

THE DIRT on Texas Foundations

A Guide to Understanding North Texas Foundation Challenges

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"There are two types of homes in Texas. Ones that currently **have** foundation problems and ones that are going to **have** foundation problems."

– TOM TRACY

Special thanks to our contributors



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The pride of being a Texan is on display everywhere you look. The Lone Star seems to hang on every house and the familiar state outline can be found from garden beds to swimming pools. But Texas has a problem. All of the people who have come to Texas have had to learn a hard lesson. Whether it was settlers coming for cheap land, wildcatters looking to strike oil or more recent settlers joining a booming business economy, they learned that the dirt under their homes was unpredictable.

In the winter the dirt would swell, and in the summer, it would shrink and split. The houses would shift, crack and sometimes break under the pressure. A multi-billion-dollar industry has been built around tackling this problem with some interesting characters and business practices that at best can be described as unsavory.

As a home inspector, I find one of the most challenging aspects of advising homebuyers is to effectively tell the "story" of Texas foundations in a thoughtful, balanced manner that gives the buyer perspective on the situation. This guide is an effort to help prepare buyers for that conversation.

Sincerely,

Tom Tracy, MBA Owner Blue Sky Home Inspections TREC #23433



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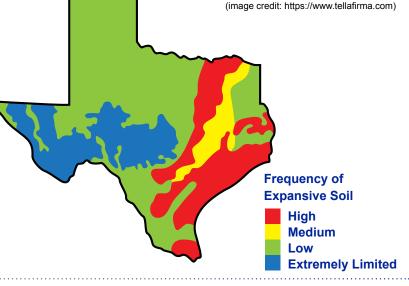
OVERVIEW

The following pages of this guide will provide you with information that will make you a smarter and more informed consumer. Ask better questions. Make better decisions. Whether you are buying a house or purchasing foundation repair services, this guide has been developed with the contribution of industry experts. I thank all of them for their help creating this guide, which reviews soil science, settlement causes, settlement types, settlement indicators, construction techniques, repairs and costs. It will also describe how to protect your foundation, give you an understanding of warranties, how the foundation repair industry is organized, and will reveal common unethical business practices.

Soil Science

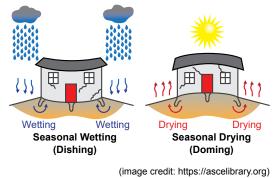
To say that the soil of Northern Texas is of poor quality for house building is as much of an understatement as when Apollo 13 astronaut Jack Swigert said "Okay, Houston, we've had a problem here."

Texas has a truly diverse soil population, with 21 different soil regions and over 1,300 distinct soil types. DFW is home to three of the soil regions and the dirt under our area is called Blackland Prairie. It is "clayey" meaning it resembles or contains clay. It is highly expansive/contractive and has a high plasticity index. All of this means that when the soil under your foundation gets really wet it will swell up and when it dries it will shrink and crack apart.



Settlement Causes

There are several possible causes of foundation settlement including highly expansive soils, poor soil preparation by the builder, improper grading and drainage, water leaks, and trees or plants. Identifying and properly responding to these issues in a home can be significantly more challenging when several contributing factors are present at the same time.



Highly Expansive Soils

Much of the soil in our area is not well-suited for good foundation stability. It is helpful to think of a slab foundation as a boat sitting on the water. The boat (slab) is reinforced to withstand the sea's movement but as the sea becomes more turbulent the boat's structural members (the framing of the house) can begin to twist and fail. In this analogy the boat, or foundation, is reinforced with post-tension rods or is anchored solidly to the harbor floor by some form of pier. The "seas" are analogous to the movement of a clay soil that when swollen with moisture can produce a force equal to and even greater than the strength of concrete, which is normally 3,500 to 4,000 pounds per square inch (PSI). The question in our area should be focused less on, "Is the soil in our area of low quality?" and instead should be, "Was the home built to address the soil deficiency and how has it performed over time?"

