Structural Design Criteria for Raised Wood Floor Foundations

An Online Continuing Education Course for Engineers

Course Number: S-4007

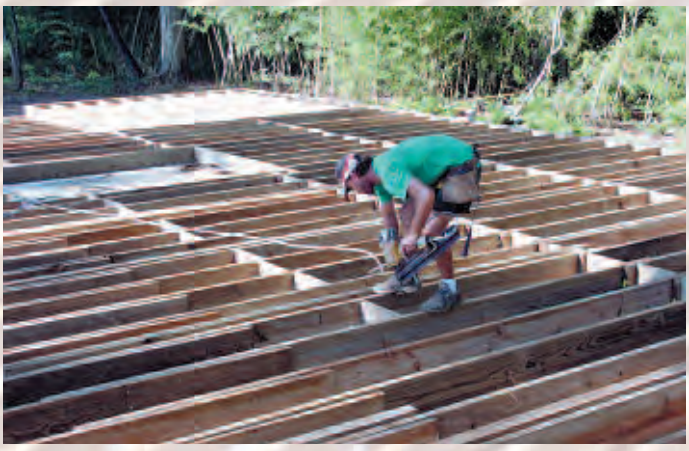
Credit: 4 Hours / 4 PDH / 4 CPD

SOUTHERN FOREST PRODUCTS ASSOCIATION®

Raised Wood Floor Foundations

Southern Pine by Design

Design and Construction Guide



SOUTHERN PINE BY DESIGN™

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Foreword *by Michael Holigan*

Our latest Project House is a 5,800 square-foot Mediterranean style custom home, designed by the Evans Group of Florida, and built in North Dallas. Due to the expansive nature of the soil at this site, our engineer recommended that we build the house on a classic pier-and-beam foundation.

My company partnered with the Southern Forest Products Association to construct a raised wood floor foundation that will not only stand the test of time but also handle the expansive clay soil problems in the area. Another goal was to ensure that the family has a comfortable home – built on a sturdy, dry, and stable foundation.

A raised floor system is an assembly of beams, girders, joists and sheathing panels comprised of various engineered wood framing products, all properly sized and connected together. A raised floor system is designed to elevate the living space off the ground, isolating it from moisture and pests. American homes have been built on raised wood floor systems since Colonial times, and the aesthetic and practical reasons for building a raised home still apply today.

Many terms are frequently used to describe raised floor systems in different regions of the country. Examples include *raised wood floor, raised wood platform floor, raised floor foundation,* and *crawlspace construction.* A raised floor can also be supported by a variety of foundation types. Examples of the most common foundation types include spot pier-and-beam foundations, continuous foundation walls (stem walls), and grade beam foundations.

Regardless of the exact term or foundation type used, a raised floor system provides numerous advantages. This publication takes an in-depth look at these advantages and explains the tangible and intangible benefits of raised floor living. It also addresses basic construction elements, providing valuable guidance to builders constructing a raised floor.

Together, homeowners, builders, insurance underwriters, architects and others can use this publication to examine the benefits of a raised floor system during the planning of a residential or commercial structure, and to make informed decisions. Once a raised floor is selected, the construction section of this publication provides the details required to properly design, specify and build the system.

The raised floor system can help a builder deliver customer satisfaction for discerning clients who demand homes with comfort and distinction. With the know-how to properly construct a raised floor, smart builders can establish a reputation for quality and craftsmanship that distinguishes them from the competition.

YNH Media, LP, based in Dallas, Texas, produces the national television series, *Michael Holigan's Your New House,* seen on 135 broadcast stations and cable by more than 2 million viewers every week. Michael Holigan.com receives over 400,000 unique visitors per month. Both the TV show and Internet site are popular with builders and consumers who are interested in building, buying, or remodeling their home.

SOUTHERN FOREST PRODUCTS ASSOCIATION®

SFPA is a nonprofit trade association that has represented manufacturers of Southern Pine lumber since 1915.

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The Southern Forest Products Association (SFPA) is a nonprofit trade promotional group supported by Southern Pine lumber manufacturers. SFPA neither grades, tests, manufactures, nor treats lumber products. The primary purpose of this publication is to provide technical information about the use of wood products in raised wood floor foundations. The content has been compiled by SFPA as a service to buyers, users, and specifiers. The concepts contained herein are illustrative of factors involved in designing and building raised wood floor foundations, but are not intended to be used as a substitute for plans and specifications prepared by qualified professionals for individual construction projects. Accordingly, SFPA does not warrant the information in this publication and assumes no liability for damage caused or contributed to by the use of such information.

