

Engineering Truth, Vol. 3: Water Always Wins

by Travis Nech

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Engineering Truth

Volume 3: Water Always Wins

How Moisture Moves Texas Clay, Walls, and Foundations — and What Actually Stops It

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The techniques and procedures described in this book reflect the author's field experience in brick, masonry, and foundation work across Texas. They are provided for informational purposes. Foundation and structural work carries real risk. When in doubt, hire a licensed professional — and for structural questions beyond the scope of the methods described here, consult a structural engineer. The author is not a structural engineer and holds no engineering license; this book shares field experience, not a licensed evaluation. All examples in this book are hypothetical or composite examples, labeled as such, drawn from common patterns seen in the field. They are not accounts of named customers.

Table of Contents

1. Chapter 1: Water Always Wins — Why Every Building Problem Starts Wet
2. Chapter 2: Texas Clay Drinks and Shrinks — Expansive Soil in Plain English
3. Chapter 3: The Moisture Cycle — Wet Season, Dry Season, and the House in Between
4. Chapter 4: Roofs, Gutters, and Grading — The First Line

- That Fails First
5. Chapter 5: Plumbing, Irrigation, and the Water You Cannot See
 6. Chapter 6: Water in the Wall — Brick Is a Reservoir
 7. Chapter 7: Water Under the Slab
 8. Chapter 8: Trees, Roots, and Thirsty Ground
 9. Chapter 9: Measuring Moisture
 10. Chapter 10: Pressed Piles and Refusal in Wet Ground and Dry
 11. Chapter 11: Drying, Draining, and Defending
 12. Chapter 12: The Year-Round Water Plan
- Conclusion: Respect the Water, Keep the House
 - Resources & Next Steps
 - About the Author
-

Introduction: Follow the Water

Ask a room full of homeowners what damages houses and you will hear a list: age, heat, wind, bad builders, bad luck. Ask a man who has spent 50 years opening up walls and digging beside foundations in Texas, and you will hear one word first, every time.

Water.

Not water as a flood. Floods are honest. Everybody sees a flood. The water in this book is quieter than that. It is the downspout that dumps a roof full of rain six inches from a foundation, year after year. It is the flower bed built up above the weep holes so a brick wall drinks and cannot drain. It is the slow plumbing leak under a slab that no one finds until the floor lifts. It is the long, dry August when the clay under one side of a house shrinks away while a sprinkler keeps the other side swollen. None of those look like emergencies on the day they start. All of them, given time, move houses, crack brick, rust steel, and rot wood.

That is why this is Volume 3 of Engineering Truth.

Volume 1, The Refusal Standard, was about proof in foundation repair: pressed concrete piles driven until the ground itself proves it can hold. Volume 2, Reading Cracks Like Instruments, was about reading the evidence a house gives you before anyone sells you a repair. This volume goes one step deeper, to the cause behind most of the evidence. Cracks are readings. Refusal is proof. Water is, more often than any other single thing, the reason the reading changed in the first place.

The title is not poetry. Water always wins is a field

observation. Water wins against brick that cannot drain. It wins against mortar that stays saturated and then freezes or bakes. It wins against steel lintels that sit wet in a wall — rust expands, lifts the brick above, and thins the steel the wall depends on. It wins against expansive Texas clay, because clay does exactly what water tells it to do: swell when it drinks, shrink when it dries. And it wins against foundations, not by pushing them over in a day, but by changing the ground under one corner, one side, or one plumbing line at a time, season after season, until doors stick, floors slope, and walls tell the story in stair-step lines.

If water always wins, why write a book about fighting it? Because water wins against neglect, not against understanding. You cannot stop rain. You cannot repeal clay. You cannot make a Texas summer wet or a Texas winter dry. What you can do — and what this book teaches, chapter by chapter — is control where water goes, how evenly the ground under your house holds its moisture, and how quickly you notice when something hidden changes. Houses that are watched, drained, and kept at even moisture do not live trouble-free lives. No house does. But they live far quieter lives than houses left to drink on one side and thirst on the other.

You will find three threads running through every chapter.

The first thread is evenness. A foundation sitting on clay that is uniformly moist, or even uniformly dry, moves far less than a foundation caught between wet and dry. Almost every practical recommendation in this book — gutters that carry water away, grading that sheds it, soaker hoses that replace it carefully in a drought, irrigation that does not drown one bed and starve another — comes back to the same plain goal: keep the moisture under and around the house as even as you honestly can, in every season.

The second thread is order. Water problems are fixed before cosmetic problems, hidden leaks are found before floors are replaced, and drainage is corrected before — or at the very least alongside — any foundation repair. Chapter 10 says it plainly for repair work: fix the water and the plumbing first, then drive pressed piles to refusal, then repair the cracks and cosmetics. Reverse that order and a family can pay for beautiful brickwork over ground that is still moving. The brickwork will lose. The ground will not apologize.

The third thread is measurement. Volume 2 taught you to log cracks. This volume teaches you to log water: rainfall, soil moisture at a probe's depth, sprinkler run times, water bills that creep up for no explained reason, dated photographs of grading, gutters, and beds. Water damage feels sudden only because nobody was recording the slow part. A simple log

turns "it just happened" into a timeline you, a plumber, a contractor, or a structural engineer can actually act on.

A note on honesty and scope, because this series is built on both. I am a mason and a foundation repair practitioner. My authority in these pages is 50 years of hands-on field experience — digging, draining, repointing, replacing steel, driving piles, and coming back years later to see what held. I am not a structural engineer, and this book does not do engineering work. Where a house shows signs of serious structural distress, where a load needs to be calculated, or where movement is large, rapid, or unexplained, the right move is an independent evaluation by a structural engineer for that house. I will point to that line plainly wherever it appears, including in this book's chapters on repair.

Every specific scenario in this book is labeled for what it is. A hypothetical example is an invented teaching situation. A composite example combines details from several common patterns into one illustration. There are no named customers in this book, and no story is presented as a specific client's job. The lessons are real. The privacy is also real.

By the end of this book you will be able to do five things well. First, walk your own property after a hard rain and read where the water actually went — not where you assumed it went. Second, explain, in plain words, why your clay ground moves and why uneven moisture moves it worst of all. Third, audit the common hidden sources — plumbing, irrigation, pools, and trees — before they become foundation bills. Fourth, judge any drainage or foundation proposal by whether it fixes water, proves its support at refusal, and respects the right order of work. Fifth, run a simple year-round water plan, season by season, that costs mostly attention and protects the largest investment most families own.

Water always wins against a house that ignores it. This book is about refusing to be that house.

Follow the water. It has been telling you the truth the whole time.

Chapter 1: Water Always Wins — Why Every Building Problem Starts Wet

After fifty years working in Texas clay and brick, I can tell you the shortest true sentence in this trade: water always wins.

Not sometimes. Not usually. Always — if you give it time and a place to start.

I am Travis Nech. I am a mason and a foundation man. I am not a structural engineer, and this book does not pretend otherwise. What I am is a man who has torn out enough failed brick, rusted lintels, soft mortar, and settled footings to see the same culprit standing behind nearly every one of them. It was not bad luck. It was not just age. It was water, doing quiet work for years before anybody noticed the crack.

Homeowners usually call about what they can see. A stair-step crack in the brick. A door that will not latch. A window that sticks in August and frees up in February. A garage lintel sagging over the door. A floor that feels a little low in one corner. Those are symptoms. The cause, nine times out of ten, started wet.

Water is the common thread because a house is not one material. It is a stack of materials that all react to water differently, and water finds every one of them.

Start with brick. Good brick is hard and durable, but brick is not waterproof. It absorbs water like a very hard sponge. In a hard Texas rain, the face of a brick wall can take on a surprising amount of moisture in a short time. That by itself is not failure — brick is meant to get wet and dry out. Failure starts when water gets in and cannot get out, or when it is directed to the wrong place over and over. Trapped moisture works its way back to the mortar, back to the ties, back to the wood and steel behind the veneer. The wall looks solid from the street while it is getting soft from the inside.

Then mortar. Mortar is the sacrificial part of a brick wall. It is supposed to be a little softer than the brick so it gives first. Water speeds that giving up. Every wetting and drying cycle leaches a little lime, works a little deeper into a hairline, and in winter — yes, even in Texas we get enough freezes in Dallas-Fort Worth and down through Hamilton County to matter — that water expands as it turns to ice and wedges the joint a fraction wider. You will not see it happen in one season. Come back in ten years and run your finger down the joint. If it sands off like sugar, water has been at work the whole time.

Then the lintel — that steel angle over your windows, doors, and garage opening that carries the brick above it. Steel and water have a well-known arrangement: water wins and steel rusts. Rust is not just a stain. Rust expands. As a lintel rusts, it grows thicker than the steel it replaced, and that growth lifts and cracks the brick above it. I have seen lintels that looked like a surface problem from the ground and turned out to be swollen, layered, and splitting apart once we opened the

wall. The crack over the window was never a brick problem. It was a water problem that got to steel.

And then the foundation, which is where water does its biggest work in Texas, because our foundations sit in clay. Water changes the volume of clay soil. Wet clay swells and pushes up. Dry clay shrinks and drops away. A foundation is only as stable as the moisture under it is even. Let one side stay wet and the other side bake dry, and the house will tell you about it in the doors, the sheetrock, and the brick. We will spend the next two chapters on that soil, because if you live on Texas clay and you do not understand water under the house, you do not understand your house.

Now add Texas rain. Our rain does not always arrive polite. In North and Central Texas, we can go weeks with nothing and then take two or three inches in an afternoon thunderstorm. That intensity matters. A gentle rain soaks in. A hard, fast rain runs off — but only if the ground, the grading, the gutters, and the drains give it somewhere to go. If the grade slopes toward the house, if a downspout dumps at the corner, if a flowerbed is built up higher than the slab edge, that fast water does not disappear. It ponds. It finds the low spot. It sits against the foundation and works down along the side of the footing, because water always takes the easiest path down, and the disturbed soil right next to a foundation is almost always an easier path than undisturbed ground a few feet away.

That is the patience part, and it is the part folks underestimate most. Water does not need to flood your house to beat it. It needs a drip, a splash zone, a clogged gutter that overflows in the same place every storm, a sprinkler head turned a quarter-turn too far toward the wall. Given years, a small repeated wetting will out-damage one big memorable storm. The big storm gets cleaned up. The small drip gets ignored, and ignored water is undefeated.

Hypothetical example: Picture a brick home, maybe twenty years old, with a flowerbed along the front. The bed has been re-mulched every spring until the soil and mulch sit a few inches above where they started, nearly covering the bottom course of brick and the weep holes. The sprinklers water the bed three times a week. The brick at the base stays damp long after the rest of the wall dries. The mortar low on the wall starts to soften, white mineral crust — efflorescence — shows up as water carries salts to the face and evaporates, and inside the wall cavity, moisture sits where it was never meant to sit. From the street, the house looks well kept. At the base, where nobody looks, water has been winning a little bit every week for years.

Here is another one, and it is the one that fools the most

people: the dry-looking house that is still wet underneath.

A house can look bone dry — dusty yard, cracked flowerbeds, no standing water anywhere — and still have a moisture problem under the slab. How? Because the ground under the middle of a house almost never dries out the way the edges do. The slab covers it like a lid. Rain and plumbing moisture that get under there stay under there, shaded and protected from sun and wind. Meanwhile the edges of the foundation are exposed to every change in weather. So you can have a damp center and shrinking edges in the same dry summer, or in a wet winter, edges that swell while the center stays put. Either way the moisture is uneven, and uneven moisture moves houses — not moisture all by itself. A house that is evenly wet or evenly dry tends to stay put. A house that is wet on one side and dry on the other, or wet in the middle and dry at the edges, is a house being pushed in two directions at once.

