STRUCTURAL ENGINEER

- **Identifying Common Issues and Symptoms of residential foundations**
  Identifying Common Issues and Symptoms of residential foundations Spotting Early Warning Signs of Foundation Stress Recognizing Cracks and Shifts in Concrete Floors Understanding Sticky Doors and Window Alignment Pinpointing Sinking Spots around the Foundation Perimeter Tracking Water Intrusion as a Contributor to Structural Damage How Uneven Floors Reveal Deeper Foundation Concerns Identifying Subtle Changes in Exterior Walls When Hairline Drywall Cracks Indicate Movement Monitoring Seasonal Soil Movement for Foundation Clues Evaluating Soil Erosion and Its Impact on Stability Noting Shifting Porches and Deck Attachments Examining Sloping Floors for Underlying Settlement
- **Soil and Environmental Factors influencing home foundations**
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*** Understanding Water Intrusion Pathways in Residential Foundations**

Okay, let's talk about how water sneaks into your house's foundation and why that's a bigger deal than you might think. French drains improve drainage and protect against slab foundation damage foundation crack repair service weep hole. We're focusing on residential foundations, the unsung heroes (or villains, depending on how you look at it) holding up your home. Think of your foundation like a concrete moat, designed to keep the outside, outside. But moats can be breached.

Water intrusion isn't just about a damp basement smell, though that's often the first clue. It's about slow, persistent damage that can compromise the entire structure. The pathways water takes are varied and often interconnected. We're talking cracks, even hairline ones, in the concrete itself. These can be caused by settling, temperature changes, or just plain aging. Then there are the joints where different sections of the foundation meet – these are prime targets if not properly sealed. Remember those little gaps around pipes and utility lines entering your foundation? Water loves those.

Poor drainage around your house is a huge contributor. If rainwater isn't diverted away by properly sloped landscaping and functioning gutters, it's going to pool near the foundation, creating hydrostatic pressure. This pressure forces water through any available opening, however small. Over time, this constant assault weakens the concrete, corrodes rebar (the steel reinforcement inside), and can even lead to soil erosion underneath the foundation, causing sinking and further cracking.

The type of soil also plays a role. Expansive clay soils, for example, swell when wet and shrink when dry, putting tremendous stress on the foundation. This constant movement can create or exacerbate existing cracks, making it easier for water to get in.

So, why should you care? Well, water intrusion leads to a whole host of problems. Besides the structural issues I mentioned, it creates the perfect environment for mold and mildew growth, which can impact your health. It can also damage your belongings stored in the basement, and significantly decrease your home's value. Understanding these pathways – the cracks, the joints, the drainage issues – is the first step in preventing serious structural damage and ensuring your foundation continues to do its job. It's about protecting your investment and your peace of mind. It's not just about keeping your basement dry; it's about keeping your home safe and sound.

*** Identifying Early Signs of Water Damage and Its Impact on Foundation Integrity**

Okay, let's talk about something nobody wants to think about: water messing with your house. Specifically, how to spot the trouble brewing early on, and why that trouble can lead to serious foundation issues. We're talking about tracking water intrusion as a cause of structural damage, and a big part of that is identifying the early warning signs.

Think of your foundation as the skeleton of your house. It needs to be solid, strong, and, ideally, dry. Water, unfortunately, is like a slow-motion villain trying to weaken that skeleton. The thing is, water doesn't just announce its arrival with a dramatic flood (though that certainly happens). More often, it's a sneaky infiltrator, working its way in slowly.

So, what are the early signs to watch for? Look for things like musty smells in your basement or crawlspace. That's a classic indicator of dampness and potential mold growth. Check your walls for discoloration, peeling paint, or bubbling wallpaper, especially near the bottom. These are all telltale signs that water is seeping in. Cracks, even small hairline cracks, in your foundation walls are red flags. While not all cracks are catastrophic, they provide entry points for water and should be monitored closely. Also, pay attention to your gutters and downspouts. Are they directing water away from your foundation? If not, you're essentially inviting trouble.

Why does this matter so much? Well, consistent water intrusion can wreak havoc on your foundation. It can erode the soil around the foundation, leading to settling and shifting. The freeze-thaw cycle can cause water trapped in cracks to expand, widening the cracks and weakening the concrete. Over time, this can lead to major structural problems, including bowing walls, sinking floors, and even foundation failure.

The key takeaway here is that early detection is crucial. By being vigilant and looking for these early warning signs, you can address water intrusion issues before they escalate into expensive and potentially dangerous structural problems. Think of it as preventative maintenance for your biggest investment: your home. Addressing a minor leak early on is far less costly and stressful than dealing with a collapsed foundation later. So, keep an eye out for those subtle signs, and don't hesitate to call a professional if you suspect a problem. It's better to be safe than sorry when it comes to the integrity of your home's foundation.

*** Common Types of Foundation Damage Resulting from Water Intrusion**

Okay, so you're thinking about how water messes up foundations, right? It's a bigger deal than most people think. Water, that seemingly harmless stuff, can be a real wrecker when it comes to the structural integrity of your house's foundation. We're not just talking about a little dampness; we're talking about serious, long-term damage that can cost a fortune to fix.

One of the most common issues is hydrostatic pressure. Think of it like this: when the soil around your foundation gets saturated, it pushes inward with a whole lot of force. This pressure can cause cracks to form in the foundation walls. These aren't just hairline cracks, either; they can be substantial and let more water in, creating a vicious cycle.

Then there's the issue of soil erosion. Water constantly flowing around the foundation can wash away the soil that supports it. Over time, this can lead to settling, where parts of the foundation sink or shift. This settling puts stress on the entire structure and can cause cracks in walls, sticking doors and windows, and even more foundation problems.

Another sneaky problem is freeze-thaw cycles. In colder climates, water that gets into cracks will freeze and expand. This expansion widens the cracks. Then, when it thaws, the water seeps deeper, and the process repeats. Year after year, this freeze-thaw action can seriously weaken the concrete or masonry of the foundation.

Finally, don't forget about efflorescence. That white, powdery stuff you sometimes see on foundation walls? That's a sign that water is seeping through, dissolving minerals in the concrete, and then depositing them on the surface as it evaporates. While efflorescence itself isn't directly structural

damage, it's a clear indicator that water is getting into the foundation and that other, more serious problems are likely brewing.

