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DEFECT-FREE BUILDINGS

A CONSTRUCTION MANUAL
FOR QUALITY CONTROL AND
CONFLICT RESOLUTION



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AND CONFLICT RESOLUTION

Robert S. Mann

Construction Lawyer, Arbitrator, and Mediator



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DEFECT-FREE BUILDINGS

A CONSTRUCTION MANUAL
FOR QUALITY CONTROL
AND CONFLICT RESOLUTION

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The first question that everyone asked after I told them that I wrote a book was: “Where did you find the time?” The truth is that I borrowed the time—from my family, my friends, and my other career as a construction mediator, arbitrator, and lawyer. So it’s only fitting that I should first acknowledge and thank my wife, Mindy, and my daughter, Merissa, so very much for loaning me the time away from being a husband and father to complete this work. Without their encouragement and support, this project would have been impossible. I promise to repay the time, with interest.

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To the experts, who for more than 25 years have taught me all that they know about construction, and to the clients who have entrusted me with representing them in memorable cases. To Lawrence Moon, for his assistance in helping describe this book in a way that made the publisher enthusiastic and interested and to Maria Valentine for so generously giving her information technology expertise.

How to Use this Book

This book was written to help construction professionals, owners and developers. Much of the information directed toward owners and developers is not technical enough to be of much use to construction professionals, and much of the information directed to construction professionals may be somewhat too technical for owners. For purposes of guidance, each section of this book is labeled *For Owners*, *For Contractors*, or *For Owners and Contractors*.

Although I have tried to provide the information to owners in clear, non-technical language, some information in the owners material may be of use to construction professionals. Similarly, even though the information for construction professionals assumes a certain level of skill and experience, owners can benefit from that information as well.

The sections for owners and contractors contain information that will be useful to both in the building process. Much of this information concerns communication and expectations. Some of the information also pertains to new technology in the construction industry, and it may be useful to both owners and contractors.

Much of the information with respect to the common types of construction defects may seem to contractors and other construction professionals to be simplistic, although it may seem overly technical to owners. To the contractors and construction professionals, I respectfully say that while the descriptions of the defects and the protocols for avoiding them may seem simplistic, it is nevertheless true that the professionals involved in construction litigation have seen every one of the defects that are described in this book countless times. This suggests that while it may be easy to avoid the defects, either contractors or other professionals are not focused on these potential problem areas or they are not paying attention to simple ways to avoid problems.

To the owners, I respectfully suggest that if the descriptions of the defects and protocols to avoid them seem too technical, use the protocols as a checklist for your contractor. As each aspect of the construction that is a possible source of defects begins to get underway, sit down with the contractor or subcontractor and discuss each of the items in the list and check them off, one-by-one, to insure that the best possible effort has been made to avoid the defects.

Introduction

If you are a contractor, architect, engineer, or developer, would you like to build a better product and reduce the chance of getting sued for construction defects or breach of contract? If you are a homeowner or developer, would you like to have a better built home, condominium, or commercial project and avoid lawsuits with your contractor? If the answer to these questions is yes, this book is for you.

After 27 years as a lawyer representing owners and contractors in construction disputes, helping parties resolve hundreds of such disputes in the capacity of mediator and deciding such disputes as an arbitrator, I realized that the same construction problems occur over and over again. I wrote this book because I believe that if owners and construction professionals had a better understanding of why construction problems arise, they could easily avoid those problems and the lawsuits that inevitably follow. By avoiding construction problems, contractors, subcontractors, and design professionals can make more money and build better projects. Owners and developers can have better buildings, and both sides in the construction process can avoid the cost and misery of litigation.

Many contract disputes between owners and contractors are the result of bad communication. Some disputes result from bad construction. This book will help you avoid disputes that result from both causes. If you should find yourself in a dispute, and if you have followed the advice in this book, you will be in a better legal position and it will cost you less in your lawsuit.

None of the recommendations in this book are intended to substitute for a contractor's years of experience in the building industry. Rather, these suggestions are intended to help contractors use their experience in a better way, to improve their business relationships, to enable them to make more money on their jobs, and to build better buildings.