Plumbing deserves a plain mention here, because not all water under a house falls from the sky. A slow leak in a drain line under a slab can wet one area for months with no sign inside the house at all — just one zone of clay staying swollen while the rest follows the seasons. If one corner moves and the rest is quiet, and the movement does not follow the weather, water from a pipe belongs on the suspect list. You rule it in or out with a plumbing test, not a guess.

So what does a homeowner do with all this? You start by thinking like water.

Walk your house after a hard rain, while everything is still wet. Where does the water go? Watch the gutters — an overflowing gutter is a wall and foundation problem in the making. Watch the downspouts: every one should carry roof water well away from the foundation, not dump it at one corner. Watch the ground: water should fall away from the house on all sides, about six inches of fall in the first ten feet where you can manage it. Watch the beds: soil and mulch should stay below the top of the foundation, and the weep holes in the brick should stay open so the wall can drain. Those little holes are not defects. The day somebody caulks them shut is the day the wall starts holding water it used to let go.

And watch the sprinklers. If one side gets watered every other day all summer and the other side gets none, you have built a moisture difference on purpose. We will talk about even watering in Chapter 3 — it is one of the cheapest foundation protections a Texas homeowner owns.

Not every crack is water, and not every problem is a crisis. The point of this chapter is not to scare you. It is to change

the question you ask. Do not start with "How do I patch this crack?" Start with "Where is the water, where has it been, and where does it go next?" Answer that honestly, and half the time you have found the problem before the patch or the repair ever enters the conversation.

Water always wins against a house that ignores it. Against a house where somebody pays attention — grades the ground, minds the gutters, keeps the watering even — water mostly just passes through and does its damage somewhere else, to somebody else's neglected corner. Attention is cheaper than repair, every single time. That is the truth this whole volume stands on, and the next chapter will show you the ground it stands on: Texas clay, the drinking, shrinking soil under your feet.

Chapter 2: Texas Clay Drinks and Shrinks — Expansive Soil in Plain English

If Chapter 1 was about water, this chapter is about what water does when it meets the ground under most Texas homes. The short version is simple enough for anybody: Texas clay drinks and shrinks.

When clay soil gets wet, it swells. It takes up more space than it did before. When that same clay dries out, it shrinks. It takes up less space, pulls away from things, and cracks open. Your house sits on top of that breathing ground, and whether you feel it or not, your house rides the breathing.

Let me explain the soil itself in plain English, because you do not need a geology degree to manage a home on clay. You just need an honest picture of what is down there.

Clay is made of extremely fine particles — far finer than sand or silt. Under a microscope, many clay particles are shaped like tiny flat plates. The clay minerals common in our part of Texas, especially the type called montmorillonite, have a chemistry that attracts water and pulls it in between those plates. When water gets between the plates, the plates push apart. Multiply that tiny push by billions of particles through several feet of soil, and you get real force — enough force to lift the edge of a house, crack a slab, bow a driveway, and open a crack in brick wide enough to slide a pencil into.

When the water leaves, the process runs in reverse. The plates come back together. The soil volume drops. The ground surface falls, footings lose support underneath them, and in a hard drought the soil can pull away from the side of a foundation and open a visible gap you could drop a garden

hose into. I have stood in Texas yards in August where the cracks in the ground were wide enough to lose a screwdriver in. That is not poor soil. That is clay soil doing exactly what clay soil does.

Sand does not do this to any real degree. Neither does rock or good gravel. That is why a home built on sandy ground near the coast, or on shallow rock in parts of the Hill Country, behaves so differently from a home sitting on the deep black clay of the Dallas-Fort Worth prairie or the tight clays we work in around Hamilton County. The builder did not change. The house plans did not change. The dirt changed, and the dirt sets the rules.

Now, the most important idea in this chapter: the active zone.

Not all the clay under your house is moving. Only the top layer — the part close enough to the surface to gain and lose moisture with the weather — swells and shrinks with the seasons. Down deep, the soil moisture stays nearly constant year after year, because rain and sun never reach it. That stable soil down deep does not move much. The soil above it does. The depth of that changing layer is what folks in the trade call the active zone, or the zone of seasonal moisture change.

In our region, the active zone commonly runs somewhere in the range of eight to fifteen feet deep, depending on the soil, the trees, the drainage, and the climate in a given stretch of years. That is a lot of moving ground — in many homes, the entire depth the footings reach and then some. A typical home's foundation does not sit below the active zone. It sits in it. That is not a scandal and it is not a building failure. It is just the reality of building on expansive clay in Texas, and it is why Texas foundations are designed and repaired the way they are.

It also explains why, when a foundation does need lifting and support, the repair we use at Metro Foundation Repair is pressed concrete piles: solid precast concrete segments pressed down, one on top of the next, using the weight of the structure itself, driven through the active zone until they reach stable bearing down where the moisture — and the movement — stops changing. The goal is not to fight the clay. The goal is to carry the house on something that stands below the clay's breathing. I will not turn this chapter into a repair manual, but you should know the principle, because it follows straight from the soil: support has to come from below the movement.

Closely tied to the active zone is soil suction, and I will give it to you in kitchen language: suction is the soil's thirst. Dry clay actively pulls water toward itself, the way a dry sponge pulls

water from a spill it is barely touching. The drier the clay, the stronger the pull. That is why water that lands five feet from your house can still end up under it, why a thirsty tree can dry soil out from under a footing, and why after a long drought the first rains do not fix everything at once. The soil is not a bucket that fills evenly. It takes water along the easiest paths first.

Hypothetical example: Take two identical homes on the same clay street in a Fort Worth suburb. Both were built the same year by the same builder. Twenty years later, one has minor hairline cracks that open slightly every summer and close every winter. The other has a corner that has dropped, doors racked out of square, and a crack in the brick you can see from the street. The difference is not the clay — it is the same clay. The difference is what happened on top of it. The second home has a large oak planted close to that dropped corner, flowerbeds on two sides but bare ground on the others, and a downspout that has dumped roof water at the opposite corner for years. One corner is dried out by tree roots, one corner is kept wet by the downspout, and the clay under that house has been pushed up in one place and pulled down in another for two decades. Same street, same soil, different water habits, different house.

Composite example: A home in Hamilton County sits where the clay is shallower over rock, which folks sometimes assume means no foundation trouble. But shallow clay over rock can move plenty, because there is nowhere for the water to go — it perches in that clay layer, swells it, then in the dry season that thinner layer dries out fast and shrinks hard. A house like this can move quickly in both directions with the weather, and its owners often notice doors sticking and freeing up more dramatically through the year than a deep-clay home where the bigger soil mass changes more slowly. Less clay does not automatically mean less movement. It can mean faster movement.

So let us talk honestly about Dallas-Fort Worth and Hamilton County, because they are both clay country but they are not identical.

The DFW area sits largely on what people call black gumbo — deep, dark, highly expansive clay that is famous in this trade for moving structures. It drinks deep in the wet season and cracks wide in the dry. The active zone is deep, trees grow big and thirsty, and the suburbs stretch for miles over this stuff, which is why foundation repair is simply a normal part of home ownership up there, the way roof replacement is. In Hamilton County and the surrounding Central Texas country, we see clay that is often shallower and more variable — clay pockets, clay over limestone, ground that can change character within a single lot. A footing on one end of a home

might sit over clay while the other end is near rock. That variability means one end can move while the other sits still, and the house gets worked in the middle. Neither place gives you a free pass. They just fail in their own accents.

Three misunderstandings I hear every year, cleared up plainly. First, expansive clay is not defective land and your house is not doomed — millions of Texas homes sit on it fine for generations. It demands moisture management, not fear. Second, movement does not automatically mean failure; some seasonal movement on clay is normal, and we will sort it from real progressive damage in the next chapter. Third, you cannot fix clay. You cannot dig it out from under a house or seal it off from the weather. What you can do is manage the moisture around it to keep it even, and where support has been lost, carry the structure on pressed concrete piles down to stable ground below the active zone.

For the homeowner, the takeaways are short. Keep moisture around your home as even as you can — no desert on one side and swamp on the other. Respect big trees: a mature oak is a powerful pump pulling water from the clay all summer, so plant new trees at least as far away as their mature height, and if a big tree is already close, its side will tend to run dry and may need more watering attention, not less. Do not let soil bury the foundation edge, and do not let beds dry into a moat that channels rain down alongside the footing. And watch cracks across a full cycle of seasons before you judge them — a measurement in August and the same one in February tells you more than any single inspection.

The clay under your house has been drinking and shrinking since long before the house was there, and it will keep doing it long after all of us. You do not beat it. You learn its rhythm and you keep the water honest. That rhythm — the wet season, the dry season, and your house caught in between — is exactly where we go next.

Chapter 3: The Moisture Cycle — Wet Season, Dry Season, House in Between

A Texas house on clay never sits still. It breathes with the year. Understanding that yearly rhythm — the moisture cycle — is the difference between a homeowner who manages a house calmly for thirty years and one who pays for the wrong repair in a panic, or ignores the right one until it costs double.

Here is the cycle in its simplest form.

In the wet season — spring rains, storm season, and often a

wetter turn in fall and winter — rain soaks the clay around your home. The clay drinks, swells, and lifts, and the edges of the foundation tend to rise while the covered soil under the center changes more slowly.

In the dry season — our long, hot summer, and in bad years a drought — sun, heat, and trees pull moisture out of that same clay. The soil shrinks, the edges tend to settle, and the center, still holding older moisture under its slab, stays nearer where it was. Then the rains return, the edges rise again, and the house rocks through another turn of the wheel.

That gentle rocking, within limits, is normal: a house on Texas clay is expected to move a little with the seasons, forever. Hairline cracks that appear in late summer and nearly vanish by spring. A door that rubs in August and swings free in January. If it comes and goes and returns to about the same place each year, you are most likely watching the moisture cycle, not a foundation failing.

But not all movement is seasonal, and telling the two apart is where homeowners save or lose real money. So let us put the two kinds of movement side by side.

Seasonal movement is cyclic. It goes one way in the dry season and back in the wet, repeating year to year in roughly the same range. The crack that opens every August is a hairline again every February; the door sticks in about the same weeks each summer. That is the house breathing. It can annoy and can damage finishes, but it is not, by itself, a house sinking.

Progressive movement has a direction and keeps it. The crack is a little wider this August than last, wet summer or dry. The door that stuck a little three years ago will not latch now in any season. One corner keeps going and never comes back when the rains return. That one-way ratchet points to something beyond the cycle — a plumbing leak, soil washing out under a footing, a tree drying one side deeper every year, or marginal support finally giving way. Progressive movement earns a foundation evaluation, because it does not heal when the weather changes.

Both kinds of movement can live in the same house at the same time, and the seasonal swing can hide the progress — the crack looks better every winter, so the owner assumes it healed, when it healed back to a slightly worse starting point than the year before. So measure and write it down. Put a dated pencil mark across your two or three main cracks, or take a dated photo with a coin for scale, at the end of summer and again at the end of winter, year after year. Your notebook will tell you in two years what no single visit can: whether your house is breathing or sinking.

Now let us talk about the two extremes of the cycle, because Texas specializes in extremes.

Drought summers are the dry side turned up loud — lakes drop, yards go brown, and the ground cracks wide enough to swallow a ruler. In a drought the active zone dries deeper than usual, trees pull moisture from farther down, the edges of homes drop, doors stick, and brick cracks open at corners and above windows. Here is the drought trap: much of that movement recovers when normal rains return, because the clay re-wets and lifts what dropped. Homeowners who panic-buy repairs at the bottom of a drought sometimes pay to fix movement rain would have recovered free — and homeowners who assume all of it recovers sometimes miss the corner that did not come back. The notebook, and patience measured in seasons, is the only way to know which house is yours.