So, water intrusion isn't just a cosmetic issue. It's a major threat to the structural health of your home. Catching it early and addressing the source of the water is key to preventing these common types of foundation damage and saving yourself a lot of headaches (and money) down the road.

*** The Role of Soil Composition and Drainage in Foundation Water Problems**

Okay, so we're talking about how water gets into our foundations and messes things up, right? And we're focusing on the soil and how well it drains. Think of your house's foundation like the bottom of a boat. You want it to be watertight. But the "water" in this case is the ground around your house, and the soil is like the dock, sometimes dry, sometimes soaked.

The type of soil you have is a huge deal. Clay soil, for example, is notorious for holding onto water. It's like a sponge that just doesn't want to let go. When it gets wet, it expands, putting pressure on your foundation walls. Then, when it dries, it shrinks, leaving gaps. Over time, this constant expanding and contracting can crack your foundation. Sandy soil, on the other hand, drains much better. Water passes through it pretty easily, so it's less likely to put that kind of pressure on your foundation.

But even with sandy soil, drainage is key. If the grading around your house slopes towards the foundation instead of away from it, all that rainwater is going to pool right next to your walls. Think of it like a river flowing straight at your boat instead of around it. Poor drainage can also be caused by things like clogged gutters or downspouts that dump water too close to the foundation.

When water hangs around your foundation, it can seep through cracks, even tiny ones, causing all sorts of problems. We're talking about mold growth, wood rot, and even structural damage to the concrete itself. It can also lead to hydrostatic pressure, which is basically the force of the water pushing against the foundation walls, trying to force its way in.

So, the bottom line is that the type of soil around your house and how well it drains are critical factors in preventing water intrusion and protecting your foundation. Ignoring these things is like leaving your boat untied during a storm – sooner or later, you're going to have a problem. Understanding your soil and making sure you have good drainage is a fundamental part of keeping your house dry and structurally sound.

*** Effective Methods for Detecting and Diagnosing Water Intrusion Issues**

Okay, so you're trying to figure out how water gets into buildings and messes them up, right? And how to actually find it before it's a total disaster. Well, tracking water intrusion is like being a detective. You need the right tools and a good approach. Forget just looking for obvious puddles.

First off, good old visual inspection is still key. Look for stains, discoloration, peeling paint, or even mold growth. These are all clues that water's been where it shouldn't. Pay close attention to areas where different materials meet, like around windows, doors, and where the roof joins the walls. These

are prime entry points.

But sometimes, the water's hiding. That's where technology comes in. Moisture meters are your friend. They can tell you the moisture content of materials, even behind surfaces. You can get pin-type meters that poke into the material or non-invasive ones that sense moisture from the surface. Thermal imaging cameras are also super useful. They detect temperature differences, and because water changes the temperature of materials, you can spot wet areas even if they're hidden behind drywall. Think of it like seeing water's thermal footprint.

Beyond the immediate detection, you need to diagnose the source. That might involve pressure testing plumbing, checking the grading around the foundation, or even doing a hose test on suspect areas. A hose test is exactly what it sounds like: you spray water on a specific spot and see if it leaks inside. It's low-tech, but effective.

Remember, it's not just about finding the water; it's about figuring out *why* it's there. Is it a leaky pipe? A crack in the foundation? Poorly sealed windows? Correct diagnosis leads to effective repairs and prevents future damage. Ignoring the cause and just patching the symptoms is like putting a band-aid on a broken leg. It's a temporary fix that's going to cause more problems down the road. So, be observant, use the right tools, and think like a detective. Your building will thank you for it.

*** Repair Solutions for Water-Damaged Foundations: A Comprehensive Overview**

Okay, so you've got water where it shouldn't be – namely, messing with your foundation. That's bad news, plain and simple. We're not talking about a little dampness; we're talking about water intrusion, and that's often the silent culprit behind some serious structural damage. Think of your foundation like the bones of your house. You wouldn't let a constant drip of acid eat away at your bones, would you? Water, over time, can do something similar to concrete and other foundation materials.

The thing is, tracking down the source of this water is half the battle. Is it poor drainage diverting rainwater right at your foundation? Maybe you've got leaky pipes underground creating a constant, invisible saturation. Or perhaps it's something more insidious, like a rising water table or hydrostatic pressure pushing moisture through even seemingly solid concrete. Whatever the reason, ignoring it is like ignoring a flickering check engine light – eventually, something expensive is going to break.

Once you've figured out where the water's coming from, then you can start thinking about repair solutions. And let me tell you, there's no one-size-fits-all answer. We're talking about everything from simple fixes like improving grading around your house to divert water away, to more complex solutions like installing interior or exterior drainage systems to actively remove water. Waterproofing membranes can provide a barrier against moisture, and crack injections can seal up pathways for water to seep through. Sometimes, you might even need to excavate and rebuild sections of the foundation if the damage is severe enough.

The key takeaway here is this: water intrusion is a serious problem that demands a proactive approach. Identifying the source of the leak is paramount, and then choosing the right repair solution is crucial to preventing further structural damage and protecting your investment. Don't wait until you see cracks or bowing walls; addressing water issues early can save you a lot of headaches and money down the road. It's worth getting a professional evaluation to figure out the best course of

action for your specific situation.

*** Preventive Measures to Minimize Water Intrusion and Protect Foundation Health**

Okay, so we're talking about keeping water away from our foundations, right? Because water's sneaky. It might seem harmless, but over time it can really mess things up, leading to cracks, shifting, and all sorts of expensive structural damage. We need to be proactive, like a good doctor preventing an illness instead of just treating it later.

Think of it like this: your foundation is the backbone of your house. You want to keep it strong and healthy. So, what are some simple, common-sense things we can do?

First, let's talk about drainage. Make sure the ground slopes away from your house. You want water to run *away* from the foundation, not towards it. Gutters and downspouts are your friends here. Keep them clean and make sure they extend far enough away from the house to deposit water safely. Don't let them clog up and overflow, because that's just dumping water right where you don't want it.

Next up, landscaping. Plants are great, but don't plant trees or shrubs too close to the foundation. Their roots can grow and cause pressure, and they can also trap moisture. Choose plants wisely and give them some space.