Likewise, the recommendations will help owners and developers identify potential problem areas in advance of the construction process, manage the process more effectively and efficiently, and get better results without spending more money.

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1

A Basic Primer on the Construction Process

FOR OWNERS

If you are like most people, you have neither built a new home, apartment building, or condominium nor remodeled an existing home. The construction process is likely a mystery to you. The selection of a contractor, negotiation of the contract with the contractor, the role of subcontractors, and issues of liens and insurance are confusing and difficult. Your lack of technical knowledge and information about the process of construction may make you nervous and you may think you are at the mercy of the contractor.

But in reality, in many respects, the construction process is not all that complicated. Understanding the basics of how homes and other wood frame structures are built, and understanding the fundamentals of the economics of construction and the relationship between the owner and the contractor, will allow you to move forward in the process with confidence.

Later in this book, in sections dealing with specific construction defects, you will read detailed discussions of various potential problem areas of construction. To put those into context, as an owner, you first need an overview of the whole process, with an explanation of some of the terms. So let's start with the basics and we'll get to the details later.

HOW WOOD FRAME STRUCTURES ARE BUILT

Virtually every wood framed home and simple wood frame structure in the United States is built the same way, using a process called *conventional light wood frame construction*. This type of building is called a *frame* or *wood frame* home. This type of construction is sometimes called *Type V* or *stick building*. Although many other types of

construction exist, some new and some old, most homes in the United States continue to be built with wood using techniques that have remained basically the same for hundreds of years. In fact, some familiar words and phrases are derived from centuries-old construction practices. For example, in medieval England, if you lived in a hut but could afford to keep a layer of wheat on the floor, you put a board across the entrance to your dwelling to keep the sheaves of wheat (the *thresh*) from falling out. The board was called a *threshold*, a term that we use today. If you weren't so fortunate, and your floor was bare dirt, you were "dirt poor," a condition in which you could find yourself today if your project ends up in a lawsuit.

Here's a basic description of wood frame construction: Every home starts with a foundation on stable soil or rock. Soil can be naturally stable, or it may be made stable by using various means to make it firm enough to bear the weight of the structure to be placed on the soil or to place structures through poor soil into stable rock under the soil. If the soil is not naturally stable and firm, those means include removing the existing soil and replacing it in layers while using machines to compact it firmly, or drilling large holes through unstable soil into the bedrock beneath the soil and filling those holes with reinforcing steel and concrete to create what are basically large concrete columns in the ground. The building is then supported on these columns, which are called *caissons*, *piles*, or *piers*.

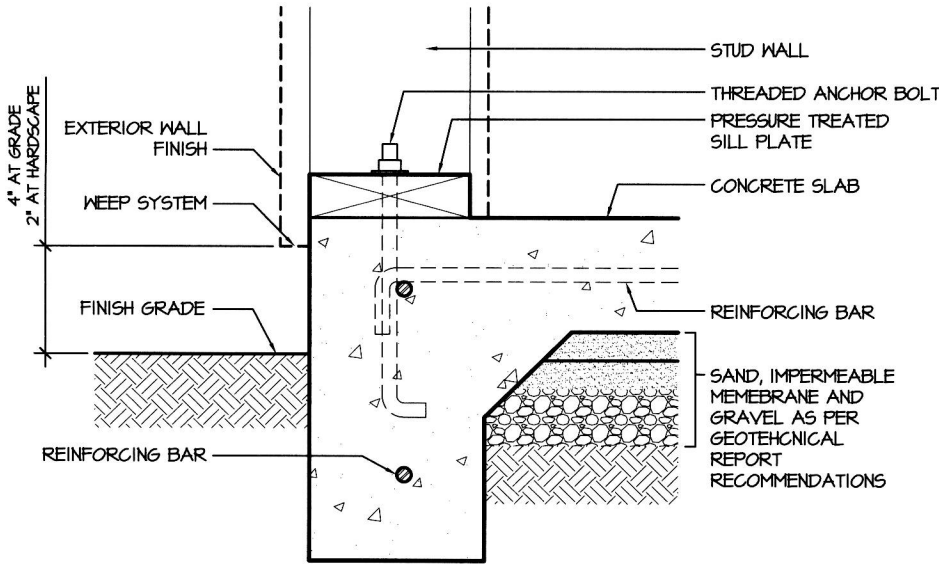
Soil that is removed and properly re-compacted according to instructions given by a soils engineer or geologist is called *certified compacted fill*. It is called *certified* because the process of its compaction has been approved by the soils engineer and the engineer has tested the soil during the compaction process to verify that it meets certain minimum standards so that it will support the home or other structure to be built on the site.

