



AMERICAN WOOD COUNCIL

What the 2015 IBC Means for Wood Construction – Part IV: Permanent Wood Foundations

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STD600-A What the 2015 IBC Means for Wood Construction – Part IV: Permanent Wood Foundations

Description:

This article provides an overview of changes for the 2015 *Permanent Wood Foundation (PWF) Design Specification*—a publication intended to address structural design requirements of a wood foundation for light-frame construction. The standard for designing wood foundations, most commonly used in residential structures in the upper Midwest, has been updated to reflect reference to the 2015 *National Design Specification® (NDS®) for Wood Construction* and 2015 *Special Design Provisions for Wind and Seismic (SDPWS)*. The 2015 PWF, 2015 NDS, and 2015 SDPWS are all adopted by reference in the 2015 *International Building Code* and the 2015 *International Residential Code*.

Learning Objectives:

After reading this article, you will:

1. Understand changes incorporated in the 2015 PWF standard
2. Be knowledgeable of the basic requirements for a PWF
3. Understand material requirements for use in a PWF
4. Be aware of related standards required to design a PWF

To receive credit, you are required to read the entire article and pass the test. Go to <http://www.awc.org/education/ecourses> for complete text and to take the test for free.

What the 2015 International Building Code Means for Wood Construction—Part IV

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[1]

Properly designed, a PWF can be engineered with stress-graded lumber framing and plywood sheathing to support lateral soil pressures, as well as, dead, live, snow, wind, and seismic loads.

Image courtesy of the Southern Forest Product Association .

By Buddy Showalter, PE

To help translate what the latest changes to building codes mean for opportunities in wood construction, the American Wood Council (AWC) has introduced four new standards that are adopted by reference in the 2015 International Building Code (IBC) and the 2015 International Residential Code (IRC).

Over the last three months, this author has covered updates to the 2015 National Design Specification (NDS) for Wood Construction[2], the 2015 Special Design Provisions for Wind and Seismic[3] (SDPWS) and the Wood Frame Construction Manual (WFCM) for One- and Two-family Dwellings[4] (ANSI/AWC WFCM-2015) standard. Each of these articles provides an overview of allowable designs for various applications of wood-frame construction based on the latest code changes in a digestible manner for designers.

In this final installment on the updated standards for wood-frame design, an overview of changes is provided for the 2015 Permanent Wood Foundation (PWF) Design Specification—a publication intended to address structural design requirements of a wood foundation for light-frame construction. The standard for designing wood foundations, most commonly used in residential structures in the upper Midwest, has been updated to reflect reference to the 2015 NDS and 2015 SDPWS, covered previously in this series.

Updated from the 2007 version, there are minimal changes to the 2015 design standard for PWFs. These include updated reference to the following standards:

- 2015 NDS;
- 2015 SDPWS;
- American Softwood Lumber Standard (PS 20-10);
- Construction and Industrial Plywood Standard (PS 1-09);
- Performance Standard for Wood-based Structural-use Panels, (PS 2-10); and

- American Wood Protection Association (AWPA) U1-14, Use Category System: User Specification for Treated Wood (Use Category 4B: Permanent Wood Foundations).

A PWF system consists of a load-bearing wood-frame wall and floor system designed for both above- and below-grade use as a foundation. These foundations can be engineered with stress-graded lumber framing and plywood sheathing to support lateral soil pressures, as well as dead, live, snow, wind, and seismic loads. The 2015 PWF standard includes criteria for materials, preservative treatment, soil characteristics, environmental control, design loads, and structural design.



[5]

The 2015, Permanent Wood Foundation (PWF) Design Specification is adopted by reference in the 2015 International Residential Code (IRC) and 2015 International Building Code (IBC).
Image courtesy AWC

Moisture-control measures based on foundation engineering, construction practice, and building materials technology are employed to achieve a dry, comfortable below grade living space. The most important of these moisture-control measures is a granular drainage layer surrounding the lower part of the basement that conducts groundwater to a positively drained sump, preventing hydrostatic pressure on the basement walls or floor. Similarly, moisture reaching the upper part of the basement foundation wall is deflected downward to the gravel drainage system by polyethylene (PE) sheeting, or by the treated plywood wall itself. The result is a dry basement space that is readily insulated and finished for maximum comfort and conservation of energy, utility, and use of space.