Poor Soil Preparation

There are several levels of oversight in a residential construction effort, especially when a larger-scale planned community is involved. Often-times, architects, geo-technical engineers, construction supervisors, contractors and local building authorities are working in close coordination to evaluate the quality of soil conditions present at a site before construction ever begins. These oversight processes normally work to produce a high-quality home. But when they fail, they tend to fail in entire neighborhoods, and (those shortcomings) tend to follow the same builder from development to development.

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It is important to understand that during the preparation process for building a new home the soil is disturbed and may lose its natural density and become loose and porous. You can find signs around a house that should cause you to ask questions, like the ones below.

Look for man-made, esthetically pleasing rises and falls in the landscape, or the presence of retaining walls and designed water features. They have been carved from dense soils that were naturally compacted over hundreds or thousands of years – and now have been disturbed. The homes adjacent to these features may not perform to expectations if the soil has not been responsibly managed during the construction process.

Questions to Ask:

- · Can I get a copy of the "Soils Report"?
- Can I see the engineer's plan and information from the contractor who built the retaining wall/water feature and did the site preparation? (This a great time to go online to search for ongoing litigation, bankruptcies and customer satisfaction reviews. Proceed with caution if you find that the builder/engineer/main contractors went bankrupt in what has historically been a boom time for construction services companies.)
- · Was a multi-site/subdivision soil testing completed?
- Are engineers' reports, hydrostatic plumbing tests or any other copies of repairs or estimates available?

Improper Grading and Drainage

Water is the enemy of your home. Proper grading is critical because it directs water away from your foundation and off your lot. Improper grading and drainage characteristics in the yard may cause water to pond near the foundation, completely saturating highly expansive soils. The soil will swell and then eventually dry out until the next rainstorm comes along and the rain/pond/swell/dry/shrink cycle repeats itself.

While there are numerous building codes that specify the building standards for grading, below are some basic standards that you can look for without any special tools.



home. In the first 10 feet around a home the grading should fall at least six inches away from the foundation. It is critical that water is encouraged to move away from the home.

The lot slopes away from the

(image credit: https://www.winnipeg.ca)

The swales are clearly defined: Swales are the depressions or trenches that direct water off the lot.

There are many perfectly acceptable variations on how the swales can be configured to move water away from the home. The key is that they are well-formed and appear properly sloped as water seeks the lowest possible level. You can learn a lot while visiting a home on a rainy day and watching how the water either ponds or moves from the home

Water runoff from the roof is effectively managed. The amount of water landing on a roof that needs to be directed away from the foundation is substantial. A one-inch rainfall on a flat 2,000-square-foot roof will capture around 1,247 gallons of water. That is a LOT of water in a short period of time. Gutters, downspouts and splashblocks should work to direct water runoff more than five feet away from the home. In my experience the majority of homes fail to meet this standard. Evaluating the severity of the deficiency is critical and bringing in a qualified contractor may be the appropriate next step. If you are not ready to call in a pro, other considerations are:

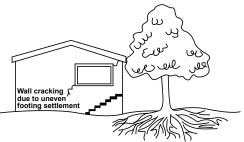
- · How close are the houses to each other?
- Are the swales that are shared with my neighbor clearly defined?
- Does my neighbor have gutters and downspouts? Are the gutters in good operational condition?
- Are there decorative garden beds or walls that may be retaining water close to the foundation?
- Is my roof and the neighbor's roof pushing a lot of water to the same area?
- · Is there evidence of ponding already present in the yard?

Water leaks Water leaks can be either the cause of foundation problems or a principal indicator of foundation settlement. A broken water line or cracked drain line can introduce hundreds of gallons of water into the soil under your foundation and cause the slab to "heave," or lift up. A "heaving" crack on a foundation may appear as a horizontal crack. It is more common for leaks to occur as a result of foundation movement than it is for foundation repairs being required because of water leaks.