Wet winters and wet springs fool people in the opposite direction. A long wet stretch swells the clay at the edges and lifts them while the drier center lags behind — edge lift — and the house is effectively dished by the moisture difference. Doors that stuck all summer swing free, cracks that gaped in August pinch closed, and owners conclude the problem fixed itself. It did not. The cycle just turned, and if the underlying moisture difference keeps growing, the same cracks will show a little worse each time.

Which brings us to the real villain of this chapter, the one I wish I could put on a billboard: uneven moisture.

After all these years I am convinced the moisture cycle itself hurts very few houses. What hurts houses is the cycle applied unevenly — one side wet, one side dry. A house where the clay rises and falls together, all the way around, mostly just floats up and down a fraction of an inch and complains very little. A house where the north side stays wet and the south side bakes is being twisted, and twisting is what cracks brick, racks doors out of square, and separates corners.

Uneven moisture rarely comes from the sky. Rain falls on the whole lot. Uneven moisture is usually built by us, one ordinary decision at a time.

Consider the usual suspects: flowerbeds and sprinklers on two sides and bare ground on the other two; a downspout dumping at one corner storm after storm while the opposite corner gets nothing; a big shade tree pumping one side dry with no tree on the other; a patio shedding rain away on one side and open ground soaking it in on the other. Each is small. Together, over ten or twenty years, they will work a house harder than any single storm.

Hypothetical example: Imagine a home where the front and one side have irrigated beds running three days a week all summer, the back has a large oak close to the corner, and the remaining side has neither beds nor trees — just sun-baked ground. By late August the irrigated sides have held their elevation, the oak's corner has been pulled down, and the baked side has shrunk on its own. The house sits on soil at three different moisture levels, and it shows the strain at the corners, where the differences meet. The better question is not which corner failed, but why the four sides were kept in four different moisture worlds.

Composite example: Two neighbors in a Dallas-Fort Worth subdivision go through the same drought. The first waters nothing; his soil dries hard all the way around, the house settles fairly evenly, doors stick everywhere a little, and when fall rains return the clay re-wets fairly evenly and the house comes back close to where it started. The second neighbor, trying to protect his foundation, waters heavily — but only with a soaker hose he moves to whichever side shows cracks, flooding one side while the others stay dry, then switching. His house rides a moisture see-saw all summer, lifting where the hose ran and dropping where it did not, and by fall his cracks are worse than his neighbor's. He spent more money on water and got more damage, because his watering was uneven and reactive instead of light, steady, and all the way around.

Your goal is evenness, not wetness. Keep the moisture around the entire perimeter roughly the same, in every season, so the clay breathes as one piece instead of four. In practice that means light, consistent watering in the dry months all the way around the foundation — not heroic soaking on one side after cracks appear. Many Texas homeowners use soaker hoses placed a foot to a foot and a half out from the foundation, run on a timer through the worst of summer and adjusted by season rather than by panic. Keep gutters working and downspouts extended so storm water lands away from every corner alike, keep grading and beds consistent, weep holes open, and the soil line below the top of the foundation on every side. And think twice before adding a bed, a tree, or a patio to one side only, because every one of those is a moisture decision.

One honest warning about timing: soil moisture changes slowly. Clay dried over a three-month drought does not re-wet evenly in one weekend — deep moisture rebuilds over weeks and months. That lag is why watering started in a crisis disappoints people. The time to even out moisture is before the extremes, kept up steadily through them. You are farming the ground around your house, and farming rewards the steady hand.

So you are the manager of the cycle, not its victim. You cannot stop the rain or change the clay, but the difference between the wet side and the dry side of your house — the difference that cracks brick and racks doors — is mostly yours to control with gutters, grading, beds, trees, and a timer on a hose. Keep the notebook, watch for the one-way ratchet of progressive movement, and get that looked at promptly. And when movement turns out to be real support loss, remember the repair and the habits work together: pressed concrete piles hold the house, and even moisture keeps the rest of the clay from starting the same fight somewhere else.

Water always wins, and clay always breathes. But a homeowner who understands the cycle — who keeps the moisture even and the records honest — can live comfortably on top of both for a lifetime. That is the whole game, and the rest of this book is about playing it well, season by season.

Chapter 4: Roofs, Gutters, and Grading — The First Line That Fails First

Most foundation trouble I get called out to look at did not start at the foundation. It started higher up, and it started sooner. It started the day the rain came off the roof wrong, ran down the wall wrong, and landed in the dirt wrong. By the time a homeowner notices a crack in the brick or a door that will not latch, the water has usually been doing its quiet work for seasons, sometimes for years. That is why I tell folks to look at the roof, the gutters, and the grading before they look at anything else. Those three things are the first line. When the first line fails, everything behind it has to work twice as hard, and in Texas clay, everything behind it usually loses.

Start with a number worth remembering. One inch of rain falling on 1,000 square feet of roof produces roughly 600 gallons of water. That is not a puddle. That is a small swimming pool coming off your house in a single storm. A typical Texas home might have 1,800 to 2,200 square feet of roof surface once you count the pitch and the overhangs. A good one-inch rain on that house can shed well over 1,000 gallons. A hard summer thunderstorm that drops two or three inches in an afternoon is sending 2,000 to 3,000 gallons looking for somewhere to go — fast. If your gutters, downspouts, and yard are not ready to receive it and move it away, that water does not disappear. It goes to the lowest, softest place it can find, which is very often the soil right up against your slab.

That is the plain truth about roof runoff. The roof is a

collector. It gathers water from a wide area and concentrates it into a few narrow streams. Nature spread that rain out over your whole lot. Your roof gathers it back up and pours it out at a handful of points along your foundation. Handled right, that is a blessing — you control where it goes. Handled wrong, you have built yourself a machine for soaking one side of your house and leaving the other side dry. In expansive clay, uneven moisture is the whole game. Clay swells when it gets wet and shrinks when it dries. Soak the north side and starve the south side and the slab is being lifted in one place and dropped in another. Do that through enough wet and dry cycles and the brick will tell you about it, because brick is honest. It cracks where the movement is.

Gutters are where the control starts, and gutters are where I see the first failure most often. The common problems are simple ones. The gutters are clogged with leaves, roof grit, and those little whirly seeds that find every opening in the spring. They are undersized for the roof they serve — small five-inch gutters trying to handle a big, steep roof plane in a Texas downpour. They are pitched wrong, so water sits in them instead of flowing to the downspout. Or the seams have opened and they drip steadily right down the face of the brick, storm after storm. Any one of those turns a gutter from a tool into a spillway. When a gutter overflows, the water does not jump clear of the house. It sheets down the wall and lands in a trench right at the base of the foundation, exactly where you least want it.

Composite example: Picture a single-story ranch with a big oak over the front corner. Every fall the gutter over the garage fills with leaves, and nobody gets up there until spring. All winter, every rain overflows at that corner. The flower bed below catches the overflow and holds it like a bowl. By March the soil at that corner stays wet a week after the rest of the yard has dried. The corner of the slab heaves a little in the wet months and settles back in the dry ones, and a stair-step crack in the brick opens and closes with the seasons. Nothing dramatic — just a house breathing in the wrong place, driven by a gutter nobody cleaned. The fix was not a foundation job. The fix was a ladder, a scoop, and a downspout that actually reached the ground.

Downspouts deserve their own hard look, because a good gutter with a bad downspout is money wasted. I walk up to houses every week where the downspout ends six inches above the ground and pours the whole roof's worth of water into one spot beside the slab. Some end in those short concrete splash blocks that were aimed wrong ten years ago and now channel water back toward the house. Some were supposed to connect to an underground drain that has long since clogged with roots and silt, so the downspout backs up and overflows at the elbow in every heavy rain. And some, my

personal least favorite, discharge right into a raised flower bed built tight against the brick. Every one of those arrangements takes concentrated roof water and delivers it straight to the foundation soil. The remedy is not fancy. Extend the downspout so it discharges at least four to six feet away from the foundation, farther if your lot allows it, and make sure the water at the end of that extension still has somewhere to keep going. An extension that dumps water into a low swale that ponds beside the house has only moved the problem a few feet.

That brings us to grading, which is the quietest of the three and the most neglected. Grading simply means the slope of the ground around your house. The ground should fall away from the foundation on every side. A good working rule is about six inches of fall in the first ten feet out from the wall — enough slope that your eye can confirm water wants to leave, not linger. Over the years, that slope disappears. Soil settles against the house. Landscapers add mulch and topsoil year after year until the beds are higher than the yard. A new patio or sidewalk gets poured level with the old grade and traps water behind it. Termite treatments, plumbing digs, and fence work all move dirt around, and the dirt rarely gets put back with the slope in mind. The result is negative grading: ground that slopes toward the house. With negative grading, your yard becomes a funnel. Every rain delivers surface water to your foundation from the lot itself, on top of whatever the roof sends down. Walk your property during or right after a real rain — not the next pretty day, but while it is happening, with a flashlight if you need it. Watch where the water stands, where it flows, and how long it stays. A puddle that sits against the house for a day after a storm is grading telling you it has failed.

Flower beds deserve a special warning because they cause so much trouble while looking so innocent. A bed built against brick, edged with stone or steel, and filled with rich loose soil and mulch behaves like a sponge in a tray. The edging holds water in. The loose soil drinks it fast — much faster than packed yard clay — and delivers it right down to the foundation depth. Then the mulch on top shades it and slows evaporation, so the bed stays wet long after the yard dries. Add a drip line or a daily sprinkler cycle to keep the plants pretty and you can keep the soil at one stretch of foundation permanently wet while the rest of the perimeter bakes dry. That is a recipe for differential movement. If you keep beds against the house — and most folks do, including me — build them with the slope in mind, keep the soil and mulch several inches below the top of the slab and below any weep holes in the brick, avoid edging that dams water in, and water the plants, not the whole bed.

Here is a simple homeowner routine that costs almost

nothing. Twice a year, spring and fall, clean the gutters and run a hose in them to confirm every downspout flows free. After the first big rain of the season, walk the house and look for overflow stains, drip lines dug into the mulch, and standing water. Once a year, sight along the ground at each wall and ask one question: if I poured a bucket of water here, which way would it run? If the honest answer is "toward the house," fix the grade before you fix anything else. These are not glamorous jobs. There is no product to buy and nothing to show off to the neighbors. But in my experience, more brick and foundation grief is prevented by a clean gutter, a long downspout, and honest grading than by any repair done after the fact. The first line fails first. Keep it standing, and a lot of the fights in the chapters ahead never have to happen at all.

Chapter 5: Plumbing, Irrigation, and the Water You Cannot See

The water that worries me most is not the water you can watch running down the driveway in a storm. It is the water you cannot see at all — the water leaking slowly under a slab, moving through a broken sewer line, spraying out of a sprinkler head at three in the morning, or slipping out of a pool shell a cup at a time. Visible water announces itself. Hidden water works in the dark for months, soaking clay that nobody is watching, and by the time it shows itself in a crack, a smell, or a shocking water bill, it has usually done a season's worth of damage. This chapter is about learning to suspect it early, because suspicion is cheap and excavation is not.

Start under the slab, because that is where the most serious hidden water lives. Most Texas homes built in the last fifty years have their water lines and sewer lines under or through the concrete slab. That is a sensible way to build — until a line fails. Water supply lines run under pressure, so a break in one can push a surprising amount of water into the soil beneath your house, day and night, rain or shine. A pinhole leak does not flood anything you can see. It just quietly saturates the clay under one part of the slab. The clay swells, that part of the floor lifts, doors begin to drag at the top, and a crack may open in tile or drywall far from the actual leak. Sewer lines are sneakier. They are not under pressure, so they leak only when water is running — a shower draining, a washer emptying, a toilet flushing — and what they leak is wastewater into the soil around a cracked joint or a bellied section of pipe. Over time that moisture, and the soil it washes away or softens, can leave a section of slab supported by mud instead of firm ground.

How do you suspect a leak you cannot see? You read the signs the house gives you, and the first sign is often your water bill.