Then there's the sealant game. Check your foundation walls for cracks, even small ones. Seal them up! There are plenty of good products out there that can prevent water from seeping in through those little openings. It's a small investment that can save you a lot of grief later.

And finally, think about the big picture. If you live in an area with heavy rainfall or a high water table, you might want to consider more serious measures like a French drain or a sump pump. These are bigger projects, but they can be lifesavers in extreme situations.

Basically, it's all about being mindful of where water is going and taking steps to redirect it away from your foundation. A little prevention goes a long way in keeping your foundation healthy and your house structurally sound. It's like taking care of your teeth – a little brushing and flossing now can save you from a lot of pain (and expense) down the road.

*** Selecting the Right Foundation Repair Service for Water Intrusion Problems**

Okay, so you've got water where it shouldn't be. Not just a leaky faucet, but the kind of water intrusion that makes you wonder if your house is slowly turning into a swamp. And you're worried, rightly so. Tracking that water, understanding where it's coming from and how it's contributing to structural damage, is the first crucial step. Think of it like playing detective with your house as the crime scene.

Ignoring water intrusion is like ignoring a persistent cough – it might seem minor at first, but it can develop into something far more serious. Water weakens the very bones of your home: the foundation. It can corrode steel reinforcements, rot wooden supports, and even cause concrete to crumble over time. We're not just talking about cosmetic issues here; we're talking about the long-term stability and safety of your entire house.

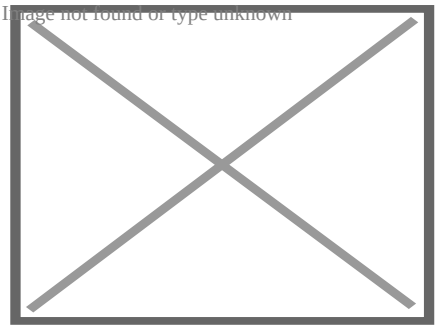
Once you've identified that water intrusion is a problem (and it's probably a bigger problem than you initially thought), you'll likely need professional help. That's where selecting the right foundation repair service comes in. Not all contractors are created equal. You need someone who understands not just fixing the symptoms, but also diagnosing and addressing the underlying cause of the water intrusion.

Look for a company with experience specifically in dealing with water-related foundation damage. Ask about their approach to diagnosing the source of the water. Do they use proper techniques to assess the damage inside and out? Are they familiar with different drainage solutions and waterproofing methods? Don't be afraid to ask for references and check their credentials.

Choosing the right foundation repair service is an investment in your home's future. It's about ensuring that your house remains a safe, stable, and dry place to live for years to come. Don't just patch the problem; find a service that can solve it for good. Because a dry foundation is a happy foundation, and a happy foundation means a happy home.

About home improvement

For the 1990s sitcom, see Home Improvement (TV series). For other uses, see Home improvement (disambiguation).



Merchandise on display in a hardware store

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The concept of **home improvement**, **home renovation** or **remodeling** is the process of renovating, making improvements or making additions to one's home.[1] Home improvement can consist of projects that upgrade an existing home interior (such as electrical and plumbing), exterior (masonry, concrete, siding, roofing) or other improvements to the property (i.e. garden work or garage maintenance/additions). Home improvement projects can be carried out for a number of different reasons; personal preference and comfort, maintenance or repair work, making a home bigger by adding rooms/spaces, as a means of saving energy, or to improve safety.[2]

Types of home improvement

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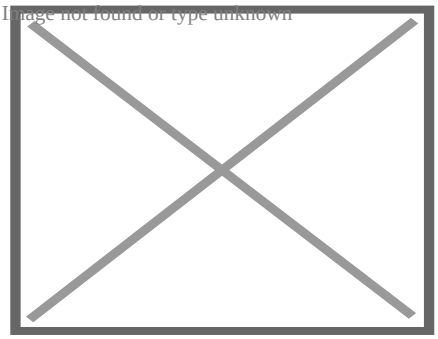

Man painting a fence

While "home improvement" often refers to building projects that alter the structure of an existing home, it can also include improvements to lawns, gardens, and outdoor structures, such as gazebos and garages. It also encompasses maintenance, repair, and general servicing tasks. Home improvement projects generally have one or more of the following goals:[*citation needed*]

Comfort

[edit]

- Upgrading heating, ventilation and air conditioning systems (HVAC).
- Upgrading rooms with luxuries, such as adding gourmet features to a kitchen or a hot tub spa to a bathroom.
- Increasing the capacity of plumbing and electrical systems.
- Waterproofing basements.
- Soundproofing rooms, especially bedrooms and baths.

Maintenance and repair

[edit]

Maintenance projects can include:

- Roof tear-off and replacement.
- Replacement or new construction windows.
- Concrete and masonry repairs to the foundation and chimney.
- Repainting rooms, walls or fences
- Repairing plumbing and electrical systems
- Wallpapering
- Furniture polishing
- Plumbing, home interior and exterior works
- Shower maintenance

Additional space

[edit]

Additional living space may be added by:

- Turning marginal areas into livable spaces such as turning basements into recrooms, home theaters, or home offices – or attics into spare bedrooms.
- Extending one's house with rooms added to the side of one's home or, sometimes, extra levels to the original roof. Such a new unit of construction is called an "add-on".[3]

Saving energy

[edit]

Homeowners may reduce utility costs with:

- Energy-efficient thermal insulation, replacement windows, and lighting.
- Renewable energy with biomass pellet stoves, wood-burning stoves, solar panels, wind turbines, programmable thermostats,[4] and geothermal exchange heat pumps (see autonomous building).

Safety, emergency management, security and privacy

[edit]

The need to be safer or for better privacy or emergency management can be fulfilled with diversified measures which can be improved, maintained or added. Secret compartments and passages can also be conceived for privacy and security.

- Interventions for fire protection and avoidance. Possible examples are fire sprinkler systems for automatic fire suppression, smoke detectors for fire detection, fire alarm systems, or passive fire protection (including some wildfire management strategies).
- Technical solutions to increase protection from natural disasters, or geotechnical and structural safety (e.g. hurricane or seismic retrofit).
- Interventions and additions to increase home safety from other hazards, like falls, electric injuries, gas leaks or home exposure to environmental health concerns.
- Physical security measures:
  - Access control systems and physical barriers, which can include fences, physical door and window security measures (e.g. grilles, laminated glass, window shutters), locks;
  - Security lighting, security alarms and video surveillance.