During settlement, the main lines to your home can break apart as your foundation moves in one direction while the main lines (sewage, water, gas, etc.) stay in place or move in another direction. Remember that once plumbing repairs under a foundation are completed, the soil will eventually dry and shrink, resulting in – you guessed it – more foundation movement.

Trees While trees and bushes are decorative and add substantially to curb appeal, planting vegetation too close to a house or selecting plants that have an aggressively expanding root structure can cause

problems. A mature oak tree can drink up to 50 gallons of water in a day. Beyond the plant's thirst, the strength of its root structure is considerable.



(image credit: https://irp-cdn.multiscreensite.com)



(image credit: https://www.nachi.org)

Different Types of Settlement

Foundation settlement issues typically fall into three categories: **Uniform**, **Tipping**, and **Differential Settlement** (shown in order above). While settlement issues are never ideal, differential settlement is by far the most concerning.

Uniform As the name implies, uniform settlement occurs when the home settles at the same rate across the entire foundation. All houses settle to some degree and this type of settlement becomes a concern when it stresses or breaks the piping (gas, water, sewage, etc.) under the foundation. A quick inspection tip: If you have to step DOWN into the house from the porch or steps leading to the home, you may have a uniform settlement problem.



Tipping Settlement The Leaning Tower of Pisa is a famous example of tipping settlement. Somehow the structural members held everything together under tremendous pressures – and it just kept leaning. This is an expensive repair when it occurs in a home because the building needs to be lifted and properly supported. But, unlike differential settlement, once the home has been lifted and supported, you (usually) don't have to fix a bunch of broken stuff inside the home.

(image credit: Paul Postema/Unsplash)

Differential settlement

The difference between differential settlement and tipping settlement is that the home's structural members start to break under the different pressures (vertical, horizontal,



(image credit: https://theconstructor.org)

torsion etc.). The costs can stack up fast because once the foundation is lifted and properly supported, a series of qualified contractors need to begin their work. A structural engineer may be needed to certify the foundation work, a plumber to fix the broken/leaking pipes, someone to fix the brickwork, drywall repair, new trim and paint – and the list can potentially continue on.

Indicators of Foundation Settlement

You will have an extremely long and frustrating home buying search if you go looking for a home without a single indicator of foundation settlement. So how do you put the varying types of foundation indicators into perspective? Unfortunately, there isn't a clear formula and you may need the advice of home inspectors, foundation experts and in some cases geo-technical engineers to get a clear understanding of the severity of your home's foundation settlement issues. Here is some general guidance on how you can better evaluate foundation settlement indicators.

- 1. The foundation often "breaks" last While every home is unique, a general trend is that there are numerous and significant secondary indicators to suggest a foundation is moving, even while the foundation itself does not show a single crack anywhere. In my experience exterior brick mortar cracks appear first, interior wall cracks appear next, followed by ceiling cracks and then uneven flooring and cracks. You can also expect to see mis-aligned doors and windows that are difficult to open as the settlement becomes more serious The key point is that a foundation that has no identified cracks does not equate to a foundation that does not have settlement issues.
- 2. Diagonal cracks They usually start at the foundation, window or garage and travel up and off to a side. Sometimes they will get wider as they travel higher up the home. Several of the pictures in this guide are extreme examples, but smaller cracks behaving in the same way should also attract your attention. Look for cracks in different parts of the home that are all angled in the same approximate direction since they will generally point to the rising/falling area of the foundation.
- 3. Wall separation Walls that have separated from either the roof structure (exterior) or the ceiling (interior) are a significant concern. The separation along the wall peak is usually not uniform and the separation will typically get bigger or smaller at one end of the wall. These are generally more serious and may negatively affect the structural capabilities of the home.
- 4. Rolling floors As the foundation is shifting downward, the floors will follow that tilt. You will be able to walk corner to corner across a room and feel the rise/drop. You will be surprised at how accurate you can become at this with a little practice and concentration.
- 5. Ceilings and floors Ceiling cracks tend to follow the seams where the drywall meets or at the transition between the wall and the ceiling. Often there will be "nail pops" where the movement has dislodged the thin skim coat of drywall mud and the nail head has broken free.
- 6. Signs of prior repair Look for changes in brick mortar color as evidence of repair, excessive amounts of caulk in window corners or newly installed crown molding. Recently planted greenery can conceal sections of the foundation. Also, look for concrete repairs at patios, porches and driveways (an 18 inch x 24 inch patch) where access

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to the foundation through concrete was made. If erosion is present, you can sometimes actually see the piers.

