

Old House Foundations

*A Primer on Foundation Issues
For the Owner of the Older San Diego Home
Including Craftsman, Spanish, and Victorian Style Houses
Built Prior to 1950*



Presented By:

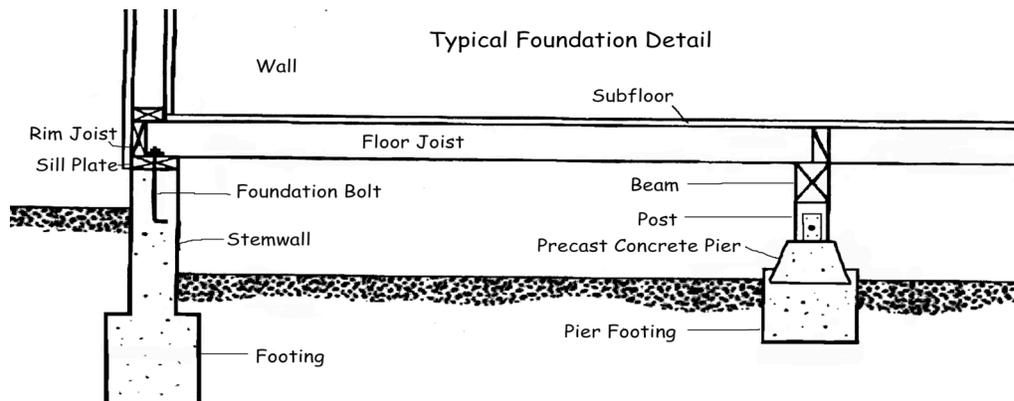
Craftsman Foundation Repair

California Contractor's License # 685993

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Introduction

Vintage Homes have great charm, style and character. Most people own old homes because of these qualities. Unfortunately, all houses require maintenance and repair, and time only adds to the homeowner's burden. Foundation repairs are associated with an understandable fear on the part of the homeowner for a number of reasons. It is intrusive, dirty and is a major investment of time and money. Frankly, foundation repairs are not as sexy or gratifying as beautiful paint and plaster, a remodeled bathroom, a new kitchen or Jacuzzi. However, foundation repairs are necessary to preserve both the house, and the homeowner's future present and future improvements. Often, the homeowner is afraid to find out the true condition of the foundation system, because they are afraid of what might be found. This is unfortunate, as foundation repairs can be examined, evaluated, and repaired like any other issue with an old home. Information about foundation repairs can help the owner of the older home make competent decisions about the protection and preservation of their investment.



The Old House Dilemma

Homes in the older communities of San Diego, Chula Vista, National City, La Mesa, El Cajon, La Jolla, Point Loma and Coronado have foundations that are often nearing the end of their useful lives. As these homes age and the revitalization and gentrification of older neighborhoods continue, foundation issues become of greater concern. Literally, a “wave” of homes are aging and often need to be repaired in a variety of ways, as well as upgraded and preserved. The vintage homes in San Diego are often well built, architecturally desirable homes. As we reinvest in older urban neighborhoods, work to

preserve our heritage, and try to act in a more “Green” manner, the remodeling and repair of older homes becomes more prevalent and necessary.

Specifically, in the older areas of San Diego County houses were built with raised foundations. Consisting of a perimeter concrete stemwall, with posts and piers supporting the interior floor structure, this was the predominant style of construction for single family structures built prior to 1940. There are a number of inherent shortcomings in the original design of these foundation systems that were simply not known at the time of construction. These problems have caused premature wear and the need for repair and replacement of foundation system. Also, poor soil conditions can cause homes to settle and tilt, and while this is not structurally unsafe, it becomes an issue when preparing to perform renovations on a house with noticeable cosmetic issues such as tilting, bowing and out of level doors, windows and cabinets. While these issues have often caused only minor settlement and cosmetic damage to these homes, the possible negative effects of even a minor earthquake by adding atypical stress may be catastrophic. Investigation of possible foundation problems is critical, particularly prior to major renovations.