The conditions under which lumber is used in construction may vary widely, as does the quality of workmanship. Neither SFPA, nor its members, have knowledge of the quality of materials, workmanship or construction methods used on any construction project and, accordingly, do not warrant the technical data, design or performance of the lumber in completed structures.

CONTENTS

Wood-Frame Construction

Wood-frame construction is the predominant method for building homes and multi-family structures in America, resulting in the world's best-housed population.

Increasingly, wood framing is also being used in commercial and industrial buildings. Raised floor systems can readily be used in "ordinary" construction of commercial buildings where exterior fire exposure is a concern. In ordinary construction, exterior walls are constructed with noncombustible materials or fire-retardant treated wood, with floors, roofs and interior structural elements built with wood framing.

Wood-frame buildings are economical to build, heat and cool, and provide maximum comfort to occupants. Wood construction is readily adaptable to traditional, contemporary and the most cutting-edge building styles. Its architectural possibilities are limitless and its durability spans the centuries.

Throughout history, wood has found favor as a building material due to its strength, economy, workability and beauty, and its ability to last has been demonstrated again and again. From the ancient temples of Japan and the great stave churches of Norway to the countless historic North American buildings, wood construction has proven it can stand the test of time.

With any building material or product, sound construction and installation practices must be followed to assure durability and trouble-free performance.

Building codes generally focus on life-safety issues, with minimal considerations given to serviceability. The details and recommendations contained in this publication reflect construction practices that are intended to not only comply with building codes, but also produce sound, low-maintenance wood-frame buildings. Primary emphasis is on the foundation and the raised floor system. Wherever possible, the provisions described in this publication conform to typical building code provisions; however, consult your local building code official for specific requirements.

The Raised Floor Advantage

Reasons to Select a Premium Floor System

THE PREMIUM FLOOR SYSTEM

Satisfying the higher expectations of today's homebuyer can present challenges to the design-build professional.

Meeting these challenges begins with a premium floor system.

Designers and builders who offer the raised floor option, framed with strong, durable, renewable wood, create value for themselves and their clients. In regions where raised floors are not common, builders can establish a market niche by offering a distinctive and affordable alternative. Clients who invest in this type of home accrue lifelong benefits such as curb appeal, comfort, practicality and lasting value.

SUSTAINABLE CONSTRUCTION

The raised floor is also the right choice for the environment — it is a sustainable construction system. First and foremost, wood is a renewable resource that takes far less energy to produce than concrete or steel. Furthermore, future structural modifications, additions or repairs can be performed more easily, extending the useful life of the structure. Builders can complete these tasks with less environmental impact, consuming less energy and avoiding expensive technologies. Finally, construction of a pier-and-beam foundation in association with the raised floor system is far less disruptive to the natural surroundings than a slab-on-grade (slab-on-ground) foundation. With a pier-and-beam foundation, less damage occurs to the root systems of neighboring vegetation.

> "A raised floor separates the living area from the earth in the classic sense of distinguishing the sacred from the profane. The home is sacred, and symbolically you make it more suitable for living by removing it from the ground. In so doing, you isolate the structure from earth-bound perils — the profane — such as animal and insect pests, flooding and other moisture sources that lead to illnesses, rot and decay."
>
> ***Kevin Harris, Architect – Baton Rouge, LA***
> www.kevinharrisarchitect.com

VALUE-ADDED OPTIONS

The raised floor system gives the builder and client an opportunity to explore ideas that can expand the livability and appeal of the home.

- The raised floor takes full advantage of amenities such as a front porch, a screened back porch, or a deck because they are natural extensions of the structure's elevated platform.
- Inside the home, attractive wood flooring is a great upgrade to offer the client, adding a dash of sophistication. A wood floor installed over wood joists also makes for a very comfortable, allergy-free walking surface.
- Another value-added option becoming quite popular in coastal areas of the United States where decay and termite infestation is a problem is "whole-house" pressure-treated framing. Pressure-treated lumber can readily be used throughout the whole house or in the floor system alone. With the new generation of wood preservatives (see pages 12-13), the homeowner and builder have even more choices today.

Construction Advantages *The flexibility of the raised floor offers several advantages in the construction phase*

easy scheduling

Construction of a raised floor may help accommodate the scheduling of trades, saving time. For example, concrete and masonry work does not have to wait on plumbing installation and inspection, which is the case with slab-on-grade. This can help expedite construction.

flexible design

Changes to the floorplan, such as relocation of a toilet or lavatory, are simple and economical compared to slab systems.

soil variations

A raised floor can be a cost-effective solution to construction in poor soil conditions, where movement of expansive clays or the subsidence of organic soils is a concern.

reduced cut and fill

For sloped lots, a raised floor on piers can be more economical and practical than building a "cut and fill" slab foundation. Less soil is disturbed, reducing erosion. The piers eliminate the need for reinforced retaining walls and other extraordinary measures to provide proper site drainage, and plumbing connections to city services may be simplified.

floodplain fix

Flooding is always a concern. Raising a slab with fill to meet minimum flood zone elevation can be expensive, and takes time and care to properly compact. A raised floor system provides a practical and affordable solution for meeting code requirements in flood-prone areas (see pages 8-9).