7. Chimneys leaning or separated Often during construction of the slab an extension will be poured at the same time for the chimney's foundation. These chimney slab extensions are often well constructed but over time they are exposed to additional forces because they protrude out into the surrounding soil and the height of the chimney magnifies the problem. Look for gaps or separation between the chimney and the home.

Construction Techniques

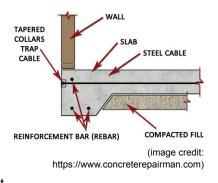
Post-tension slab

foundation A post tension slab is a concrete slab that has steel cables running through it that have been intentionally placed under significant tension. This tension makes the concrete slab much stronger than concrete without reinforcement and helps reduce cracking. The cost of using a posttension slab system is more economical when the soil conditions are poor because a post tension slab will spread the load of the home over a wider area. In a standard home without a post-tension slab, the weight of the structure is carried on the foundation and piers, whereas on the post-tension slab, the weight



(image credit: https://profengineering.com)

A post-tension slab foundation spreads the weight of the building over a wider area, and steel cables provide additional strength.



is partially carried by the slab as well. This means smaller and less expensive footings are required.

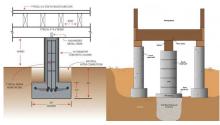
Pier and Beam

A pier and beam foundation is an alternative to a slab or basement foundation. It usually includes a crawl space beneath the living space and footings to support the foundation. A pier and beam foundation offers more stability in shifting soils, and with the crawl space, allows easier access to heating, plumbing and other mechanical components. Also, isolating the foundation movement to a few piers that can be in the center of the foundation, and focusing



(image credit: https://abrybros.com)

A pier and beam system is an effective way to support a home and offers a crawl space for easier access to plumbing and other systems.



(image credit: www.pinterest.com)

the repairs in a specific and targeted manner, can be more cost effective. The drawback is that the home's weight load is directly focused on a limited number of piers rather than spread over the entire concrete slab.

8. Assess the neighborhood As reviewed earlier, differential

settlement tends to occur in geographic clusters because there were either unidentified soil issues in an area or a

homes they were building. Taking the time to research the

bankruptcy a long time ago, it is common for them to be

currently operating under a different company name.

builder is a good idea. While the builder may have declared

builder did not properly support the foundations of the

How To Protect Your Foundation

We have said it before, and we will say it again: water is the enemy of your home. In order to protect your foundation, you have to maintain a reasonably consistent level of soil moisture. Assuming you have decent grading, here are the main options.

Drip irrigation For a modest amount (often just \$300 to \$400) you can purchase a set of irrigation timers and hoses that connect to one of your external faucets. The timer and hoses will allow you to set a watering schedule that will keep the soil at a more consistent moisture. For best results, the hoses should be placed 12 inches to 18 inches away from the slab to avoid water migrating under the slab.

Sprinkler systems While these common accessories need little explanation, they can include either drip lines or sprinkler heads. Drip lines can be installed around the perimeter of your foundation as part of a new system or added on later and are really effective at maintaining consistent moisture levels. If you have only spray heads on your sprinkler system, regularly check that the spray patterns are adequately covering the ground around your entire foundation.

Gutters Gutters, downspouts and French drains are often a great option when erosion, ponding or a negative grade is directing water too close to the foundation.

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Repairs and Costs

The foundation industry is not licensed by the State of Texas, which means that there is limited oversight for various business practices. In very few other industries will you ask for a quote for repair and receive such wide variances between the different quotes. There are a couple of reasons for these dramatic differences that the consumer will have to sort through.