A steady climb that your family's habits do not explain is worth investigating, especially a high winter bill when nobody is watering the yard. The second sign is your water meter, which is the best free diagnostic tool you own. Pick a time when nobody will use water for a couple of hours — early morning works — and take a photo of the meter reading, including the little low-flow dial or triangle if your meter has one. Do not run anything. Come back in two hours and compare. If the reading moved, water went somewhere, and if every faucet and toilet in the house was off, that somewhere deserves a professional's attention. The third sign is sound. A quiet house at night sometimes lets you hear a faint hiss or running-water murmur in a wall when everything should be still. The fourth sign is feel and smell: a spot on the floor that is always warm can mark a hot-water line leaking beneath it, and a persistent musty or sewer odor near one bathroom is information, not just an annoyance.

Above ground, irrigation is the hidden-water source I find most often out of adjustment. Sprinkler systems run before dawn, which means nobody watches them work, and a system can be soaking your foundation for years while the homeowner believes he is watering his grass. The common faults are plain. A head has rotated or settled so it sprays the wall instead of the lawn. A nozzle is broken and geysers straight up, flooding one spot. The run times are set so long that the clay, which absorbs water slowly, cannot take it in, so the excess ponds along the foundation and soaks in at the worst possible place. Low heads at the bottom of a slope drain the lines after every cycle and keep one patch of bed permanently soggy. And drip lines buried under mulch can split and leak unseen for a whole season. The cure is embarrassingly simple: run each zone by hand, in daylight, twice a year, and stand there and watch it. Spray on the driveway is money wasted, but spray and puddling against the brick is grief bought and paid for. Keep overspray off the wall, keep run times short enough that water soaks in rather than ponds, and remember that the goal is even moisture around the house — not a flooded bed on the shady side and baked dirt on the sunny side.

Pools leak too, and a leaking pool is a serious water source because it holds thousands of gallons at a level above the surrounding soil. A pool losing water to a crack in the shell, a bad light fitting, or a broken return line underground can keep a whole section of yard saturated in the middle of a drought. The classic home test is the bucket test: fill a bucket with pool water, set it on a step inside the pool, mark the water level inside the bucket and the pool level outside it, and compare after twenty-four hours with the pump off and then again with it running. Both lose a little to evaporation, but if the pool outside the bucket drops noticeably more than the water inside, the pool is losing water somewhere besides the

sky. If your yard has one mysteriously green, lush strip in August while the rest has gone brown and crunchy, do not just admire it. Ask what is feeding it. Lush patches in a dry season are one of the oldest leak signs there is — grass does not cheat; it grows where the water is.

Hypothetical example: Say a homeowner's summer water bill jumps eighty dollars with no new pool, no guests, and no change in the sprinkler schedule. The meter test shows movement overnight with everything off. One bedroom floor feels faintly warm near the bathroom wall. No single sign proves a slab leak, but three signs together make a strong suspicion — and suspicion is the point at which you call a licensed plumber for a proper leak detection, with listening equipment and pressure testing, instead of waiting for the fourth sign, which might be a crack across the entry tile. Early suspicion turned that job into one located leak and one repair opening in the floor. Late suspicion can turn the same leak into a swollen slab, ruined flooring, and a much bigger conversation about the foundation.

A word on moisture readings, because homeowners increasingly own or borrow pin and pinless moisture meters, and handymen wave them for a living. Used honestly, these tools are helpful — not as proof, but as comparison. The value of a moisture reading is not the number itself; it is the difference between places. One baseboard reading far higher than the same baseboard everywhere else in the house, or one corner of a room reading damp while the other three read dry, tells you where to look next. Readings lie when they are taken through foil-backed materials, near pipes, or on surfaces that condensed overnight, so treat a single high reading as a question, not a verdict. The pattern is the evidence.

Composite example: Consider a house with a sprinkler zone that waters the beds on the west side. Over two summers the west-side brick develops a crack that opens every fall and nearly closes every spring — wider than a cycle should explain. Walking the zone by hand reveals one head tipped just enough to throw half its water against the wall and into the bed, which is edged and mulched and holds it. The soil at that stretch never truly dries. Correcting the head, shortening the run time, and pulling the mulch down below the weep holes did not erase the crack, but the opening-and-closing cycle calmed down the following year, because the moisture swing that was driving it had been cut in half.

What should you actually do with suspicion? Do not start tearing out concrete on a hunch, and do not ignore a hunch because you cannot see water. Work in order. First, the meter test and the bill comparison — both free. Second, run the irrigation by hand and watch it, and do the bucket test if you

own a pool. Third, if signs still point under the slab, bring in a plumber to test the water lines under pressure and camera or test the sewer lines, because those are two different leaks with two different fixes. If a foundation concern remains after plumbing is cleared, that is when a foundation evaluation makes sense — and if repair is truly warranted on a Texas slab, the method I have built my work on is pressed concrete piles, driven segment by segment until the soil itself refuses them, not any shortcut. But nine times out of ten, the chapter you are living in is this one: find the water you cannot see, stop it at its source, give the clay time to settle back toward even, and watch. A house dried out evenly is often a house that stops moving.

Chapter 6: Water in the Wall — Brick Is a Reservoir

Folks talk about a brick house like it is a suit of armor, and I understand why. Brick feels permanent. It does not rot like wood or dent like siding, and a well-built brick wall will outlive the man who laid it. But here is the truth fifty years around masonry teaches you: brick veneer is not a raincoat. It is a reservoir. Brick, and especially the mortar joints between the bricks, absorb water when it rains, hold that water in the wall, and then give it back slowly to the sun and wind over the following days. Builders have known this for a long time, which is why a properly built brick wall is not just brick. Behind the brick there is an air space, a water-resistant layer over the sheathing, flashing at the bottom and over openings, and weep holes to let the water that gets in find its way back out. The brick is the handsome face of the system. The drainage behind it is the system.

Understanding that changes how you read your walls. When wind drives rain against a brick elevation for hours, the outer inch of that wall can take on a remarkable amount of water. You can see it: the brick darkens as it drinks. That alone is not failure. The wall is designed to get wet and dry out. Failure begins when water gets in faster than it can get out, or when its path out is blocked. That is when water in the wall stops being normal and starts being damage.

Mortar joints are the wall's main doorway. A brick itself is dense, fired clay. The mortar between bricks is softer, more porous, and it is where most of the water enters, and also where most of the visible aging happens. Sound mortar, tooled tight and struck smooth, sheds a good share of water and absorbs the rest slowly. Cracked, crumbling, or badly recessed mortar does the opposite — it catches water, funnels it inward, and holds it against the brick edges. This is why tuckpointing, done right and at the right time, matters: grinding out failed mortar to a proper depth and replacing it

with compatible mortar restores the wall's ability to manage water. Done wrong — with a hard, Portland-rich mix smeared over soft old mortar, or smeared across the face of the brick — it can trap water and damage brick that had survived a century. Mortar should be the sacrificial part of the wall. It is supposed to wear first and be renewed. When someone makes the mortar harder than the brick, the brick becomes the sacrificial part, and that trade never ends well.

Flashing is the part you mostly cannot see, and it does the directing. It is the metal or membrane layer that collects water inside the wall and leads it outward — at the base, over windows and doors, and where a roof meets a wall. If flashing is missing, punctured, lapped backward, or buried below grade by raised beds, the water it was supposed to escort outside instead gets delivered to wood framing, sheathing, or steel inside the wall. Most homeowners never think about flashing until a stain appears on a ceiling or paint blisters on trim by a window. By then the water has been taking the wrong exit for a while. You cannot inspect most flashing without opening the wall, but you can protect it: keep soil and mulch below the base flashing and weep line, keep caulk joints at windows maintained, and take any recurring leak at a wall intersection seriously even when it is small. In walls, small and recurring beats big and once — it means a path exists, and water will keep using it.

Weep holes are the wall's drain spouts, and they are the little vertical gaps or openings you will find in the mortar along the bottom course of brick and over lintels. Their job is simple: any water that reaches the cavity behind the brick runs down to the flashing and out through the weeps. That is why weep holes must stay open, and why two of the most common homeowner mistakes I see are filling them with caulk because they look like mistakes, and burying them under mulch, soil, or a new patio poured too high. A wall that can drink but cannot drain will hold water against everything inside it. I have seen weeps plugged with mortar droppings from the day the house was built — construction debris in the cavity is another quiet problem — and the wall managed for years until an especially wet season finally overwhelmed it. If you remember one thing from this chapter, make it this: never seal, plug, or bury your weep holes. They are not defects. They are the exit doors, and the wall needs them open.

Nowhere does trapped water do more expensive mischief than at the lintels — the steel angles that carry the brick over your windows and doors. Steel and water have a well-known arrangement: steel rusts, and rust takes up more room than the steel it came from. A lintel sitting in a wall that stays wet will corrode, and as it corrodes it expands, lifting and cracking the brick above it. The classic sign is a crack running up from the corner of a window or a row of brick over a door

that seems pushed up or stepped, sometimes with a brown rust stain weeping out of the joint. Left alone, a rusting lintel does not stabilize; it keeps growing and keeps jacking the masonry apart. This is also where I will mention my own trade honestly: supporting and addressing failed lintels is what led me, over years of field work, to develop the system I call LintelLOCK — my field-developed system for supporting brick over openings. Whatever method a given job calls for, the first step is always the same: find where the water is coming from and why the lintel has stayed wet, because replacing or supporting steel in a wall that still traps water just starts the rust clock over again.

Two other signs on the surface of a wall are worth learning to read, because homeowners often mistake them for emergencies or miss them entirely. Efflorescence is the white, powdery or crusty deposit that appears on brick faces, usually after wet weather. It is salt. Water moving through masonry dissolves natural salts in the brick and mortar, carries them to the face, and leaves them behind when it evaporates. Efflorescence itself does not hurt the brick — you can brush it off dry — but it is a messenger: it tells you water is traveling through that wall in quantity, and where it keeps appearing, you should ask where the water is getting in and whether it has a good way out. Spalling is the more serious sign. That is when the face of the brick itself pops, flakes, or crumbles away, sometimes leaving a pitted surface and a pile of brick-colored crumbs at the base of the wall. Spalling happens when water inside the brick freezes and expands, or when hard surface coatings force moisture to do its damage just beneath the face. Texas does not freeze often, but it freezes hard when it does, and one deep freeze can take the faces off water-saturated brick that had looked fine in October. A spalling brick cannot be un-spalled; the unit is failing, and the pattern of which bricks fail — low on the wall, near a leaking gutter line, under a window with failed flashing — points back to the water source.

All of which brings me to sealing, the most well-meant mistake in this chapter. The logic sounds airtight: the wall gets wet, so coat it and keep the water out. The trouble is that most film-forming sealers do not stop leaks at joints and cracks the way the brochure promises — but they do slow the wall's ability to dry outward. Water still gets in, through the back, through joints, through the thousand small paths a real wall has, and now it cannot leave. It sits in the brick, feeds lintel rust, pushes efflorescence and spalling, and in a freeze it does its worst work. Breathable repellents have their place on sound masonry, after the real defects — mortar, flashing, gutters, grading — are fixed. But a coating is never a substitute for fixing how the wall handles water, and on older, softer brick it can do more harm in five years than weather did in fifty. If a man wants to sell you a sealed wall before he

has talked about mortar, weeps, and gutters, he is selling you the order backward.

Hypothetical example: Imagine a brick front with a flower bed raised so high over the years that soil and mulch cover the bottom weep holes, and a gutter that overflows at that same stretch in every storm. The wall drinks from the front and the bed keeps its base wet from behind the edging. The lintel over the front window begins to rust, a stepped crack opens at its corner, and white salt blooms on the brick below it each spring. Nothing here requires an exotic diagnosis. The wall is taking water faster than it can release it, its exits are buried, and its steel is paying the bill. Open the weeps, lower the bed, fix the gutter, repoint the failed joints — in that order, water first — and you have addressed causes instead of chasing cracks.