BUILDING TO HIGHER EXPECTATIONS

Homebuyers expect more from their home than ever before, and more is not always measured in total square feet of living area. After all, a home is often a person's largest investment, so value is placed on both the tangible and intangible elements that make a home livable, not merely functional.

A recent national survey[1] asking consumers to define their American Dream House revealed more interest in comfort and style than size. And almost half the respondents – 49% – characterized their dream house as a safe, comfortable haven instead of a designer show house.

So, homebuyers of today desire a livin
that nurtures and prot
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PEACE OF MIND FOR BUILDER AND CLIENT

Although no system is perfect for all conditions, the raised floor offers some real advantages when it comes to design reliability, especially where moisture is an issue.

- By design, the raised floor removes a structure from contact with the ground, isolating the living space from ground moisture. Therefore, a raised floor system is less susceptible to foundation-related moisture problems.
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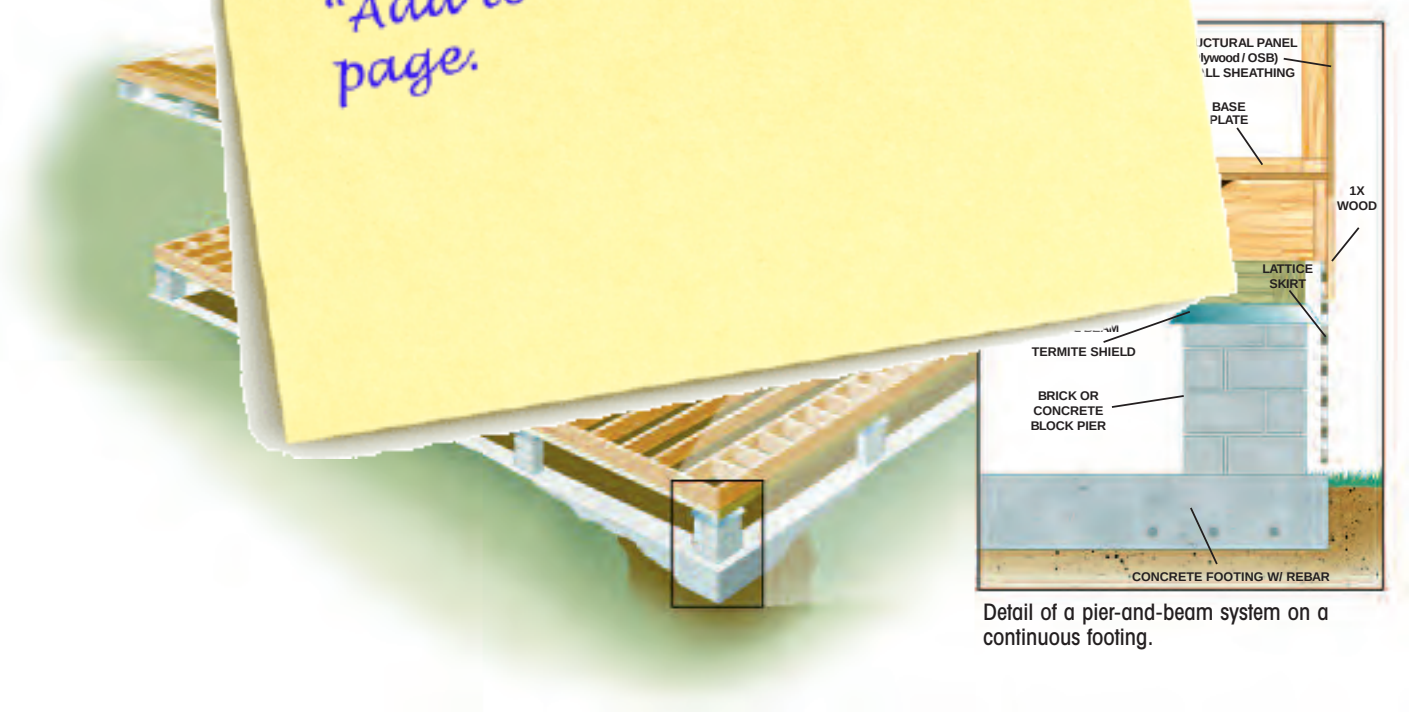

Detail of a pier-and-beam system on a continuous footing.