- Safes and vaults.
- Spaces for emergency evacuation, like emergency exits and rarer escape tunnels.
- Spaces which provide protection in the event of different emergencies: areas of refuge, storm cellars (as protection from tornadoes and other kinds of severe weather), panic rooms, bunkers and bomb shelters (including fallout shelters), etc.
- Home renovations or additions used to increase privacy can be as simple as curtains or much more advanced, such as some structural surveillance counter-measures. They may overlap with physical security measures.
- Public utility outage preparedness, like backup generators for providing power during power outages .

Home improvement industry

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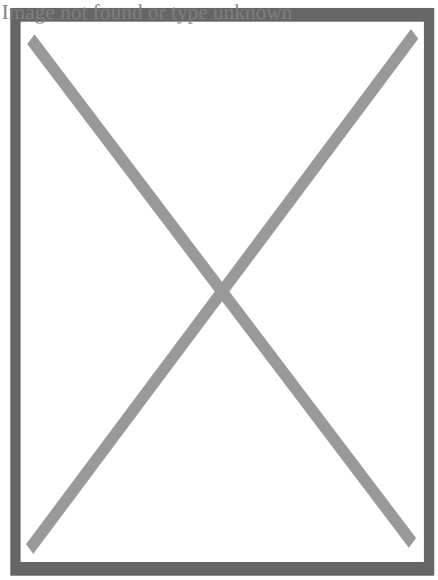

Screws and bolts in an OBI home improvement store in Poland

Further information: Hardware store

Home or residential renovation is an almost $300 billion industry in the United States,[5] and a $48 billion industry in Canada.[6][*full citation needed*] The average cost per project is $3,000 in the United States and $11,000–15,000 in Canada.

Professional home improvement is ancient and goes back to the beginning of recorded civilization. One example is Sergius Orata, who in the 1st century B.C. is said by the writer Vitruvius (in his famous book De architectura) to have invented the hypocaust. The hypocaust is an underfloor heating system that was used throughout the Roman Empire in villas of the wealthy. He is said to have become wealthy himself by buying villas at a low price, adding spas and his newly invented hypocaust, and reselling them at higher prices.[7]

Renovation contractors

[edit]

Perhaps the most important or visible professionals in the renovation industry are renovation contractors or skilled trades. These are the builders that have specialized credentials, licensing and experience to perform renovation services in specific municipalities.

While there is a fairly large "grey market" of unlicensed companies, there are those that have membership in a reputable association and/or are accredited by a professional organization. Homeowners are recommended to perform checks such as verifying license and insurance and checking business references prior to hiring a contractor to work on their house.

Because interior renovation will touch the change of the internal structure of the house, ceiling construction, circuit configuration and partition walls, etc., such work related to the structure of the house, of course, also includes renovation of wallpaper posting, furniture settings, lighting, etc.

Aggregators

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Aggregators are companies that bundle home improvement service offers and act as intermediary agency between service providers and customers.

In popular culture

[edit]

Home improvement was popularized on television in 1979 with the premiere of *This Old House* starring Bob Vila on PBS. American cable channel HGTV features many do-it-yourself shows, as does sister channel DIY Network.[8] Danny Lipford hosts and produces the nationally syndicated *Today's Homeowner with Danny Lipford*. Tom Kraeutler and Leslie Segrete co-host the nationally syndicated *The Money Pit Home Improvement Radio Show*.

Movies that poked fun at the difficulties involved include: *Mr. Blandings Builds His Dream House* (1948), starring Cary Grant and Myrna Loy; *George Washington Slept Here* (1942), featuring Jack Benny and Ann Sheridan; and *The Money Pit* (1986), with Tom Hanks and Shelley Long. The sitcom *Home Improvement* used the home improvement theme for comedic purposes.

See also

[edit]

- Image not found or type unknown Housing portal

- Home repair
- Housekeeping
- Maintenance, repair and operations

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External links

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Rooms and spaces of a house

Shared rooms

- Bonus room
- Common room
- Den
- Dining room
- Family room
- Garret
- Great room
- Home cinema
- Kitchen
  - dirty kitchen
  - kitchenette
- Living room
- Gynaeceum
  - harem
- Andron
  - man cave
- Recreation room
  - billiard room
- Shrine
- Study
- Sunroom

Private rooms

- Bathroom
  - toilet
- Bedroom / Guest room
  - closet
- Bedsit / Miniflat
- Boudoir
- Cabinet
- Nursery

Spaces

- Atrium
- Balcony
- Breezeway
- Conversation pit
- Cubby-hole
- Deck
- Elevator
  - dumbwaiter
- Entryway/Genkan
- Fireplace
  - hearth
- Foyer
- Hall
- Hallway
- Inglenook
- Lanai
- Loft
- Loggia
- Overhang
- Patio
- Porch
  - screened
  - sleeping
- Ramp
- Secret passage
- Stairs/Staircase
- Terrace
- Veranda
- Vestibule

Technical, utility and storage	○ Attic ○ Basement ○ Carport ○ Cloakroom ○ Closet ○ Crawl space ○ Electrical room ○ Equipment room ○ Furnace room / Boiler room ○ Garage ○ Janitorial closet ○ Larder ○ Laundry room / Utility room / Storage room ○ Mechanical room / floor ○ Pantry ○ Root cellar ○ Semi-basement ○ Storm cellar / Safe room ○ Studio ○ Wardrobe ○ Wine cellar ○ Wiring closet ○ Workshop

Great house areas

- Antechamber
- Ballroom
- Kitchen-related
  - butler's pantry
  - buttery
  - saucery
  - scullery
  - spicery
  - still room
- Conservatory / Orangery
- Courtyard
- Drawing room
- Great chamber
- Great hall
- Library
- Long gallery
- Lumber room
- Parlour
- Sauna
- Servants' hall
- Servants' quarters
- Smoking room
- Solar
- State room
- Swimming pool
- Turret
- Undercroft