Types of Problems Associated With Old Foundations

There are a number of inherent defects in older raised foundations. These are outlined as follows:

Material Quality- Older concrete is substantially lower in original construction quality than concrete produced in compliance with current standards. Concrete is comprised of Portland cement, sand, and aggregate. Older concrete often has a lower percentage of Portland cement (which bonds the concrete together) than is currently used. The sand was typically unclean, with other materials such as salts or other impurities, often originating as beach sand. The aggregates were often used from on site sources (meaning the rocks dug up when the footings were excavated), were often not cleaned properly, and were typically larger than is considered desirable. These substandard materials can all contribute to causing concrete to break down/wear out prematurely. Foundation systems that cause the most concern are those where unreinforced masonry were used including brick, hollow block and mortared rocks, or when posts and piers are used as a perimeter foundation. These alternate foundation systems offer less support and strength, cannot be retrofitted for earthquake protection, and are even more susceptible to wear.

Poor Moisture Control- Most houses built prior to 1940 and even many newer homes have had very poor drainage and moisture control. Architecturally it has traditionally not been desirable or considered necessary to have rain gutters installed on homes in San Diego, due to the relatively small amount of rainfall. Unfortunately, the sheer volume of

water that can come off a roof (a 10' section of roof during a rainstorm generating 1" of water=10" of water at the foundation) can have a very negative effect on the foundation, especially over the long term. Downspouts are often not properly directed to remove water away from the areas immediately adjacent to the foundation. Also, many older homes have poor drainage in the areas adjacent to the house with flowerbeds, low areas, and lack of proper curbing for crawlspace entrances and vents. Long term "creep" of the surrounding grade as the ground gets higher relative to the house can exacerbate the problem. Insufficient clearance between the sill plate and the soil can cause water intrusion and termite damage. Finally, older plumbing can have leaks that go undetected for significant periods. Couple in the causes of water with the seasonal changes (i.e. droughts) and the results can cause large swings in soil moisture content.

Shallow Footings and Soil Movement-Typically the footing depth for one and two story houses built prior to 1940 have footings less than the current code of 12" below grade. Many are 6" or less. Unfortunately, much of San Diego was built on a layer of clay soil, typically 5-10 feet deep. This clay soil is very susceptible to seasonal changes in moisture. Wet winters and dry summers cause expansion and shrinking of the soil, resulting in significant movement of footings. This movement causes cracks in plaster, doors and windows that do not function, and sloping floors. It is not unusual for an older house to be 3" or more out of level (The record for old houses is 10" out of level!). The industry standard of acceptable sloping of floors is $\frac{3}{4}$ " in 20 feet.

Lack of Foundation Bolts-Foundation bolts were rarely used prior to 1940, and were not required by building codes until 1949. Foundation bolts are intended to secure the sill plate or sole plate and wood frame of the house to the concrete foundation during periods of applied stress such as during earthquakes or adverse weather.

Lack of Shear Paneling-Cripple walls are used in some older houses, typically 2x4 or 2x6 framed walls below the floor joists, constructed on top of the sill plate. Without proper bracing, the wall can collapse as a unit during periods of duress. Shear paneling consists typically of $\frac{1}{2}$ " plywood nailed to framed walls to give it shear resistance.

Lack of Reinforcement-Concrete by itself is hard, but has no integral strength. Stresses on concrete such as soil movement, earthquakes and tree roots can cause movement that the concrete by itself cannot resist. This causes the concrete to crack. Once cracked, the concrete will move at an increased rate, and wear will also increase in rate. Older homes were typically poured without rebar, which gives concrete strength to resist movement and cracking.

Poorly Constructed Posts and Piers-Often, posts and piers have been added, adjusted, and replaced over time. The concrete used is of the same poor quality as the perimeter. The top of the piers can be at or below the soil level, causing long-term damage to the wood posts. Shims are often added between the posts and the piers. Piers are installed below current code, without footings. Posts are replaced with substandard materials.