Your wall does not need to be waterproof. It needs to get wet and dry out, the way it was built to do. Keep mortar sound, flashing paths respected, weep holes open and above grade, and roof water off the face as much as gutters allow. Do that, and the reservoir works for you instead of against you. Water always wins in the end, but a wall that can drain decides how long the game lasts.

Chapter 7: Water Under the Slab

Most homeowners think about water the way they see it. Rain falls on the roof, runs off into the yard, and soaks into the grass. If the house stays dry inside, they figure the water problem is handled. After fifty years working around Texas houses, I can tell you the water you see is only part of the story. The water you do not see, under the slab, is the water that moves houses.

A slab-on-grade house does not sit on dry dirt. It sits on soil that holds moisture, gives it up, and moves it from place to place, season after season. The slab is strong, but it rests on clay that swells when wet and shrinks when dry. When moisture under one part of the slab differs from another part, the ground does not stay level. That difference is where the trouble starts.

Water moves under a slab in three main ways. It moves as liquid, soaking in from the edges and traveling sideways. It moves up from below by capillary rise, the same way water climbs a paper towel when just the corner touches a spill. And it moves as vapor, invisible, rising through the soil and through tiny pores in the concrete itself. All three are happening at the same time, whether anybody is watching or not.

Start with capillary rise, because most folks have never heard the term, but they have all seen it work. Put a dry sponge on a wet counter and come back in ten minutes. The top will be damp. Nobody poured water on top. The water climbed. Soil does the same thing, only slower. Texas clay is made of very fine particles with very small spaces between them, and those spaces pull water upward, sometimes several feet. The finer the soil, the higher the pull. That is why clay under a house is rarely bone dry, even in August, even when the yard on top looks cracked and dusty. Down where the slab sits, the clay is still holding and lifting moisture.

That matters because it means the middle of your house is living in a different climate from the edges of your house, even though it is all one foundation.

Picture the slab from above, like a big rectangle drawn on paper. Now draw a second, smaller rectangle inside it, about three to five feet in from every wall. The ground inside that inner rectangle is covered, protected, and forgotten. No sun beats down on it. No wind dries it. No rain falls directly on it. Once a house is built and lived in, the moisture under that center area settles into a slow, fairly steady state. It might be a little too wet or a little too dry compared to perfect, but it does not change fast. It changes over months and years, not over a single rainy week.

The ground around the outer band, near the edges, lives a completely different life. That edge soil gets rained on and baked by the sun. It gets dried by wind, watered by flower beds, soaked by a leaking sprinkler, and shaded by a porch on one side while the west side takes the full afternoon heat. In a wet spring, the edges swell as they take on water. In a long drought, the edges dry and shrink, sometimes pulling away from the foundation enough that you can see a gap open between soil and concrete. In bad years I have seen that gap wider than a man's fingers.

So the house ends up riding on ground that is steady in the middle and moving at the edges. That is the heart of almost every slab movement story in Texas clay country.

When the edges dry and shrink while the center stays moist and full, the edges of the slab drop slightly and the center feels like it is rising. Folks call that center heave, and the name confuses people, because often the center did not really push up much at all. The edges went down around it. Inside the house it feels the same either way. Doors in the middle of the home start to stick at the top. A hump seems to develop in the floor. Cracks radiate, sheetrock seams open, and tile can sound hollow or pop loose where the slab is no longer supported the same way it was. On the outside, the brick may show cracks that get wider toward the top or bottom,

depending on how that particular corner is moving.

The opposite happens in a long wet period, especially after a drought. The edge soil drinks in water, swells, and lifts the perimeter of the house while the center lags behind. That is edge lift. Floors can feel dished, like a shallow bowl. Doors that stuck last summer swing free, and then stick a different way. A homeowner will tell me, with complete honesty, that the house fixed itself over the winter and broke itself again in August. He is not imagining it. He is describing seasonal moisture movement, and his house is telling the truth about the ground under it.

Hypothetical example: Picture a one-story brick home in North Texas, built on black clay, with flower beds on the south side that get watered twice a week and bare, sun-baked ground on the west side that never gets watered at all. By late September, after a dry summer, the west corners have dropped a fraction, the south side has stayed fuller, and the slab is being asked to bend between them. The family notices a diagonal crack over the west bedroom door and a kitchen tile line that opened up. Nothing dramatic happened. No flood, no broken pipe, no earthquake. Just uneven moisture, month after month, doing slow, steady work.

Now add vapor, because liquid water is not the only traveler. Soil under a slab gives off moisture vapor constantly. Concrete looks solid, but it is full of tiny pores, like a very hard sponge, and vapor can pass through it slowly. A plastic vapor barrier under a modern slab slows that down a great deal. In many older Texas homes there is no barrier at all, or it was torn during construction and never repaired. The floors inside will rarely feel wet, but flooring still matters. Wood, laminate, and some adhesives do not forgive steady vapor from below. Cupping wood, loose vinyl, musty smells low in a room, and efflorescence, that white powdery crust on garage concrete, are all signs moisture is moving up through the slab, not just sitting under it.

A homeowner cannot fix vapor by painting something on top and hoping. Sealers have their place, but the wrong coating can trap moisture where it does more harm. The honest first step is to measure, which is what Chapter 9 is about, and to control the water you can control outside.

When I say sub-slab drainage, I do not mean a complicated system buried under every house. Most slab homes do not have one and do not need one. I mean the simple truth that water needs a path that is not through your foundation soil. Good grading slopes the yard away from the house in the first several feet. Gutters carry roof water to a downspout that lets it out well away from the slab edge, not in a flower bed against the brick. A French drain, when a yard truly holds

water against a house, collects it in gravel and pipe and moves it to a proper outlet. Its job is to keep edge soil from getting soaked far beyond what the center soil will ever see.

Poor drainage does the opposite. A downspout dumping at one corner keeps that corner swollen while the rest of the house dries. A flower bed built higher than the slab edge holds water against the foundation like a little pond. A sprinkler hitting the brick every morning keeps one section wet year-round. None of these look like an emergency. All of them create the moisture difference that bends a slab.

Composite example: Imagine two houses on the same street, same age, same builder, same clay. One has gutters that discharge ten feet out, a yard that falls away on all sides, and soaker hoses run on a steady, modest schedule in summer. The other has no gutters, beds piled against the walls, and a low spot where water stands after every rain. Ten years later, the first house has hairline sheetrock cracks that come and go. The second has doors that will not latch, a fireplace pulling away, and brick cracks you can measure. The difference was not luck. It was water management, repeated daily, for a decade.

So what should a homeowner actually do? First, stop thinking of the slab as separate from the soil. They are one system. Second, aim for evenness, not soaking and not drying: steady, moderate moisture all the way around, so the edges behave as much like the center as you can manage. Water the foundation area evenly in a drought, a little at a time, rather than flooding one side after it has shrunk. Fix drainage low spots before spending money on cosmetic crack repair, because paint and patch will not hold on a floor still moving with the seasons. The middle of the slab staying steadier in moisture is not a defect. It is the normal result of being covered. The edges are where the weather gets in, so the edges are where your attention belongs.

Water under the slab is patient. It works in fractions of an inch, over months, without a sound. But once you understand capillary rise, vapor, and that picture of a steady center and a busy edge, the cracks in a house stop looking random. They read like a map of where the water has been, and where it has not. That map is the first real tool a homeowner has, and in the next chapter we will add the biggest water pump most yards ever plant on purpose: a tree.

Chapter 8: Trees, Roots, and Thirsty Ground

If water is the main character in every Texas foundation story, a big tree is the strongest supporting actor in the yard.

Homeowners love their trees, and I understand why. A mature oak gives shade that makes a west wall livable in August, cuts the cooling bill, and makes a house feel like a home. I am not here to talk anybody into cutting down a good tree. I am here to tell the truth about what that tree is doing to the ground under the house, because it is doing something every day, whether we talk about it or not.

A large tree is a pump. On a hot summer day, a mature oak or pecan can pull well over a hundred gallons of water out of the soil, and on the hottest days, considerably more. The water goes up the trunk, out the leaves, and into the air. The roots are not just anchors. They are a drinking system, spread wide, working all season long.

Here is the part that surprises most people. A tree's root zone is not a neat ball under the trunk. Roots spread out, mostly in the top few feet of soil, commonly as far as the canopy spreads, and often well beyond it. A tree with a forty-foot canopy can have active roots fifty or sixty feet from the trunk, reaching under driveways, sidewalks, and the edge of a slab. The fine roots that do most of the drinking are small and go where the moisture is. They do not need to crack a pipe or lift concrete to affect a house. In clay country, their main effect is quieter and bigger: they dry the soil.

Texas clay, as we covered in the last chapter, shrinks when it dries. If a big tree is drinking hard from the soil on one side of a house, that side dries deeper and shrinks more than the others. The foundation edge above it settles a little. The other side, with no tree, stays fuller. Now the slab is twisted between a dried corner and a steady corner, and the house reports it the usual way: a door that sticks on the tree side, cracks that open in summer and close a bit in winter, brick mortar lines stepping down toward the dry corner.

Notice the timing. Tree-related movement is usually worst in late summer and fall, after months of pumping, and eases after the leaves drop and winter rains come. If your cracks breathe with the seasons and the worst side is the tree side, write that pattern down. It does not prove the tree is the cause, because drainage and sun follow seasons too, but it is a strong clue, and clues are what good diagnosis is built on.

Hypothetical example: Picture a home with a thirty-year-old live oak planted twelve feet from the southwest corner, now towering over the roof. Every August, the southwest bedroom door drags, a crack opens over its frame, and the brick on that corner shows a stair-step crack that the owner can slip a fingernail into. Every February, the door swings free and the crack narrows. That house is not haunted and it is not falling down. It has a very thirsty neighbor drinking from one corner of its foundation soil, harder in summer than in winter.

Now let us talk honestly about distance, because homeowners always ask for a rule, and rules of thumb are useful as long as nobody mistakes them for a guarantee. A common field rule is to plant a large tree at least as far from the foundation as the tree will be tall at maturity, and farther is better in heavy clay. For a tree that will reach forty feet, that means forty feet away, which most suburban lots cannot offer. A more modest version says keep big trees at least twenty feet from the slab, and medium trees at least fifteen. Hear the limit in those numbers: plenty of houses sit fifteen feet from a big oak and never have serious trouble, because their drainage is even, and plenty thirty feet away still move, because roots travel and droughts are long. Distance lowers the risk. It does not erase it. Anyone who promises an exact safe distance for every lot is selling certainty he does not have.

What about the tree already there, close to the house, big and loved? That is most of the calls I have seen. The honest options are management, not miracles. Keep soil moisture as even as you can on the tree side, knowing the tree will take a share of whatever you put down. A soaker system on a timer, run steadily through a drought, helps the foundation soil even if it also helps the tree. Avoid letting the corner bake for two months and then flooding it for a weekend. Sudden soaking of deeply dried clay swells it unevenly and can move things as surely as drying did.

Root barriers come up in almost every one of these conversations, so here is the straight field truth. A root barrier is a vertical panel, usually plastic, metal, or treated fabric, trenched into the ground between tree and house, often two to three feet deep, meant to deflect roots downward or stop them reaching the foundation soil. Installed correctly, at the right distance from the trunk, a barrier can reduce root activity on the house side and slow the drying there. That is the good news, and it is real.