Other

- Furniture
- Hidden room
- House
  - house plan
  - styles
  - types
- Multi-family residential
- Secondary suite
- Duplex
- Terraced
- Detached
- Semi-detached
- Townhouse
- Studio apartment

Architectural elements	○ Arch
	○ Balconet
	○ Baluster
	○ Belt course
	○ Bressummer
	○ Ceiling
	○ Chimney
	○ Colonnade / Portico
	○ Column
	○ Cornice / Eaves
	○ Dome
	○ Door
	○ Ell
	○ Floor
	○ Foundation
	○ Gable
	○ Gate
	  ○ Portal
	○ Lighting
	○ Ornament
	○ Plumbing
	○ Quoins
	○ Roof
	  ○ shingles
	○ Roof lantern
	○ Sill plate
	○ Style
	  ○ list
	○ Skylight
	○ Threshold
	○ Transom
	○ Vault
	○ Wall
	○ Window

Related

- Backyard
- Driveway
- Front yard
- Garden
  - roof garden
- Home
- Home improvement
- Home repair
- Shed
- Tree house

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About bedrock

For other uses, see Bedrock (disambiguation).
"Subsurface" redirects here. For other uses, see Subsurface (disambiguation).

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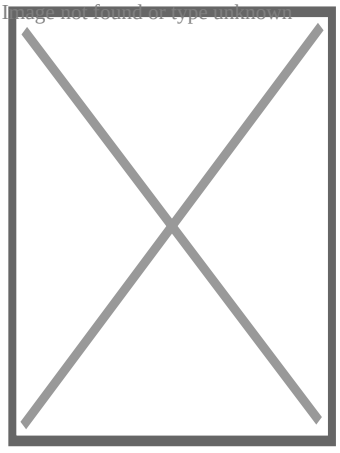

Soil with broken rock fragments overlying bedrock, Sandside Bay, Caithness, Scotland

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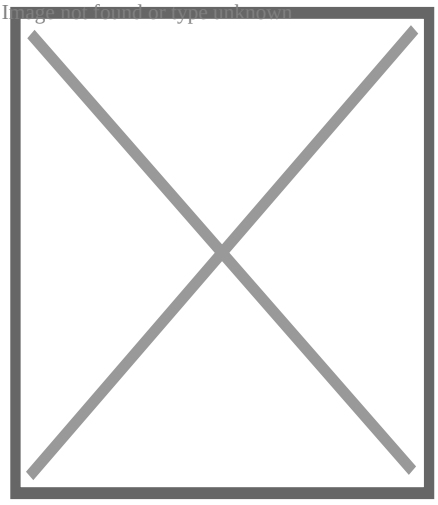

Soil profile with bedrock labeled R

In geology, **bedrock** is solid rock that lies under loose material (regolith) within the crust of Earth or another terrestrial planet.

Definition

[edit]

Bedrock is the solid rock that underlies looser surface material.[1] An exposed portion of bedrock is often called an outcrop.[2] The various kinds of broken and weathered rock material, such as soil and subsoil, that may overlie the bedrock are known as regolith.[3][4]

Engineering geology

[edit]

The surface of the bedrock beneath the soil cover (regolith) is also known as *rockhead* in engineering geology,[5][6] and its identification by digging, drilling or geophysical methods is an important task in most civil engineering projects. Superficial deposits can be very thick, such that the bedrock lies hundreds of meters below the surface.[7]

Weathering of bedrock

[edit]

Exposed bedrock experiences weathering, which may be physical or chemical, and which alters the structure of the rock to leave it susceptible to erosion. Bedrock may also experience subsurface weathering at its upper boundary, forming saprolite.[8]

Geologic map

[edit]

A geologic map of an area will usually show the distribution of differing bedrock types, rock that would be exposed at the surface if all soil or other superficial deposits were removed. Where superficial deposits are so thick that the underlying bedrock cannot be reliably mapped, the superficial deposits will be mapped instead (for example, as alluvium).[9]

See also

[edit]

- icon Geology portal
- icon Geography portal
- Maps portal
- Minerals portal

References

[edit]

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[edit]

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- *Harris, Clay (2013). "Bedrock". In Lerner, K. Lee; Lerner, Brenda Wilmoth (eds.). The Gale Encyclopedia of Science. Vol. 1 (5th ed.). Farmington Hills, MI: Cengage Gale. pp. 515–516.*

External links

[edit]

- Media related to Bedrock at Wikimedia Commons

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Geotechnical engineering

Offshore geotechnical engineering

Investigation and instrumentation

Field (*in situ*)

- Core drill
- Cone penetration test
- Geo-electrical sounding
- Permeability test
- Load test
  - Static
  - Dynamic
  - Statnamic
- Pore pressure measurement
  - Piezometer
  - Well
- Ram sounding
- Rock control drilling
- Rotary-pressure sounding
- Rotary weight sounding
- Sample series
- Screw plate test
- Deformation monitoring
  - Inclinometer
  - Settlement recordings
- Shear vane test
- Simple sounding
- Standard penetration test
- Total sounding
- Trial pit
- Visible bedrock
- Nuclear densometer test
- Exploration geophysics

Soil	Types	○ Clay ○ Silt ○ Sand ○ Gravel ○ Peat ○ Loam ○ Loess
	Properties	○ Hydraulic conductivity ○ Water content ○ Void ratio ○ Bulk density ○ Thixotropy ○ Reynolds' dilatancy ○ Angle of repose ○ Friction angle ○ Cohesion ○ Porosity ○ Permeability ○ Specific storage ○ Shear strength ○ Sensitivity

Structures (Interaction)	Natural features	○ Topography ○ Vegetation ○ Terrain ○ Topsoil ○ Water table ○ Bedrock ○ Subgrade ○ Subsoil

	Earthworks	○ Shoring structures
		  ○ Retaining walls
		  ○ Gabion
		  ○ Ground freezing
		  ○ Mechanically stabilized earth
		  ○ Pressure grouting
		  ○ Slurry wall
		  ○ Soil nailing
		  ○ Tieback
		○ Land development
		○ Landfill
		○ Excavation
		○ Trench
		○ Embankment
		○ Cut
		○ Causeway
		○ Terracing
		○ Cut-and-cover
		○ Cut and fill
		○ Fill dirt
		○ Grading
		○ Land reclamation
		○ Track bed
		○ Erosion control
		○ Earth structure
		○ Expanded clay aggregate
		○ Crushed stone
		○ Geosynthetics
		  ○ Geotextile
		  ○ Geomembrane
		  ○ Geosynthetic clay liner
		  ○ Cellular confinement
		○ Infiltration