Insufficient Access-The fact that current codes call for 18” minimum clearance beneath the floor joists is not arbitrary. In order to perform necessary periodic inspections and repairs access is critical, and less than 18” can make these impossible. Insufficient access also minimizes necessary ventilation, which is necessary to remove moisture as it emits from the soil.

Age-All the deficiencies listed above add together with time to cause foundations to wear out. It is the combination of all the above problems over time that can make repairs or replacement of the foundation system necessary.



Note the exposed aggregate on this worn foundation.

Chronic or Critical?

What bears discussing is the long-term nature of these issues. Houses that have poor foundations rarely if ever actually fail under normal conditions. Typically, foundation repairs cannot be referred to as “Emergency” repairs, but merely one of the many responsibilities of home ownership. The reality is that issues not dealt with pertaining to the foundation will not significantly change over time. Unfortunately, there are a number of forces that may force action by homeowners in addressing the issues.

The first issue is the likelihood of a major earthquake. While it has been over 100 years since San Diego has had a major earthquake, it is only a question of when, not if, an earthquake will occur. The survivability of wood frame homes is generally considered good. However, those houses without foundation bolts or even a coherent foundation have significant risk of failure.

The repair or remodeling of an older home also gives reason for addressing foundation issues. Installing a new kitchen, new bathrooms, flooring, windows, doors, tiles, painting, plaster repairs, etc. on an out of level, shifting foundation would be considered

unwise at best. Investment in repairs and upgrades to a property without properly protecting that investment can be a waste of money.

Finally, the sale of a home brings these issues to the forefront. Either the buyers will ask for significant reduction in the price, or will be unable to secure financing, or may just choose to cancel the purchase due to the unresolved problem. The potential loss of time, disinterest by potential buyers, and possible loss of revenue can force sellers to deal with these issues prior to completing a sale.



This 1930's house dropped about a foot during the 1989 Loma Prieta Earthquake.

Repair Versus Replacement

There are a number of repairs that can be performed short of replacement.

Earthquake Retrofitting-If the only problem is lack of foundation bolts the foundation can be retrofitted. Earthquake retrofitting a house consists of connecting the sill plate to the concrete foundation to prevent the house from moving off the foundation during an earthquake. Straps are installed at 4' intervals, within 12" of each corner of split in the sill plate. The straps are connected to the stemwall with bolts epoxy doveled into the concrete and then nailed or lag bolted to the sill plate. Unfortunately, worn foundations or those constructed with hollow block, brick, or posts and piers cannot be retrofitted.

Post and Pier Repairs-Posts and piers can have a variety of have issues. The posts can be missing, damaged, or replaced with substandard blocks, shims and posts. The concrete piers can be worn, missing, or spaced too far apart. Replacement consists of "wet setting" new strapped piers on a poured concrete base and installing new pressure treated posts and adding straps at the post to beam connection. Current code calls for 4' spacing on new posts and piers. While minimum footings size is currently 12" square

and 12" deep, in most of San Diego the footing size is recommended to be larger such as 16" square and 12" deep.

Floor Leveling-Assuming the perimeter is in good shape the floors can be lifted and leveled in conjunction with the post and pier repairs. Proper floor leveling consists of a floor level survey, and lifting the floors to improve their level, typically within 1/2" across the entire structure. Additionally beams are necessary to lift directly under wall sections, and these need new posts and piers. Impediments to leveling include limited access, chimneys and other permanent structures, and permanent warping of wood framing. Once level, the perimeter gaps are filled with concrete (as opposed to shims) to properly support the floor framing.

Crack Repair-Cracks in stemwalls can be repaired in several ways. Injection with two-part epoxy can bond the sides' back together. Grade beams or sister footings can tie the sides together and support stemwalls that are shifting. Straps or rebar can be bolted or notched into the concrete to tie the sides together.