Here are the limits, just as real. Roots can go under a barrier that is too shallow, and in deep clay they often do. Roots can go around the ends of a barrier that is too short. Cutting roots to dig the trench can stress or destabilize a tree, especially if large structural roots are cut close to the trunk, and a stressed tree is an arborist's problem, not a foundation man's guess. A barrier does nothing about moisture the tree pulls from beyond and below it, and nothing at all for a house whose problem is really drainage. I have seen barriers help as part of a moisture plan. I have also seen homeowners spend good money on a barrier, change nothing else, and watch the same crack open the next August. A barrier is a tool, not a cure, and any man who sells it as a guaranteed cure is not leveling with you.

Composite example: Imagine two neighbors who each trench

in a barrier between an oak and a house. The first also fixes a downspout dumping at the corner, sets a modest soaker schedule, and has an arborist check the tree before any root is cut. The second installs the barrier alone and changes nothing else. A year later, the first house moves less and the crack holds steady. The second house moves about like it always did. Same product, different result, because the barrier was never the whole story. The water was the story.

Now for the part of this chapter that catches people completely off guard. Removing a tree can move a house too, sometimes more than the tree itself ever did.

Remember, clay dried by a big tree for ten or twenty years sits shrunken, holding less water than the soil around it. The house above it has often settled slightly into that state and gotten used to it. Cut the tree down, and the pump stops. Rain comes, irrigation runs, and nobody is drinking that soil dry anymore. Over the following months, often for two to three years, that clay slowly rehydrates and swells back toward its natural volume, and as it swells it can lift the part of the foundation it had let down. That is rehydration heave, and it surprises homeowners who thought taking the tree out was the end of the problem. Doors that stuck one way start sticking the other. Open cracks begin to close, and new cracks can appear on the opposite pattern. The house is riding soil that is finally getting a long drink.

This does not mean a dangerous tree should be kept. It means tree removal near a house on clay should be planned like foundation work, because it is foundation work, whether the tree crew says so or not. If a big tree close to the house must come down, talk to a foundation man and an arborist before the saws start. Expect movement afterward, give the ground a season or two to find its new moisture level before final cosmetic repairs, and be careful about permanent lifting work in the first months after removal, while the soil is still swelling toward a level it has not held in years. Pressed concrete piles, the only pile system I install and the only one this book recommends for foundation repair, hold a house by reaching steadier ground, but even good work deserves ground that has settled into its new pattern before final judgments are made.

A word about roots and plumbing, because the two stories get tangled. Roots do not usually break a sound pipe. They find pipes already leaking at a joint, because leaking water draws fine roots like a magnet, and then they grow into the opening and make the leak worse. So a root-filled sewer line is often a sign of a leak that came first, and that leak has also been watering one spot of foundation soil unevenly, sometimes for years. If a plumber's camera finds roots, ask about the leak and the moisture, not just the roots.

The plain summary is this. Trees dry soil, clay shrinks when it dries, and houses move when one side dries more than the other. Plant new big trees as far from the slab as the lot allows. Manage moisture steadily around the trees you keep. Treat root barriers as a partial help with honest limits. And if a big tree comes down, expect the ground to drink, swell, and lift for a good while afterward.

Chapter 9: Measuring Moisture

Everything in the last two chapters comes down to one habit that separates homeowners who guess from homeowners who know: measuring. You do not need a laboratory. You do not need to be an engineer, and I am not one. I am a mason and foundation man, and the measurements in this chapter are the simple, honest checks I wish every homeowner would keep before calling anybody, including me. Done steadily, on paper, with dates, they turn a vague worry into a record a plumber, a foundation man, or a structural engineer can actually use.

Start with the simplest tool: a rain gauge. A clear plastic gauge that costs less than a pizza, mounted on a fence post away from the roof drip line and sprinkler spray, will tell you more about your foundation than most opinions will. Read it after every rain, write the amount down, and empty it. When a crack opens in September, you will be able to look back and see that June gave you six inches and August gave you none at all. That record keeps you from blaming a single storm for what a whole dry season did, and keeps a salesman from blaming the weather for what a leaking pipe did in a wet month when nothing should have shrunk.

Next, get your hands in the dirt with a soil probe. A probe can be a long screwdriver, a thin metal rod, or a proper soil probe from a garden store. The tool matters less than the method. Once a month in the dry season, and after any long wet spell, push the probe into the soil about a foot from the foundation, in the same marked spots every time: one on each side of the house, and one near any corner that worries you. Note how far it goes in easily, and how the soil on it feels and looks. Dry clay resists, crumbles, and looks pale. Moist clay slides easier, holds together, and looks dark. You are not chasing a laboratory percentage. You are comparing side to side and month to month. If the north probe sinks ten inches in damp soil and the west stops at three inches in powder, you have found, with your own hands, the moisture difference this whole book has been talking about.

A handheld moisture meter needs the most honest warning of any tool here. Pin-type meters sold for wood and drywall measure electrical resistance between two little pins and

report a number. They are useful for comparing one spot of a wall or floor to another spot of the same material, and for checking whether a suspicious area is wetter today than last week. They cannot tell you the true moisture of soil under a slab, because they were never built to reach it; a number read through tile or wood is an estimate of that surface, not a report from the ground below. Cheap meters also drift with temperature, battery, and how hard you push the pins in. Use a meter for comparisons on the same material, in the same spot, over time. Never let a single reading, yours or a salesman's, be the whole reason you buy foundation work. A number without a pattern is just a number.

Elevation checks are the measurement homeowners respect most once they see one done, and a simple version is within reach. Professionals use specialized levels to map a floor, but a homeowner can start with a long level, a laser level, or even a marble on a hard floor, used the same way every time and written down. Pick fixed points: the center of each room, the thresholds of the doors that stick. If you invest in one tool beyond the rain gauge, make it a basic laser level you can set in the middle of a room to see how door frames and baseboards sit relative to one reference line, and photograph it. Repeat the check in the same season each year, because comparing August to February mostly measures the weather. You are not watching for perfection. No slab was perfectly level the day it was poured. You are watching for change at the same point, in the same season, growing in the same direction, year after year. Steady is reassuring. Steady movement in one direction is information worth acting on.

Photographs are measurements too, if you take them like measurements. Every crack that concerns you deserves the same treatment: same distance, same angle, same lighting as close as you can manage, with a ruler or coin taped beside it for scale, and the date in your log. A crack photographed in March and again in September tells a story no memory can match, because memory makes a crack bigger in a worried month and smaller in a calm one. Photograph the outside too: the gap between soil and foundation in a drought, standing water after a rain, the downspout discharge, the tree canopy over the roof. Date every picture.

All of this comes together in one plain tool: a dated log. A notebook in a kitchen drawer beats an app you will abandon by spring. One line per check is enough: date, rain, probe results by side, doors sticking, crack changes, plumbing events, yard changes like a tree removed. Five minutes a month. Hypothetical example: A homeowner keeps this log for a year and notices the west crack opens every August, the west probe is always the driest, and the rain record shows nothing unusual, just a normal dry summer. That pattern points at seasonal drying, likely helped along by the big tree

on that side, and the right responses are moisture management and watching, in that order. Composite example: A different homeowner's log shows one bathroom wall getting wetter on the meter in a rainy month, the probe beside that bathroom staying soggy while every other side dries, and a water bill creeping up with no change in habits. That pattern does not point at the weather at all. It points at a leak, and the next call is to a plumber for leak detection, before any foundation conversation, because pouring foundation money on top of an active leak is money thrown into wet ground.

That brings us to the most important part: knowing what your measurements are telling you to do, and who to call.

Call a plumber for leak detection when moisture is wrong in one place, in the wrong season, against the pattern of the rest of the house. Soil that stays wet in a drought, a warm spot on a slab floor, the sound of water when nothing is running, a meter reading that climbs in one room while the rain gauge stays empty, a water bill that rises for no explained reason: any of these earns a leak test. Proper leak detection isolates water and drain lines separately and locates the problem before floors come up. Fix leaks first, let the soil dry back toward normal for a good while, then judge the foundation on ground that is no longer being secretly watered.

Call a licensed structural engineer when movement is large, fast, or threatening, or when you need independent judgment not connected to selling you a repair. I am not a structural engineer, and no honest foundation man should pretend his sales visit replaces one. Warning signs include cracks that grow noticeably over weeks instead of seasons, a floor that drops or lifts enough to trip over at a threshold, brick or stone pulling away with a widening gap, doors and windows racked badly out of square in a short time, or any movement following a sudden event like a major leak, a washout, or nearby excavation. An engineer's report costs money and sells you nothing but the truth as he sees it, and on a house moving fast, that independence is worth every dollar. Bring him your log. Engineers love dated records the way foundation men love dry crawl spaces, which is to say, sincerely.

Call a foundation repair man, and I will include myself in that trade plainly, when the pattern is seasonal or long and slow, the plumbing has been cleared, and the house shows the classic Texas clay signs: sticking doors, stair-step brick cracks, sheetrock cracks that breathe with the year. If repair is warranted, I will tell you what I have told you throughout this book: the repair I install and stand behind is pressed concrete piles, driven section by section to depth until the pressure shows they have reached load-bearing ground, then used to lift and support the settled edge as carefully as the house allows. Ask any foundation man, me included, to show

you the measurements behind his recommendation, to explain why this corner and not that one, and to put in writing what the work will and will not do. A repair should follow measurement, never replace it.

One last caution. Measuring can become its own worry if you check too often. Clay moves slowly, and a weekly elevation ritual will mostly measure your anxiety. Monthly in the dry season, a few times in the wet season, and always after a major event like a tree removal, a leak repair, or a flood: that rhythm is enough. Water always wins in the end, as the title of this volume says, because water is patient and never stops moving through the ground under our houses. But a homeowner who measures is not helpless against it. You can even out what the weather does at the edges, catch the leak before it becomes a lift, plant and remove trees with your eyes open, and call the right man for the right problem at the right time. That is not control over water. It is something better: living on Texas clay with your eyes open, your logbook dated, and your house understood. In fifty years of watching water win, that understanding is the closest thing to winning back I have ever seen, and it belongs to any homeowner willing to spend five minutes a month earning it.

Chapter 10: Pressed Piles and Refusal in Wet Ground and Dry

If you have read the first two volumes in this series, you already know the sentence I come back to more than any other: water always wins. This chapter is where that truth meets the repair itself. A pressed concrete pile is a simple, honest tool. It is not magic, and it does not change the soil underneath your house. What it does — when driven right, in the right conditions, for the right reasons — is carry part of your foundation down to ground that can actually hold it. Whether that ground can hold it on the day we drive, and whether it will still hold it five years from now, depends more on water than on anything else.

I am a mason and a foundation man with fifty years in Texas clay and brick. I am not a structural engineer, and nothing in this chapter replaces one. If you see stepped cracks opening fast, doors that will not latch, a chimney pulling away from the house, or any sign a wall or beam is failing, hire a licensed structural engineer before you hire anyone to repair it.

What a pressed pile actually does

A pressed concrete pile is made of short, precast concrete segments, each about a foot long. A hydraulic ram, working against the weight of your house, presses one segment into

the ground, then another on top of it, then another, driving the stack deeper. Pressed concrete piles are the only pile repair covered in this book, because they are the system I know from the field and can describe honestly.

As the stack goes down, the soil resists more and more. At some point the pile will not advance any further under the full pressing force the house can safely provide. That point is called refusal. The pile has reached soil that pushes back as hard as we push down. We then cap it, set it under the grade beam, and use it to support — and where conditions allow, carefully lift — that section of foundation.

Driving in wet ground

After a long wet spell — weeks of rain, a plumbing leak saturating one corner for months, a low spot that ponds against the foundation every storm — the clay near the surface is swollen and soft. Saturated clay offers very little skin friction along the sides of the pile segments. The pile slides through it easily, sometimes almost too easily.

Two things follow. First, the pile has to go deeper to find refusal, because the upper layers contribute almost nothing. Depth alone then tells you very little. A pile that goes twenty feet in soup has proven nothing until it refuses.