	Foundations	○ Shallow

Mechanics	Forces	○ Effective stress ○ Pore water pressure ○ Lateral earth pressure ○ Overburden pressure ○ Preconsolidation pressure

	Phenomena/ problems	○ Permafrost
		○ Frost heaving
		○ Consolidation
		○ Compaction
		○ Earthquake
		  ○ Response spectrum
		  ○ Seismic hazard
		  ○ Shear wave
		○ Landslide analysis
		  ○ Stability analysis
		  ○ Mitigation
		  ○ Classification
		  ○ Sliding criterion
		  ○ Slab stabilisation
		○ Bearing capacity * Stress distribution in soil

Numerical analysis software	○ SEEP2D ○ STABL ○ SVFlux ○ SVSlope ○ UTEXAS ○ Plaxis	

Related fields

- Geology
- Geochemistry
- Petrology
- Earthquake engineering
- Geomorphology
- Soil science
- Hydrology
- Hydrogeology
- Biogeography
- Earth materials
- Archaeology
- Agricultural science
  - Agrology

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About soil compaction

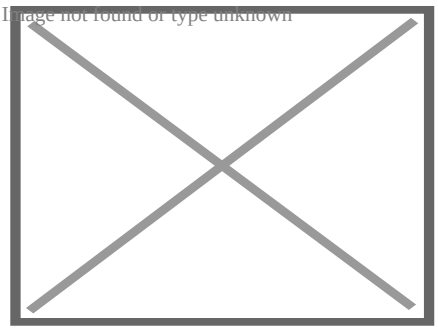
For soil compaction in agriculture and compaction effects on soil biology, see soil compaction (agriculture), for natural compaction on a geologic scale, see compaction (geology); for consolidation near the surface, see consolidation (soil).

In geotechnical engineering, **soil compaction** is the process in which stress applied to a soil causes densification as air is displaced from the pores between the soil grains. When stress is applied that causes densification due to water (or other liquid) being displaced from between the soil grains, then consolidation, not compaction, has occurred. Normally, compaction is the result of heavy machinery compressing the soil, but it can also occur due to the passage of, for example, animal feet.

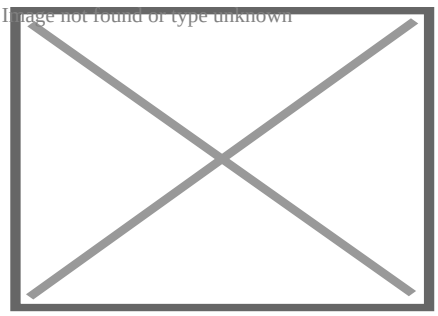
In soil science and agronomy, **soil compaction** is usually a combination of both engineering compaction and consolidation, so may occur due to a lack of water in the soil, the applied stress being internal suction due to water evaporation[1] as well as due to passage of animal feet. Affected soils become less able to absorb rainfall, thus increasing runoff and erosion. Plants have difficulty in compacted soil because the mineral grains are pressed together, leaving little space for air and water, which are essential for root growth. Burrowing animals also find it a hostile environment, because the denser soil is more difficult to penetrate. The ability of a soil to recover from this type of compaction depends on climate, mineralogy and

fauna. Soils with high shrink–swell capacity, such as vertisols, recover quickly from compaction where moisture conditions are variable (dry spells shrink the soil, causing it to crack). But clays such as kaolinite, which do not crack as they dry, cannot recover from compaction on their own unless they host ground-dwelling animals such as earthworms—the Cecil soil series is an example.

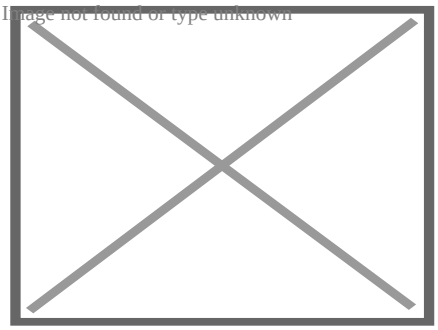
Before soils can be compacted in the field, some laboratory tests are required to determine their engineering properties. Among various properties, the maximum dry density and the optimum moisture content are vital and specify the required density to be compacted in the field.[2]



A 10 tonne excavator is here equipped with a narrow sheepsfoot roller to compact the fill over newly placed sewer pipe, forming a stable support for a new road surface.



A compactor/roller fitted with a sheepsfoot drum, operated by U.S. Navy Seabees



Vibrating roller with plain drum as used for compacting asphalt and granular soils

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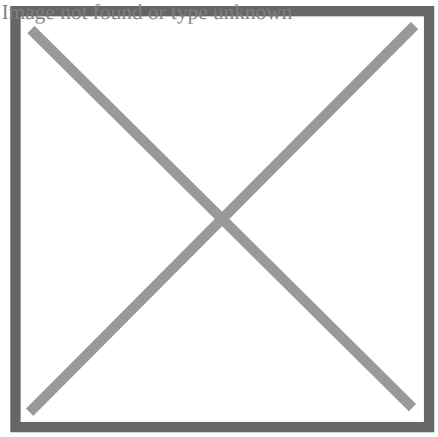


Vibratory rammer in action

In construction

[edit]

Soil compaction is a vital part of the construction process. It is used for support of structural entities such as building foundations, roadways, walkways, and earth retaining structures to name a few. For a given soil type certain properties may deem it more or less desirable to perform adequately for a particular circumstance. In general, the preselected soil should have adequate strength, be relatively incompressible so that future settlement is not significant, be stable against volume change as water content or other factors vary, be durable and safe against deterioration, and possess proper permeability.[3]

When an area is to be filled or backfilled the soil is placed in layers called lifts. The ability of the first fill layers to be properly compacted will depend on the condition of the natural material being covered. If unsuitable material is left in place and backfilled, it may compress over a long period under the weight of the earth fill, causing settlement cracks in the fill or in any structure supported by the fill.[4] In order to determine if the natural soil will support the first fill layers, an area can be proofrolled. Proofrolling consists of utilizing a piece of heavy construction equipment to roll across the fill site and watching for deflections to be revealed. These areas will be indicated by the development of rutting, pumping, or ground weaving.[5]

To ensure adequate soil compaction is achieved, project specifications will indicate the required soil density or degree of compaction that must be achieved. These specifications are generally recommended by a geotechnical engineer in a geotechnical engineering report.