Considering that the "product" is buried underneath your home and the successful performance of the contractor's work may not be known until years later, working with an experienced and reputable contractor is essential. Since there are no licensing requirements, there is also no mandatory General Liability Coverage (GLC) insurance. Most commonly, foundation quotes are based on the number and location of piers being installed. Exterior piers are usually significantly less expensive to install and are often quoted in the \$300 to \$450 per pier range, with steel piers commonly \$600 to \$700 per pier.

What Drives Costs

- 1. It is safer and more profitable for the repair company to expand the scope of work. Since repairs are often priced on a per-pier schedule it is more profitable for the foundation company to add more piers than is really required. But it is also important to remember that by installing more piers the installer has also reduced their company's long-term liability and warranty expense exposure.
- 2. It is largely a labor business. While there are differences in the types of anchoring systems used, the work is largely performed by relatively inexpensive labor. Material costs represent a smaller portion of the total project. This lends itself to wide fluctuations in price based on how busy (or slow) a contractor is at a specific time.
- General Liability Coverage (GLC) GLC protects the homeowners from a variety of potential jobsite hazards, and it is an expensive part of a reputable foundation repair company's costs. In some cities, municipalities require GLC

to register for a work permit, but in some cases a company will start work on a home only to be stopped partway into the job by the city for not having proper permits. With no GLC coverage and no way to get a permit, the company abandons the worksite, often with some of the customer's money in hand. The homeowner is left with holes dug around the foundation, a half-finished job, and a real challenge to find another contractor who wants to finish the work (and assume the liability) for a project that another company has started. Make sure to get a copy of the GLC policy and confirm it is in effect with the carrier before any work begins.

- 4. Warranty work is part of the original price. A premium for anticipated warranty work is part of every foundation repair job being sold. An extremely low bid or a very limited scope of work should raise concerns about the contractor's expectations of being around later to honor the warranty.
- 5. Steel Piers vs Push Piers Steel piers are the "Gold Standard" because they are considered a permanent fix and commonly do not require follow up work since they drive down to bedrock. The most common pier used is a Concrete Push Pier, but many professionals consider these to be only a temporary fix because they often require additional adjustments five to seven years after the original installation. The same forces that originally moved your home's foundation will move these piers as well.
- 6. Minor procedural differences can be marketed as

critical. Each manufacturer of pier products will have marketing materials, catchy brand names and proprietary processes that differentiate them from their competitors. In many cases the differences between the installation techniques and products are modest and the consumer must separate meaningful competitive advantages from exaggerated marketing.

Understanding the Foundation Repair Industry

There are typically three different trades that are involved in the identification and repair of foundation concerns in Texas.

Home inspectors Home inspectors are often the first license holder to raise a warning flag about the foundation's performance. To illustrate the importance of communicating foundation performance, the Texas Real Estate Commission (TREC) has mandated that the inspector must provide a written opinion of the foundation. It is the only required "opinion" statement the inspector must include in the final report. The inspection is a visual inspection only and no specific tools are required. The inspector

will observe the foundation, exterior walls, interior walls, ceilings, floors and the alignment of doors and decide if "further evaluation and repair by a highly qualified foundation expert is required."

Retaining walls are not a part of a home inspection unless the retaining wall is considered directly related to the foundation's performance. This can be interpreted by some home inspectors as "The retaining wall is not in direct contact with the foundation and won't be included in my report." Some retaining walls are more critical than others. Key things to look for: extremely high walls, staggered or tiered walls, walls that do not look engineered or professionally designed, walls close to the foundation or walls near water features like lakes or ponds. Only when the structural integrity of the home or the safety of its occupants *continued on page 9*



(image credit: https://www.redi-rock.com/



(image credit: https://blogs.agu.org)

are in question will the inspector recommend further evaluation and repairs to be conducted by a structural/civil or technical engineer.