Once it has been determined that the soil under the house is stable, a concrete foundation is built on the ground. The foundation is generally of one of two types: *slab on grade* or *raised*. Each type has its advantages and disadvantages (more about that later). A slab on grade foundation is made by digging a trench around the perimeter of the proposed structure. Wood forms are built inside the trench so that the trench has the shape of an upside-down *T*.

This upside-down *T* shaped trench is called a *footing*. Bars of round, textured steel (rebar) are laid down inside the forms to provide reinforcement for the concrete footing. Rebar comes in different thicknesses, each of which is numbered. The numbers correlate to an eighth of inch: thus, Number 3 rebar is 3/8 inch thick, and number 8 rebar is 1 inch thick.

In a slab on grade foundation, the dirt surrounded by the footings is leveled and prepared to accept more concrete. Concrete is then poured into the forms that have been built around the perimeter of the slab and, additionally, on top of the ground in the area surrounded by the footings. This type of foundation is called slab on grade because the concrete slab is poured directly onto the grade, meaning on top of the ground. Figure 1-1 shows a drawing of a slab on grade foundation and footing. The drawing shows how the foundation would look if you sliced through it (a section). The section shows the grade (the earth), 2 inches of sand, a layer of plastic (the vapor barrier), another 2 inches of sand, the concrete, and the rebar. The drawing also shows a *sill plate* (described in more detail soon) that is anchored to the foundation by an anchor bolt.

Figure 1-1
Slab on grade
foundation and
footing



Sometimes special types of slabs are used to provide extra strength for a foundation system. One of these systems is called a *post-tensioned* slab. The other is called a *structural* or *mat* slab. A post-tensioned slab is built in much the same way as a conventional slab on grade foundation. The difference is that steel cables are placed inside the area where the slab will be poured, and these cables are stretched after the concrete is poured and then allowed to return to their original length so that they pull the edges of the slab inward. A structural or mat slab is usually 6 to 12 inches thick and has substantially more reinforcing steel than a conventional slab.

A raised foundation is made by digging trenches around the perimeter as described above, and building wood forms into which concrete is poured. The difference is that the stem of the *T* is longer—about 24 inches. When the concrete is poured, a portion of the stem of the *T* remains above the ground. The house is constructed on these raised foundations (also called *stem walls* or *foundation walls*) by using pieces of wood called *floor joists* to span the distance across the raised foundations instead of pouring concrete on the ground in the area surrounded by the footings. The top of the footings is at least 18 inches above the ground. When the wood is placed across from footing to footing, this leaves a crawl space under the floor of the home. Figure 1-2 shows a section of a raised foundation footing. The drawing shows the sill plate, the floor joist, the rim joist (blocks of wood between the floor joists at the edge of the assembly), the plywood subfloor, and the sole plate upon which the walls will be constructed.

Some important facts must be considered with respect to building a raised foundation or a slab on grade foundation. Raised foundations offer room in the crawl space to install utility connections, such as electrical, plumbing, and heating and air conditioning. Slab on grade foundations require careful planning because arrangements must be made for openings for utility lines before the concrete slab is poured, and it is expensive to change these openings later. Generally speaking, slab on grade foundations are less expensive but offer the homeowner fewer alternatives and less flexibility for later installations.