The soil type—that is, grain-size distributions, shape of the soil grains, specific gravity of soil solids, and amount and type of clay minerals, present—has a great influence on the maximum dry unit weight and optimum moisture content.[6] It also has a great influence on how the materials should be compacted in given situations. Compaction is accomplished by use of heavy equipment. In sands and gravels, the equipment usually vibrates, to cause re-orientation of the soil particles into a denser configuration. In silts and clays, a sheepsfoot

roller is frequently used, to create small zones of intense shearing, which drives air out of the soil.

Determination of adequate compaction is done by determining the in-situ density of the soil and comparing it to the maximum density determined by a laboratory test. The most commonly used laboratory test is called the Proctor compaction test and there are two different methods in obtaining the maximum density. They are the **standard Proctor** and **modified Proctor** tests; the modified Proctor is more commonly used. For small dams, the standard Proctor may still be the reference.[5]

While soil under structures and pavements needs to be compacted, it is important after construction to decompact areas to be landscaped so that vegetation can grow.

Compaction methods

[edit]

There are several means of achieving compaction of a material. Some are more appropriate for soil compaction than others, while some techniques are only suitable for particular soils or soils in particular conditions. Some are more suited to compaction of non-soil materials such as asphalt. Generally, those that can apply significant amounts of shear as well as compressive stress, are most effective.

The available techniques can be classified as:

1. Static – a large stress is slowly applied to the soil and then released.
2. Impact – the stress is applied by dropping a large mass onto the surface of the soil.
3. Vibrating – a stress is applied repeatedly and rapidly via a mechanically driven plate or hammer. Often combined with rolling compaction (see below).
4. Gyrating – a static stress is applied and maintained in one direction while the soil is a subjected to a gyratory motion about the axis of static loading. Limited to laboratory applications.
5. Rolling – a heavy cylinder is rolled over the surface of the soil. Commonly used on sports pitches. Roller-compactors are often fitted with vibratory devices to enhance their effectiveness.
6. Kneading – shear is applied by alternating movement in adjacent positions. An example, combined with rolling compaction, is the 'sheepsfoot' roller used in waste compaction at landfills.

The construction plant available to achieve compaction is extremely varied and is described elsewhere.

Test methods in laboratory

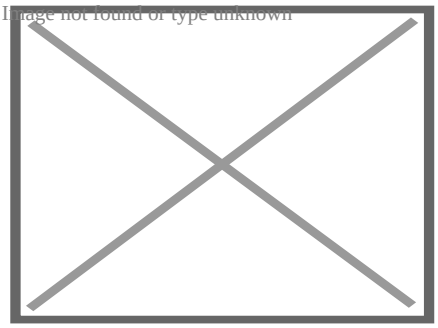
[edit]

Soil compactors are used to perform test methods which cover laboratory compaction methods used to determine the relationship between molding water content and dry unit weight of soils. Soil placed as engineering fill is compacted to a dense state to obtain satisfactory engineering properties such as, shear strength, compressibility, or permeability. In addition, foundation soils are often compacted to improve their engineering properties. Laboratory compaction tests provide the basis for determining the percent compaction and molding water content needed to achieve the required engineering properties, and for controlling construction to assure that the required compaction and water contents are achieved. Test methods such as EN 13286-2, EN 13286-47, ASTM D698, ASTM D1557, AASHTO T99, AASHTO T180, AASHTO T193, BS 1377:4 provide soil compaction testing procedures.[7]

See also

[edit]

- Soil compaction (agriculture)
- Soil degradation
- Compactor
- Earthwork
- Soil structure
- Aeration
- Shear strength (soil)



Multiquip RX1575 Rammax Sheepsfoot Trench Compaction Roller on the jobsite in San Diego, California

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[edit]

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Geotechnical engineering

Offshore geotechnical engineering

Investigation and instrumentation

Field (*in situ*)

- Core drill
- Cone penetration test
- Geo-electrical sounding
- Permeability test
- Load test
  - Static
  - Dynamic
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- Pore pressure measurement
  - Piezometer
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		  ○ Mitigation
		  ○ Classification
		  ○ Sliding criterion
		  ○ Slab stabilisation
		○ Bearing capacity * Stress distribution in soil

Numerical analysis software	○ SEEP2D ○ STABL ○ SVFlux ○ SVSlope ○ UTEXAS ○ Plaxis	

Related fields

- Geology
- Geochemistry
- Petrology
- Earthquake engineering
- Geomorphology
- Soil science
- Hydrology
- Hydrogeology
- Biogeography
- Earth materials
- Archaeology
- Agricultural science
  - Agrology

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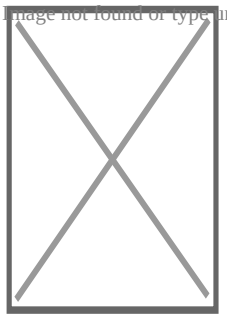
Soil science

- History
- Index

Main fields

- Pedology
- Edaphology
- Soil biology
- Soil microbiology
- Soil zoology
- Soil ecology
- Soil physics
- Soil mechanics
- Soil chemistry
- Environmental soil science
- Agricultural soil science



Soil topics

- Soil
- Pedosphere
  - Soil morphology
  - Pedodiversity
  - Soil formation
- Soil erosion
- Soil contamination
- Soil retrogression and degradation
- Soil compaction
  - Soil compaction (agriculture)
- Soil sealing
- Soil salinity
  - Alkali soil
- Soil pH
  - Soil acidification
- Soil health
- Soil life
- Soil biodiversity
- Soil quality
- Soil value
- Soil fertility
- Soil resilience
- Soil color
- Soil texture
- Soil structure
  - Pore space in soil
  - Pore water pressure
- Soil crust
- Soil horizon
- Soil biomantle
- Soil carbon
- Soil gas
  - Soil respiration
- Soil organic matter
- Soil moisture
  - Soil water (retention)