Foundation specialists These specialists represent the interest of the foundation repair company and are not licensed by the state. Their respective levels of expertise can vary greatly. They commonly will inspect the foundation at no charge. They often use levels or digital measuring equipment (Ziplevels) to determine the rise/fall of the floor throughout the home and can often produce reports that visually illustrate these elevation changes. It is important to note that foundation specialists can describe the current performance, but they are limited in identifying the underlying cause of the performance issue.

Geo-technical engineers These licensed engineers specialize on how buildings interact with the ground. They are highly regulated, extremely well-credentialed and are the final authority on not only the performance of the foundation but the underlying factors that led to the performance deficiency and what repairs will be required. While costs can vary, these engineers will often produce a detailed finding of a residential home for a modest \$400 to \$700 fee. As with most trades, all engineers are not created equal. Be sure to find a well-referred, experienced and specialized expert.

Understanding Warranties

The fine print truly matters in all documents concerning real estate transactions. Evaluate the foundation warranty well before closing on a house. When considering a foundation repair company or evaluating a transferable warranty during a home purchase consider these points:

Gain clarity around the definition of lifetime Is it the "life" of the home, the life of the purchaser of the repairs, or the life of the repair company?

Transferability Under what specific conditions will the warranty be allowed to be transferred from one party to another?

Required repair provisions Confirm what required repairs or ongoing maintenance requirements are needed to keep the warranty valid, as well as which repairs have already been completed or can reasonably be accomplished. Since there were underlying concerns that caused the original foundation issues, it is important to fully understand both parties' requirements to keep the warranty valid.

Company longevity Are any specific provisions included in the warranty that protect the consumer if the repair company closes or goes bankrupt?

Consequential or incidental damages How does the warranty address other damages that may be directly associated with the foundation repair? Often, main drain lines break or are severed during repairs. Understanding the limitations associated with what is considered to be "cosmetic damage" is critical since damage to freshly painted walls, floor tiles and other surfaces can be extremely expensive to repair.

Express or implied warranty Be sure to retain all documents, communications, promotional and marketing materials and try to get all spoken claims in writing because they may imply a warranty that is more generous than the actual written warranty. Advice from a qualified attorney may be able to argue that the expressed or implied warranty may exceed the coverage of the actual written warranty.



Questions to Ask:

- How many projects in the past twelve months have your honored the warranty? On how many projects in the past 12 months have you done warranty work?
- How do you handle warranty claims that are not specifically listed in your warranty?
- How do you handle claims outside of your warranty?
- Will you be my point of contact if I have a warranty problem? If not you, then who?

General tone of the warranty Is the warranty language filled with disqualifiers that will

allow the repair company to avoid responsibility? Does it read as if the warranty is written to protect only the foundation repair company or is it written to provide the consumer with clear and discernible rights in the event of the work not performing to standards?

Scope of work When evaluating a foundation repair warranty that is being transferred to you, determine the scope of work that was originally performed, whether that full or partial warranty will transfer to you, and whether the scope of work previously performed aligns with the engineer's or foundation expert's assessment of the home's needs.

While the points above provide a starting point for evaluating the functionality of the warranties, they are no substitute for the professional guidance that a Realtor or Real Estate Lawyer would be able to provide you.

Identifying Unethical Business Activities

There are hundreds of honest, hard-working people in the foundation industry, but unfortunately this business attracts more than its share of questionable characters. Below are practices to be aware of:

Down payment required "We need to reserve your place on our calendar," or "We have to buy a lot of materials for a job this size," are often followed by requests for a down payment before work ever begins. While there are circumstances where some advance payment may be needed (an extremely large job hopefully with a long-term reputable contractor) down payments should be approached with an abundance of caution. Hiring a contractor who has earned the trust and respect of the community they serve has never been more important.

Changing business names While the business owner(s) remain the same, their firm closes down after a period of time and another opens up with a similar name under a different corporation to avoid warranty claims. The Better Business Bureau is a great research tool to validate a business.