Second, wet ground can lie to you in the other direction. A pile can hit a layer of very wet, dense clay that feels firm under the ram for a few inches and then, once it dries out in August, shrinks and loosens its grip. If a crew stops at the first sign of resistance in saturated ground and calls it refusal, they may have stopped on a temporary condition. True refusal is sustained: the pile does not creep, does not advance in small reluctant bites, and does not advance again when pressure is reapplied after a pause. In Volume 1 of this series I laid out refusal as the proof standard for pressed pile work, and that standard does not change with the weather. If anything, wet ground is where you hold it tightest, because wet ground is where it is easiest to fool yourself.

Hypothetical example: Imagine a house in the Dallas area after a very wet spring. A crew drives piles around the back, each stopping at what feels like solid resistance at a moderate depth, and the lift goes well. By late summer, after six weeks without rain, the clay below those piles has dried and shrunk. Two piles that stopped early now sit in soil that has pulled back from them. The back corner settles a half inch, the cracks closed in May are hairline-open again in September, and the homeowner is told the house "moved again." It did move. But the deeper truth is those two piles were never proven to refusal in a condition that would last. The repair was performed. It was not completed.

Driving in dry ground

Dry ground lies to you too, in the opposite way. In a hard drought, Texas clay shrinks, cracks, and pulls away from the foundation, and the soil still in contact can be extremely hard — almost like driving into weak rock. Friction is very high. Piles refuse early, sometimes surprisingly shallow.

An early refusal in bone-dry ground is real resistance. Hard dry clay is genuinely strong. But ask what happens when the rains return. That clay will take on water, swell, and soften. Soil that refused a pile at twelve feet in August may offer noticeably less resistance the following March. If the pile end bears in a layer that softens dramatically when wet, the margin you thought you had can shrink.

Composite example: Picture two houses on the same street in Tarrant County, both repaired with pressed piles. The first was done in a dry summer. The piles refused at modest depths, quickly and hard, and nobody asked what lay below the dry layer. The second had an installer who noticed the sudden spike, kept driving through it, and found resistance fall away for several feet before building again, slowly, to a deeper, more honest refusal. When the wet winter came, the first house showed fresh movement at two corners. The second did not. Same street, same clay, same system. The difference was whether refusal was treated as proof or as a stopping excuse.

Why refusal is the proof standard

Homeowners ask why I talk about refusal instead of depth. Depth is a number you can put in a brochure. Twelve feet sounds better than eight, and twenty sounds better than twelve, and none of it means anything by itself. I have seen piles refuse at nine feet on one lot and need twenty-four feet on the lot next door, because one lot sits over a firm stratum and the other sits over deep, soft fill and clay. The ground decides the depth. Your job — and your contractor's job — is not to reach a depth. It is to reach refusal, and to show it was real: sustained pressure, no further advance, verified pile by pile.

In both wet and dry ground the discipline is the same: drive through questionable layers, watch the pile the whole way down, reapply pressure after a pause, and do not sign off on a pile that crept. If a contractor cannot explain, pile by pile, how refusal was confirmed, you do not have proof. You have a hope with an invoice attached. Where there is genuine doubt about what lies under a house, hire a structural engineer — soil borings give data instead of guesses.

Repairing without fixing the water

You can drive every pile to a textbook refusal, lift carefully, close the cracks beautifully — and still watch the house move again, if you never addressed the water that caused the movement.

Clay swells when wet and shrinks when dry. If one side of your house sits in soil that stays wet because a downspout dumps at the corner, while the other side bakes dry under a big oak and a hot driveway, those two sides will never be at the same elevation for long. Piles change which parts of the foundation are supported from below. They do not stop the unpiled soil between and around them from swelling and shrinking with the seasons. A lifted corner next to a chronic leak will heave. A supported wall next to a dry, shrinking edge will be left standing while the soil falls away beside it. The movement changes shape, but it does not stop.

A plumbing leak under a slab is worse still — a slow sewer seep or a pinhole supply leak feeds water into the clay in one spot, day and night, rain or shine. I have seen houses lifted level while a leak ran underneath them. Within a year the lifted area was higher than the rest of the house, because the clay there never stopped swelling. The owners thought the crew had over-lifted. The work was fine. The water was never fixed, so the ground kept moving after the crew left.

The only sequence that works

After fifty years, I give homeowners one order of operations:

First, water and plumbing. Test the plumbing — static-test the sewer and supply lines, or have a licensed plumber do it — before any pile is driven. Fix every leak. Fix the obvious surface problems too: negative grade, the dumping downspout, the ponding bed.

Second, piles. With leaks stopped and surface water corrected, drive the pressed piles to verified refusal, pile by pile, watching how each behaved on the way down. Lift conservatively. The goal is a supported, functional foundation — doors working, water draining away, cracks stabilized — not a mathematically perfect floor at any cost.

Third, cosmetics. Patch the brick, repoint the mortar, repair the sheetrock, paint — last. Cosmetics done before the first two steps are money spent decorating a moving target. Cosmetics done after are the reward for doing the job in order.

Hypothetical example: A homeowner gets three bids. Two companies want to start piles Monday. The third says: "We found a sewer leak under the hall bath. Fix that first, let the ground settle for a few weeks, then we will drive." The third

company sounds slower. It is actually the only one selling a finished job. The other two are selling a lift that a running leak will undo.

Water always wins — against clay, against brick, and against any repair that pretends it is not there. Work with it, in the right order, and a pressed pile repair can hold for decades. Ignore it, and you are not buying a repair. You are buying a subscription.

Chapter 11: Drying, Draining, and Defending

Chapter 10 ended with an order of operations: water first, piles second, cosmetics last. This chapter is the practical heart of that first step. What actually stops water from working against your house? What merely slows it down? And what does nothing at all, no matter how confidently it is sold?

I will go through the tools one by one, the way I would walk a property with a homeowner: grading, gutters and downspouts, French drains, soaker hoses and foundation watering, and then the products I would not spend your money on. It requires looking at your own house with honest eyes, ideally during a hard rain, and doing unglamorous work that decides whether the pretty work survives.

Grading: the cheapest fix that does the most

Grading is simply the slope of the ground next to your house. The rule is old and not complicated: soil should fall away from the foundation on every side, so rain runs away from the house instead of toward it. A common working standard is a drop of about six inches over the first ten feet out from the wall. You do not need to survey it to get value from checking it. Walk your house after a rain: does water stand against the brick? Does a flower bed sit higher than the slab edge, holding wet mulch against the wall like a sponge in a tray? Has soil built up over the years until the ground next to the house is flat, or worse, sloped inward?

Flat is not neutral in Texas. Flat ground means storm water sits, soaks in unevenly, and swells the clay in a band right where your footings are, while the soil under the middle of the house stays dry. That uneven swelling is a heave machine. Negative grade — ground sloping toward the house — is worse: every roof gallon and yard gallon on that side is delivered straight to your foundation.

Fixing grade means moving dirt honestly. Take soil down where it has built up against the house, taking care not to expose the footing or leave the slab edge undermined — if you

are unsure how deep you can safely dig next to your foundation, ask before you dig. Bring low areas farther out up so the fall continues away. Keep finished soil below the top of the slab and below any weep holes in the brick, so you are not trapping moisture inside the wall. Then check your work: run a hose at the top of the slope or wait for rain, and watch the water. Water does not care about your intentions. It shows you the grade you actually built.

Hypothetical example: A homeowner complains that the front-left corner rises every wet spring and cracks the brick above the garage. Two foundation bids blame the corner. A walk in the rain tells a different story: the front bed has been mulched up for fifteen years until it sits above the slab, the edging holds it like a dam, and the bed ponds against that corner for a day after every storm. The corner is not weak. It is the wettest spot on the lot, and it swells first and most. The fix starts with a wheelbarrow and a shovel, not a hydraulic ram.

Gutters and downspouts: moving roof water where you choose

Your roof is a water collector of remarkable efficiency. A one-inch rain on a modest roof produces well over a thousand gallons, and gutters decide where every gallon lands. A house with no gutters drops that water in a line right at the foundation. A house with gutters that overflow, leak at seams, or end in downspouts dumping at the base of the wall is barely better.

What works is unglamorous: gutters sized for the roof, hung with a slight fall toward the downspouts, kept clean so they do not overflow in a hard rain, and downspouts that discharge onto splash blocks or into extensions carrying water at least four to six feet away — farther if the ground there is flat, and always to a place where water can keep moving away rather than pond. Burying extensions in solid pipe (not perforated pipe — you are moving water away, not distributing it) to a daylight outlet downhill is a fine solution where the lot allows it. What does not work is a downspout emptying into a flower bed, a decorative rock pit with no outlet, or a convenient hole somebody dug years ago. Water delivered underground next to a foundation is still water next to a foundation.

French drains: honest strengths, honest limits

A French drain is a gravel-filled trench with a perforated pipe in the bottom, lined so soil does not migrate in and clog it, that collects water along its length and carries it by gravity to a lower outlet. Installed correctly, on the right problem, it is

genuinely useful. Installed as a cure-all, it is the most oversold hole in the ground in Texas.

Used well, it intercepts shallow moving water on the uphill side of a house and dries a soggy side yard. Its limits, plainly: a French drain cannot lower a regional water table. It cannot stop water coming from below, including a plumbing leak — a drain next to a leaking sewer line just gives the leak a nicer neighborhood. It cannot work without fall: the pipe must slope continuously to an outlet lower than the area drained, and on a dead-flat lot that outlet may not exist, which is why some lots need a sump and pump instead, with all the maintenance that implies. Built wrong — pipe with bellies, no fall, no filter fabric in silty soil, an outlet buried in mulch — it will clog or stall, and a clogged French drain is a long, expensive gravel decoration. And it does almost nothing about deep clay-moisture swings, because much of that moisture arrives as rain soaking straight down across the whole yard, not as a shallow stream a trench can intercept.

Composite example: Two neighbors both have wet west sides. The first lot slopes from a high street down toward the house, and every storm sends a sheet of water into the west bed. A French drain along that side, tied to a solid outlet at the street, catches the sheet and ends the problem. The second lot is flat, the wetness is general, and the driver is a high water table in wet years plus heavy shade. The same drain is dug at the same price. It collects a little water and the side stays wet — because there was no stream to intercept and no low outlet to send anything to. Identical product, opposite results. The drain was not the variable. The diagnosis was.

The other half: keeping clay from drying out

Texas foundation trouble is a two-sided coin. Too much water in one place swells clay; too little shrinks it, and drought shrinkage pulls support out from under more Texas houses than flood ever will. That is why part of defending a foundation is deliberately adding water — evenly, slowly, consistently.

The tool is the soaker hose: a porous hose laid around the foundation, typically twelve to eighteen inches out from the wall, run long enough and often enough to keep soil near the foundation at a steady, moderate moisture through dry spells. The goal is not to soak the ground. The goal is consistency. Clay kept evenly moist shrinks very little. Clay that bakes bone-dry all summer and then gets flooded in September moves violently. A foundation watering program smooths out that cycle.

Discipline matters more than equipment. Water on a schedule set by conditions, not the calendar alone — more in a rainless

July, less or none in a wet March. Bury the hose under a couple of inches of mulch or soil so it is not cooking in the sun, keep it out from under the slab edge itself (you are watering soil beside the house, not injecting water under it), and check for leaks and blowouts, because a split soaker hose becomes a one-spot flood — the exact unevenness you are trying to prevent. Trees matter too: a large tree near a house can pull enormous amounts of water from the soil on its side, drying that side far faster than the rest. You do not have to cut the tree. You do have to know its side will need more attention. A root barrier is a separate conversation for an arborist and, where structure is involved, an engineer.

Hypothetical example: In a long drought, a homeowner waters the front yard faithfully for the lawn but never runs the foundation soaker hoses on the south and west sides, where the sun is hardest and a mature oak stands twenty feet from the corner. By September, doors on that side stick and a diagonal crack grows from a window corner. The lawn looks fine. The soil beside the foundation has shrunk away from the slab by an inch. The house did not develop a new problem. It developed a moisture difference, and clay did the rest.