- **v**
- **t**
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Soil classification

World Reference Base for Soil Resources (1998–)	○ Acrisols ○ Alisols ○ Andosols ○ Anthrosols ○ Arenosols ○ Calcisols ○ Cambisols ○ Chernozem ○ Cryosols ○ Durisols ○ Ferralsols ○ Fluvisols ○ Gleysols ○ Gypsisols ○ Histosol ○ Kastanozems ○ Leptosols ○ Lixisols ○ Luvisols ○ Nitisols ○ Phaeozems ○ Planosols ○ Plinthosols ○ Podzols ○ Regosols ○ Retisols ○ Solonchaks ○ Solonetz ○ Stagnosol ○ Technosols ○ Umbrisols ○ Vertisols
USDA soil	○ Alfisols ○ Andisols ○ Aridisols ○ Entisols ○ Gelisols ○ Histosols

Applications

- Soil conservation
- Soil management
- Soil guideline value
- Soil survey
- Soil test
- Soil governance
- Soil value
- Soil salinity control
- Erosion control
- Agroecology
- Liming (soil)

Related fields

- Geology
- Geochemistry
- Petrology
- Geomorphology
- Geotechnical engineering
- Hydrology
- Hydrogeology
- Biogeography
- Earth materials
- Archaeology
- Agricultural science
  - Agrology

Societies, Initiatives

- Australian Society of Soil Science Incorporated
- Canadian Society of Soil Science
- Central Soil Salinity Research Institute (India)
- German Soil Science Society
- Indian Institute of Soil Science
- International Union of Soil Sciences
- International Year of Soil
- National Society of Consulting Soil Scientists (US)
- OPAL Soil Centre (UK)
- Soil Science Society of Poland
- Soil and Water Conservation Society (US)
- Soil Science Society of America
- World Congress of Soil Science

Scientific journals	○ *Acta Agriculturae Scandinavica B* ○ *Journal of Soil and Water Conservation* ○ *Plant and Soil* ○ *Pochvovedenie* ○ *Soil Research* ○ *Soil Science Society of America Journal*
See also	○ Land use ○ Land conversion ○ Land management ○ Vegetation ○ Infiltration (hydrology) ○ Groundwater ○ Crust (geology) ○ Impervious surface/Surface runoff ○ Petrichor

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About Cook County

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Things To Do in Cook County

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Sand Ridge Nature Center

4.8 (96)

Photo

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River Trail Nature Center

4.6 (235)

Photo

Palmisano (Henry) Park

4.7 (1262)

Driving Directions in Cook County

Driving Directions From Palmisano (Henry) Park to

Driving Directions From Lake Katherine Nature Center and Botanic Gardens to

Driving Directions From Navy Pier to

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Reviews for

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Jeffery James

(5)

Very happy with my experience. They were prompt and followed through, and very helpful in fixing the crack in my foundation.

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Sarah McNeily

(5)

USS was excellent. They are honest, straightforward, trustworthy, and conscientious. They thoughtfully removed the flowers and flower bulbs to dig where they needed in the yard, replanted said flowers and spread the extra dirt to fill in an area of the yard. We've had other services from different companies and our yard was really a mess after. They kept the job site meticulously clean. The crew was on time and friendly. I'd recommend them any day! Thanks to Jessie and crew.

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Jim de Leon

(5)

It was a pleasure to work with Rick and his crew. From the beginning, Rick listened to my concerns and what I wished to accomplish. Out of the 6 contractors that quoted the project, Rick seemed the MOST willing to accommodate my wishes. His pricing was definitely more than fair as well. I had 10 push piers installed to stabilize and lift an addition of my house. The project commenced at the date that Rick had disclosed initially and it was completed within the same time period expected (based on Rick's original assessment). The crew was well informed, courteous, and hard working. They were not loud (even while equipment was being utilized) and were well spoken. My neighbors were very impressed on how polite they were when they entered / exited my property (saying hello or good morning each day when they crossed paths). You can tell they care about the customer concerns. They ensured that the property would be put back as clean as possible by placing MANY sheets of plywood down prior to excavating. They compacted the dirt back in the holes extremely well to avoid large stock piles of soils. All the while, the main office was calling me to discuss updates and expectations of completion. They provided waivers of lien, certificates of insurance, properly acquired permits, and JULIE locates. From a construction background, I can tell you that I did not see any flaws in the way they operated and this an extremely professional company. The pictures attached show the push piers added to the foundation (pictures 1, 2 & 3), the amount of excavation (picture 4), and the restoration after dirt was placed back in the pits and compacted (pictures 5, 6 & 7). Please notice that they also sealed two large cracks and steel plated these cracks from expanding further (which you can see under my sliding glass door). I, as well as my wife, are extremely happy that we chose United Structural Systems for our contractor. I would happily tell any of my friends and family to use this contractor should the opportunity arise!

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Chris Abplanalp

(5)

USS did an amazing job on my underpinning on my house, they were also very courteous to the proximity of my property line next to my neighbor. They kept things in order with all the dirt/mud they had to excavate. They were done exactly in the timeframe they indicated, and the contract was very details oriented with drawings of what would be done. Only thing that would have been nice, is they left my concrete a little muddy with boot prints but again, all-in-all a great job

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Dave Kari

(5)

What a fantastic experience! Owner Rick Thomas is a trustworthy professional. Nick and the crew are hard working, knowledgeable and experienced. I interviewed every company in the area, big and small. A homeowner never wants to hear that they have foundation issues. Out of every company, I trusted USS the most, and it paid off in the end. Highly recommend.

Tracking Water Intrusion as a Contributor to Structural DamageView GBP

Frequently Asked Questions

If you find water intrusion, what steps will you take to *stop* it and prevent further damage, beyond just repairing the cracks?

Identify the source, then implement waterproofing, drainage, sump pumps, or grading solutions.

United Structural Systems of Illinois, Inc

Phone : +18473822882

City : Hoffman Estates

State : IL

Zip : 60169

Address : 2124 Stonington Ave

Google Business Profile

Company Website : https://www.unitedstructuralsystems.com/

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