Framing used in the PWF system is required to be lumber in accordance with PS 20 and needs to bear the stamp of an approved grading agency or inspection bureau participating in an accreditation program, such as the American Lumber Standard (ALS) program or equivalent.

Sheathing used in the PWF system is required to be plywood manufactured with all softwood veneers, bonded with exterior adhesive (Exposure 1 or Exterior), and grademarked indicating conformance with PS 1, PS 2, or applicable code evaluation reports.

The following components must be pressure-treated with preservatives;

- exterior foundation-wall framing and sheathing (except the upper top plate);

- interior bearing-wall framing, and sheathing, posts or other wood supports used in crawlspaces;
- sleepers, joists, blocking, and plywood subflooring used in basement floors; and
- other plates, framing, and sheathing in contact with the ground or in direct contact with concrete.

Treatment is in accordance with AWWPA U1's "Commodity Specification A" (Section 4.2, Lumber and Plywood for Permanent Wood Foundations). Each piece of treated wood is required to bear the quality mark of an inspection agency listed by an accreditation body complying with the requirements of the ALSC Treated Wood Program or equivalent.

Wood foundation sections of lumber framing and plywood sheathing may be factory-fabricated or constructed at the jobsite.

Fasteners and connectors used in preservative treated wood are required to be of Type 304 or 316 stainless steel. However, when framing lumber is treated with chromated copper arsenate (CCA) and the moisture content of the framing remains at 19 percent or less (such as studs, blocking, and top plates of exterior and interior basement walls), hot-dipped galvanized (zinc-coated) steel fasteners conforming to the requirements of ASTM A153, are permitted in lumber-to-lumber connections.

Structural design of a PWF is required to be in accordance with the NDS, SDPWS, and provisions of the PWF standard. Reference design values for sawn lumber, plywood, and connections are provided in the NDS, while nominal unit shear capacities for shear walls and diaphragms are in SDPWS.

The 2015 PWF Design Specification is available for download on the AWC website[6]. It was first developed in 2007 and is based on information developed cooperatively by the wood products industry and the U.S. Forest Service, with the advice and guidance of the Department of Housing and Urban Developments (HUD's) Federal Housing Administration (FHA)



[7]John "Buddy" Showalter, PE, joined the American Wood Council (AWC) in 1992, and currently serves as vice president of technology transfer. His responsibilities include oversight of publications, website, helpdesk, education and other technical media. Showalter is also a member of the editorial boards for Wood Design Focus, published by the Forest Products Society, and STRUCTURE magazine, published jointly by National Council of Structural Engineers Associations (NCSEA), American Society of Civil Engineers/Structural Engineering Institute (ASCE/SEI), and Council of American Structural Engineers (CASE). Before joining AWC, Showalter was technical director of the Truss Plate Institute. He can be reached at bshowalter@awc.org[8].

Endnotes:

1. [Image]: <http://www.constructionspecifier.com/wp-content/uploads/2015/06/PWFfloorbeams.jpg>
2. Wood Construction: <http://www.constructionspecifier.com/what-the-2015-international-building-code-means-for-wood-construction-part-i/>
3. Special Design Provisions for Wind and Seismic: <http://www.constructionspecifier.com/what-the-2015-international-building-code-means-for-wood-construction-part-ii/>
4. Wood Frame Construction Manual (WFCM) for One- and Two-family Dwellings: <http://www.constructionspecifier.com/what-the-2015-international-building-code-means-for-wood-construction-part-iii/>
5. [Image]: <http://www.constructionspecifier.com/wp-content/uploads/2015/06/2015-PWF-Cover.jpg>

6. AWC website: <http://www.awc.org>

7. [Image]: <http://www.constructionspecifier.com/wp-content/uploads/2015/04/Buddy-Showalter-Headshot.jpg>

8. bshowalter@awc.org: <mailto:bshowalter@awc.org>

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