Moisture Protection-Worn concrete can have its life extended by the application of a moisture sealer, followed by a coat of mortar. Unfortunately, when concrete is worn to the point that it cannot be retrofitted, this repair is not acceptable, and gives a false impression that the stemwall is in good shape, when in fact it is not.

Partial Replacement-Often, only a section of perimeter foundation needs repair. A partial foundation replacement can be performed if there is coherent remaining foundation to epoxy dowel rebar into. The footings should be 12" deep only to match the remainder of the foundation to help equalize future movement. Unfortunately, if the foundation is too worn out it may be necessary to consider full replacement. If more than 40% of a house's perimeter foundation needs to be replaced the current San Diego building code will require full replacement.

The Time has Come

Preserving a house by replacing the foundation entails a number of specific repairs and upgrades that make the replacement properly effective. You only get one bite at the apple, so it should be done correctly. First, the floors should be leveled as much as is feasible. Access to the crawlspace should be created by lifting the entire house if possible, or by tunneling underneath or cutting access holes in the subfloor if necessary. The sill plate should be replaced, as well as any damaged floor joists. Blocking between the joists and doubled rim joists are necessary. Screws can be used for placement, but all wood framing needs to be fully nailed. All wood that touches concrete must be pressure treated or foundation grade redwood (good luck finding the latter). Current codes call for a minimum of 3" x 8" pressure treated sill plate. Foundation bolts are galvanized, 5/8" x 12", with a 3" square washer. Straps should be installed to connect between the sill plate and the blocking, and the blocking and the bottom plate of the wall at 24" intervals. The footing depth should be 24" deep to properly support on clay soils, unless it is a partial replacement, where it should be 12"

square to match the existing to avoid differential movement. The reinforcement steel (rebar) must be properly bent and placed to have 3" of minimum clearance to soil or air. The posts and piers should be upgraded with proper poured concrete bases and pressure treated wood. All utilities are required to have framed openings or to be properly wrapped for future repairs or movement. The finish of the exterior concrete should be uniform and clean. All the details are frankly too numerous to mention here. Nevertheless, **this type of project requires proper plans and city permits to ensure that all current codes and requirements are met.**



A properly constructed stemwall and cripple wall with full blocking between joists, 1/2" cdx plywood shear paneling, straps at framing connections, screen and curb.

Most importantly, a professional should perform these repairs. The contractor should have a C61-D30 foundation repair specialty license. The contractor should carry Workman's Compensation Insurance for all employees (day laborers included), as well as Liability Insurance. Experience in proper repair techniques is important, as fixing an improperly constructed foundation can be an expensive nightmare. The particulars of a proper home improvement contract can be accessed through the California Contractor's State License Board (www.cslb.ca.gov), but nonetheless, should be clearly written and understood, meet current legal standards, be fair to all parties, and detail properly the work to be performed.

Unacceptable Repairs

Any discussion of foundation issues would be remiss if repairs that are of poor quality and design were not addressed. Typical of poorly designed repairs include beams, posts and piers added to support a perimeter foundation. While “technically” this calculates out by engineering standards, this is not a good repair for a number of reasons. First, the weight of the structure in the perimeter walls, the roof load, and the ceiling load is not supported by the new beam. This causes a bend in the floor over time as it cantilevers out from the beam. There is no earthquake protection in this repair.

Another typical poor repair is to adjust the floors by isolated lifting of the floors and joists, and adding shims under the posts or even to fill gaps between the beams and the floor joists. The shims crush or become loose over time.

Skim coating a worn foundation simply covers up the problem, and could be construed by some as fraudulent if a house was sold under the false pretense that the foundation was in serviceable shape.