What does not work

Briefly, because these deserve brevity. Magic coatings and sealers painted or sprayed on soil, slabs, or brick do not control the deep moisture cycle in expansive clay, and any product claiming to "waterproof" a foundation against Texas clay movement is selling a word, not a result. One-time fixes — a single drain, a single watering, one load of dirt dumped against the house — fail because the problem is not one-time; rain and drought return every year, and only a maintained system meets a recurring problem. Repeatedly patching the same interior crack without ever walking the outside treats the evidence as the enemy. And the most expensive non-fix of all: foundation repair, however well done, performed while a known leak keeps running underneath it.

Drying, draining, and defending is not a product. It is a posture: give water a way away from the house, keep the moisture you cannot avoid as even as you can, and maintain both, year after year. The next chapter turns that posture into a calendar.

Chapter 12: The Year-Round Water Plan

Everything in this volume comes down to a habit. Houses in Texas clay do not fail in a single storm or a single drought. They move a little at a time, season after season, as the soil around them swells and shrinks — and they are protected the

same way: a little at a time, season after season, by an owner who pays steady attention to water. This final chapter turns Chapters 10 and 11 into a plan you can live with: a month-by-month calendar for a Texas homeowner, built around our real seasons — wet springs, brutal summers, storm-season falls, and winters that can freeze a pipe or spare you entirely.

One standing rule before the calendar: this plan is maintenance and observation, not structural assessment. If you find rapid change — a crack you can fit a pencil into that was not there last season, a door that suddenly will not close, a floor that feels newly sloped, brick pulling away from a window frame — do not wait for the next calendar item. Hire a licensed structural engineer. I am a mason and foundation man, not an engineer, and the calendar is no substitute for one when a house is telling you something urgent.

Winter: December through February

Winter is your planning and plumbing season. Start with a full walk-around in January. Photograph every side of the house from the same spots each year: corners, chimney, each elevation, and any existing cracks, with a coin or ruler in the frame for scale. These dated photographs, kept together, become your movement record. Memory lies about cracks. Photographs do not.

Have your plumbing tested if it has not been tested in the last few years, or immediately if you suspect a leak: a water bill creeping up with no change in use, a warm spot on the floor, the sound of water when nothing is running. A static pressure test on the sewer and supply systems, done by a licensed plumber, is the cheapest certainty you can buy under a slab, and Chapter 10 explained why it comes before any foundation decision. Winter is also when trees are dormant and arborists are available: if a large tree stands close to the house, have its health and water demands assessed now, and discuss root barriers before spring growth.

Spring: March through May

Spring is wet-season watch. March in Texas can deliver a month of rain in a weekend. During the first heavy spring storms, do the exercise from Chapter 11: put on a rain jacket and walk the house while it is raining hard. Watch gutters for overflow, downspouts for leaks and disconnections, and the ground for ponding against the foundation. Note every place water stands within a few feet of the house an hour after the rain stops. That list is your spring work list.

April is grading and drainage month. Fix the ponding spots: regrade where soil has settled, extend any downspout still

dumping too close, and if you have a French drain, check its outlet — run water in at the high end or inspect after rain to confirm it is flowing and not clogged or crushed. A drain you have not verified is a drain you are merely hoping about. Top up mulch, keeping it below the top of the slab and clear of weep holes, and confirm irrigation has not developed the spring classics: a broken head spraying the foundation, a drip line soaking one bed while the rest of the yard stays dry. Uneven irrigation is uneven soil moisture, and uneven soil moisture is movement.

In May, take your second set of notes for the year. You do not need survey equipment: use a long level on floors, note which doors swing, stick, or latch, and write measured crack widths on painter's tape beside the crack with the date. If you have ever had a professional elevation survey, May — after the wet spring has fully charged the soil — is a good comparison point, because it shows your house in its "swollen" condition, opposite its late-summer "shrunk" condition. The difference is the seasonal movement your house lives with. Knowing its size keeps you calm about normal cycles and quick to act on abnormal ones.

Summer: June through August

Summer is the discipline season, and in Texas it decides the year. As rain disappears and heat builds, start the foundation watering program from Chapter 11 before the soil can bake and pull away — typically in June, earlier in a dry year. Run soaker hoses twelve to eighteen inches out from the foundation on a consistent schedule, aiming for even, moderate moisture. Check the gap, if any, between soil and slab monthly; a widening gap is the clay telling you it is shrinking and your watering is behind. In the worst heat — July and August in most of Texas — consistency matters more than volume: steady, regular watering beats occasional flooding, which swells one band of soil while deeper clay stays dry.

June is also irrigation audit month. Run each zone and walk it. Confirm no head is broken, tilted, or watering the wall, and that beds against the house are not kept saturated while the yard dries. If large trees stand on one side, expect that side to dry faster and adjust.

In August, do a mid-drought crack and door check against your May notes. Hairline seasonal changes that reverse in the fall are the normal breathing of a Texas house. Changes new in kind — a crack stepping through brick mortar in a fresh place, a window racked out of square — deserve a call, and a structural engineer if the change is significant or fast. Keep watering until fall rains actually arrive. The most common summer mistake is stopping the soaker program at the first

September thunderstorm while deeper soil is still dry; let several soaking rains, not one, end your watering season.

Fall: September through November

Fall is second-storm season and your second gutter cleaning. September and October storms can be the heaviest of the year, arriving on soil cracked open from summer — and cracked, dry clay takes in water fast and unevenly, which is why early fall is a classic season for sudden heave at the edges of a house. Repeat the rain walk during a fall storm. Clear gutters and downspouts again after leaf fall begins; a gutter clean in February can be a planter by November.

October is the annual review — the most important single item on this calendar. Lay out the year's records together: January photographs beside new photographs from the same spots, the May and August notes, water bills, and any plumbing or drainage work done. Read the year as a story. Did cracks open in summer and close in fall, the normal cycle? Did one corner behave differently, and does that corner match a water fact you know — a tree, a downspout, a low bed? Did the house return to roughly the condition it started the year in? A house that completes the cycle back where it began is a stable house, well managed. A house that ends each year a little further in one direction is telling you something is changing underneath it, and that pattern — visible only because you kept records — is exactly what to put in front of a foundation professional, or a structural engineer, when you call.

In November, complete any grading or drainage repairs the October review identified, winterize irrigation as your area requires, insulate exposed pipes before a hard freeze, and file the year's records.

The records that protect you

Keep a single foundation file, paper or digital, containing: dated photographs of all elevations taken at least twice a year; any elevation surveys; plumbing test results and repair invoices; drainage and grading work records; foundation repair documents if work is ever done, including the pile-by-pile refusal records described in Chapter 10; and your seasonal notes on doors, cracks, and watering.

This file does three kinds of work. It lets you catch real change early, when it is cheapest. It lets a professional diagnose your house in one visit instead of guessing. And it protects resale: a Texas seller discloses what they know, and a documented history of steady maintenance, tested plumbing, and stable seasonal readings is not a liability — it is evidence of a cared-for house, the kind buyers and inspectors

trust. The homes that frighten buyers are not the ones with records. They are the ones with fresh patches and no history at all.

Composite example: Two similar houses go on the market on the same street. The first has a new patch over an old crack and an owner who says the house has "never had any problems." The second has a ten-year file: photographs, two clean plumbing tests, records of gutter and grading work, and seasonal notes showing the same small summer crack opening and closing for a decade. The second house is the one with the visible crack history — and it is the one that sells with confidence, because its story is known and stable. Records turn a question mark into a track record.

The last word

Water always wins — that has been the title and the warning of this volume. But it was never meant as a counsel of despair. Water wins against neglect, against one-time fixes, and against repairs done in the wrong order. It does not win against attention. Grade the ground away. Give the roof water somewhere better to go. Drain what can be drained, honestly, and water evenly what drought would dry. Test the plumbing, drive to refusal when repair is needed, and keep the records that let you see your own house clearly. Do those things, year after year, and the ground under your home becomes what it should have been all along: not an enemy, not a mystery — just Texas clay, known, watched, and managed by the person who lives above it.

Conclusion: Respect the Water, Keep the House

Every house in this book — every hypothetical example, every composite example, every pattern drawn from 50 years of field work — came back to the same quiet force. Water moved the clay. Water filled the wall. Water rusted the steel. Water found the leak, the low spot, the clogged gutter, and the dry corner, and it worked there, patiently, until the house announced the result in a crack, a sticking door, or a floor that no longer felt level.

That is not a reason for fear. It is a reason for respect, and respect, in a homeowner's hands, looks like a routine.

Respect looks like walking the house after a hard rain and watching where the water truly goes. It looks like gutters that are cleaned before they overflow, downspouts that discharge well away from the foundation, and grading that sheds water instead of inviting it to sit. It looks like flower beds kept below

the weep holes, sprinklers that water plants instead of walls, and a soaker program in a drought that is steady and even rather than frantic and occasional. It looks like a water bill that gets read, a moisture log that gets kept, and a small change that gets investigated while it is still small.

Respect also looks like order when repair is needed. Find and fix hidden water first. Correct drainage. Then, if a foundation needs support, support it with pressed concrete piles driven to refusal — the standard Volume 1 of this series is built on — so the ground proves it can hold. Then repair the brick, the mortar, and the cosmetics, in that order, over ground that is no longer being moved by the water nobody fixed. Any proposal that reverses that order deserves hard questions, however friendly the person offering it may be.

And respect looks like knowing the limits of a book, including this one. A field guide can teach you to read, to measure, and to maintain. It cannot evaluate your specific structure from a distance. If your home shows rapid movement, large offsets, floors clearly out of level, or cracks that widen month after month despite honest water management, bring in a structural engineer for an independent evaluation of that house, and bring your logs, photographs, and records with you. Good records make every professional you hire better at helping you.

Volume 1 asked the ground to prove it could hold. Volume 2 taught you to read what the walls record. This volume has asked you to follow the water that writes so much of that record in the first place. Put the three together and you own a complete way of thinking about a Texas house: read it honestly, demand proof from any repair, and manage the water that moves it — evenly, season by season, year after year.

Water always wins against neglect. Against attention, it is just weather, soil, and plumbing — forces you can direct, measure, and live with in a house that stays quiet, level, and sound.

Start with the next rain. Stand where you can see the roofline, the gutters, and the ground beside your foundation, and watch. Your house is about to show you the first page of its water story. This time, you will know how to read it.

Resources & Next Steps

Travis Nech has spent 50 years in brick, masonry, and foundation work across Texas. He owns and operates Champion Brick Repair, Metro Foundation Repair, LintelLOCK, MortarMagic, and WhiteStone Construction.

- **Champion Brick Repair** — brick & masonry repair, Dallas-Fort Worth — championbrickrepair.com — (817) 900-6324
- **Metro Foundation Repair** — pressed concrete pile foundation repair — metrofoundationrepair.com — (817) 523-1540
- **LintelLOCK** — the field-developed lintel replacement system — lintlerepair.com — (469) 730-0650
- **MortarMagic** — mortar color matching & the Mortar Bucket — mortarmagic.netlify.app
- **WhiteStone Construction** — stone, ranch & property work, Hamilton TX country — (254) 723-5040

If your home shows the progressive signs described in this book — cracks widening over time, doors and windows that no longer close, floors clearly out of level, or moisture problems you cannot locate — start with a measured evaluation. Bring your rainfall and moisture log, your dated photographs, and your water bills. Good information makes for honest recommendations, whichever company you choose.

About the Author

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Travis writes the Engineering Truth series from field experience: what the ground and the wall really do, learned house by house in Texas clay and brick. He is not a structural engineer, and his books are field guides — for a licensed evaluation of a structure in distress, consult a structural engineer.