressure-treated wood foundations for houses. The wood foundation can be built in weather too cold to place and cure concrete. Little or no concrete is required unless the house is to have a basement. The basement floor is then placed after the house has been enclosed but before the foundation is backfilled. Detailed designs and specifications for wood foundations are available for both crawl-space and basement houses (see SHC-BRC Instruction Sheets # 30 and 31 respectively).

The pressure-treated wood used should carry a recognized quality mark stamp indicating that the material has been treated in conformance with the respective quality control standards to pro-

vide protection against decay and insect attack. A typical grade stamp is shown below.

Treated foundation materials are generally not available as stocked items in supply yards, and therefore must be specially ordered. For further information, refer to the *All-Weather Wood Foundation System Design, Fabrication, and Installation Manual*, National Forest Products Association; the *Quality Control Program Manual*, American Wood Preservers Bureau; *The Quality Control Procedure Manual*, American Wood Inspection Agency; the American Wood Preservers Institute, and the Small Homes Council-Building Research Council, University of Illinois.



## RECOMMENDED PRESERVATIVE TREATMENTS

product	use location	preservatives							AWPA specification
		creosote	penta	ACC	ACA	CCA	CZC	FCAP	
Lumber	above ground	●	●	●	●	●	●	●	C2
Lumber	in soil or concrete	●	●	●	●	●	NR	NR	C2
Building poles	soil contact	●	●	●	●	●	NR	NR	C23
Sawn posts	soil contact	●	●	●	●	●	NR	NR	C16
Plywood	soil, concrete or water contact	●	●	●	●	●	NR	NR	C9
Millwork	no soil contact	NR	●	●	●	●	●	●	C16
All weather wood foundation material	soil contact	NR	NR	NR	●	●	NR	NR	C2, C9 <sup>1</sup>

<sup>1</sup> Minimum retention for both lumber and plywood is 0.60 pounds per cubic foot  
NR = not recommended

## FIRE-RETARDANT TREATMENTS

### Lumber and Plywood

Most building codes severely restrict the use of combustible materials in the construction of nursing homes, schools, and other types of public buildings. Lumber and plywood can be pressure-treated with fire-retardant chemicals, making it acceptable as a "non-combustible" material. FRT lumber is used primarily for non-load-bearing walls and for roof construction. Most FRT materials are for interior use only.

Fire-retardant chemical treatments do not fully protect the wood against decay and termite attack, but they do reduce flame spread and will extinguish glowing combustion when the source of flame is removed. Water is used as the carrier for the fire-retardant chemical, making redrying essential. The treatment does reduce the strength of the wood about 10% after redrying. For further details, see AWPA Standard C20 for lumber and C27 for plywood.

Although a pilot study has been done on the mechanical characteristics of metal truss plates and nail-glued plywood truss plates used with FRT lumber (see SHC-BRC TN # 6, *Investigation of the Mechanical Characteristics of Truss Plates on Fire-Retardant-Treated Wood*), little information is available on the corrosive effect of the chemicals on metal plates or nails driven into wet wood.

### Shingles and Shakes

Untreated wood shingles and shakes are highly combustible. Shingles and shakes are now available with an exterior fire-retardant treatment. The Underwriters' Laboratories have awarded a Class C rating or a Class B rating when additional special sheathing construction is used.

Class C coverings are effective against light fire exposures. They are not readily flammable, afford a slight degree of fire protection, and may require occasional repairs or renewals to maintain their fire-resisting properties. Class B includes coverings that are effective against moderate fire exposures. Under such exposure, they are not readily flammable, do not carry fire, afford a moderate degree of fire protection to the roof deck, do not slip from position, possess no flying brand hazard, but may require infrequent repairs to maintain their fire-resisting properties.

### SOURCES OF TREATED MATERIALS

Since every type of treated material is not available at all supply locations, it is recommended that your order include specifications for the type of treatment you need for the intended use. Do not just ask for "treated wood." Some treatments are intended for soil contact, whereas others are for less severe conditions. Some treated material may be identified with an association grade mark. Although most chemicals color the wood, not all colored wood is treated with *preservative* chemicals. The best guarantee is to buy from a reputable dealer.

Farm supply yards have stocked treated wood items such as fence posts, poles, timber, and lumber for years, but demand has not been enough to warrant stocking them in volume. However, with expanded use for residential construction, treated wood products are becoming more readily available, partly because of the development of quality standards by the American Wood Preservers Bureau. These standards specify the retention and distribution of the preservative chemicals in the wood and are verified by the presence of the AWPB grade mark.