Foundation replacements where the floors are not leveled, the wood forms are not removed, necessary sill plate and joist repairs are not made, and insufficient blocking is



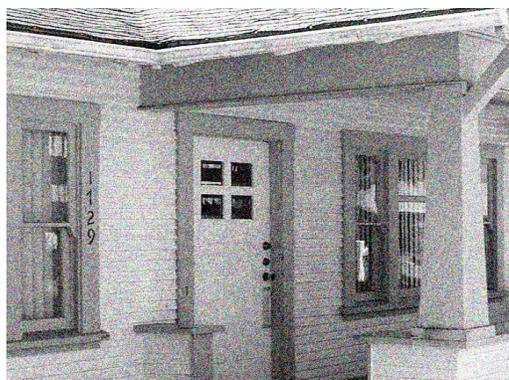
not installed are all typical repair blunders. Bundling of rebar to make placement easier/cheaper reduces the intended strength of the reinforcement. Incomplete or improper repairs can become more expensive over time than a proper repair. Old houses were built with craftsmanship and quality and deserve a proper foundation.

This foundation was poured without proper blocking, without finishing the exterior concrete, without straps, without leveling the floors, and without the proper permit.

What to Do?

No analysis of the foundation system of a house can be made without the knowledge of what the needs and desires of the owner are. Replacing a foundation on a house that is to be moved or torn down is foolish. Likewise, replacing a foundation without a plan as

to what other repairs might be necessary would be unrealistic. Long term goals and plans should be thought out prior to implementation of a repair strategy. Foundation repairs impact all systems of the house including plumbing, electrical, cosmetic finishes, siding, chimneys, doors and windows and fixtures. Careful planning and budgeting are necessary to accomplish remodeling goals. Most homeowners break down repairs into individual projects, and a clear understanding of the impact of different projects on each other is critical.



For significant foundation problems such as slope failure, improperly compacted fill soils or major settlement, consultation with a qualified engineer provides the definitive answer as to a structure's current condition. The engineer can provide testing and analysis necessary to determining the proper repair solution. Nevertheless, most foundation problems associated with older homes are readily determined. Call Craftsman Foundation Repair for a free estimate in the Greater San Diego area. We are happy to assist you in determining the condition of the foundation system on your home, and to offer functional, efficient repair options.

Craftsman Foundation Repair

History- My name is Larry Teves and I started Craftsman Foundation Repair as Larry Teves Construction in 1994. I've worked in the construction field for over 25 years, and have exclusively performed foundation repairs for the last 20 years. I graduated with a BS in Business Management from San Diego State in 1990. Previous to starting the firm I worked for The Horizon Company for 5 years, performing all phases of foundation repairs. Larry Teves Construction changed its name to Craftsman Foundation Repair in 1997. The company incorporated as Teves Construction, Inc., D.B.A. Craftsman Foundation Repair on January 1, 2000, and received a C-61/D-30 Foundation Repair

Specialty license in May of 2000. Craftsman Foundation repair has performed over 1,500 Foundation Repairs in San Diego County since 1994.

Mission Statement-We strive to be the leading residential foundation repair company in San Diego. We provide service, quality workmanship, and dedication to preserving and enhancing the value of our client's homes. We treat our employees fairly, with emphasis on personal growth and development, as well as paying a fair wage and providing safety programs to ensure our employee's well being. We are responsible members of our community, and work to ensure our society's historical heritage by preserving older homes. We evaluate foundation problems and recommend proper, cost effective repairs for our clients. We communicate clearly with our customers by being responsive, understanding and fair. We will be prompt, courteous, and sincerely gracious to our clients. We will avoid conflict of interest issues by recommending without compensation engineering and further evaluation if necessary. We will work with and recommend only those professionals that meet our standards of quality, competence, and customer service. We are not afraid of the dark, spiders, getting dirty, getting into and out of tight spots and meeting our customer's expectations. We will not perform any repair that does not meet our or our customer's highest standards and expectations.



We replace porches and steps too!

Contact us at (619) 295-1230

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Check out our Website at www.Craftsmanfoundation.com for more information