Several company names under one roof You have done your due diligence and received three separate quotes. While they are extremely expensive, they are within a few hundred dollars of each other. It is possible that the separate quotes are from different "brands" that are actually part of the same overall business entity. This is more likely to occur in smaller markets and a quick online search should help identify the parent company.

No insurance Some companies go to great lengths to mislabel their employees as independent contractors or subcontractors – or completely falsify their insurance documents – in order to avoid costly Worker Compensation insurance. Fraudulent companies sometimes produce fake insurance coverage documents. Be sure to take the next step and call the insurance carrier to confirm coverage.

New business entity claiming decades of experience By purchasing the name of an older, existing company without keeping any of the employees or using any of their hard-learned processes, a company can misleadingly claim "decades" of experience.

Marketing machines Some foundation repair companies are nothing more than marketing and selling machines that subcontract 100% of their work.

Watch out for referrals and extra work If additional repairs are found outside the original scope of work, be sure to diligently check out any referrals offered. Sometimes a fraudulent contractor may raise concerns about the "delays/costs of waiting," and he will point out that his "referral" can be there in a few hours. He may have a financially lucrative arrangement with the "referral." Worse yet, the "repairs" may not even need to happen. (Are you really going to crawl under your house to see a leaking sewer pipe?)



One Final Thought

Purchasing a home is never an easy undertaking. When one of the largest purchases most people make is sitting on low-quality soil, the challenges increase exponentially. While I hope this guide will help you feel more confident as a consumer, I offer one final thought: to make your home-buying experience as successful as possible, rely on experts – Realtors, Foundation Repair Contractors, Engineers and Home Inspectors – who you trust to truly focus on your well-being. If there is anything that the contributors to this guide can do to support your efforts, please let us know.

Blue Sky Home Inspections

Blue Sky Home Inspections is a trusted partner for Realtors and their clients in the home buying decision. We pledge to always be the resource that is trustworthy, unbiased, diligent and disciplined, providing expertise throughout the entire inspection process. It is our core values that guide our daily operations and ensure our clients receive the best service possible.

Our Core Values:

Protect the Client Share What You Know Be Diligent and Disciplined Be Independent

About the Author – Tom Tracy, MBA

Tom is Founder and Chief Inspector of Blue Sky Home Inspections, a home inspection services company serving Collin and surrounding counties (The Greater DFW Market). Tom founded Blue Sky Home Inspections with the mission of providing a trustworthy, unbiased resource for home buyers to receive high-quality information. Before founding his company, Tom led operation teams for large retail organizations responsible for driving a positive customer service culture while ensuring effective day-to-day management.

His passion for sharing knowledge and creating a outstanding customer experience is found throughout Blue Sky Home Inspections from the four core values (protect the client, share what you know, be diligent & disciplined and be independent) to the amount of detail provided to every client within the home inspection report.

Tom received his MBA from Walsh College and his Bachelor of Science from Central Michigan University. He is currently the Vice Chair of the Affiliate Committee for Collin County Association of Realtors. He is a licensed professional inspector, licensed continuing education instructor and holds certifications in thermography, pool operations and pool inspections.

Tom and his wife Racheal live outside of Dallas and enjoy hanging on the deck with a cool beverage or spending time with their boys Ryan and Sean.

Contributors



I would like to thank **Chris Statzer** and the team at **1st Choice Foundation Repair Company** for their help with this guide.

Since 1990, 1st Choice Foundation Repair has specialized in Residential and Commercial Foundation Repair in the Dallas, Tarrant, Rockwall and Collin County areas. As a result, they have gained unparalleled experience in the industry and their repair expertise, knowledge and know-how are keys to your foundation's success.



Additional thanks to **Independent Foundation Engineers, Inc. (www.foundationprofessor.com)** for their help with this guide.

Independent Foundation Engineers help homeowners by providing an unbiased foundation repair plan that can be used to obtain building permits needed to proceed with repairs. IFE provides a full line of engineering services from visual inspections and elevation survey analysis to contour mapping, pool support structure, drainage, and foundation design.



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