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
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*** Understanding Concrete Floor Cracks: A Homeowner's Perspective.**

Okay, so you're walking through your house, maybe grabbing a snack or heading to the couch, and *bam*, there it is. Moisture levels should be monitored to prevent future foundation issues foundation repair expert service steel. A crack. In your concrete floor. Not a good feeling, right? It's easy to panic and imagine your house crumbling around you, but before you start selling the furniture, let's talk about understanding those cracks from a homeowner's point of view.

The thing is, concrete isn't some indestructible magical substance. It's going to move. It's going to settle. And sometimes, that movement shows up as cracks. Recognizing them is the first step. We're not talking about hairline fractures; those are pretty common and often just cosmetic. We're talking about actual cracks, maybe ones you can feel with your toe, or ones that seem to be getting wider.

And it's not just the cracks themselves, but also any shifts or unevenness in the floor. Is one section of the floor suddenly higher or lower than the rest? Are you noticing a new slope where there wasn't one before? These shifts can be even more concerning than the cracks themselves, as they can indicate more significant movement in the foundation.

Think about where the cracks are. Are they near a wall? Running across the middle of a room? The location can offer clues about the cause. Cracks near walls can be related to settling of the foundation, while those in the middle might be from shrinkage during the curing process or heavy loads.

So, what's the point of recognizing all this? It's about being informed. It's about understanding the difference between something that's probably normal and something that might need a professional's attention. Because let's face it, as homeowners, we need to be proactive. Spotting potential problems early can save us a lot of headaches (and money) down the road. Seeing a crack doesn't automatically mean disaster, but recognizing it, understanding its characteristics, and then deciding whether it warrants further investigation is all part of responsible homeownership.

*** Types of Cracks Requiring Professional Residential Foundation Repair.**

Okay, so you're walking around your house, maybe doing some spring cleaning, and you glance down at your concrete floor. And…crap. A crack. Or maybe a whole bunch of them. Before you panic and start budgeting for a new house, let's talk about which cracks actually scream "call a foundation expert, like, yesterday" and which ones are just kinda...meh.

Think of it like this: concrete is tough, but it's not invincible. It expands and contracts with the weather, and your house is constantly settling. Hairline cracks, the super-tiny, barely-there ones? Those are usually just cosmetic. They're annoying, sure, but they generally don't mean your house is about to crumble. You can often fill those in yourself with some concrete crack filler.

But then there are the cracks that are red flags. Big, honking, "oh no" cracks. We're talking about cracks that are wider than, say, a quarter of an inch. Especially if they're uneven, meaning one side of the crack is higher than the other. That's a sign of differential settling, where different parts of your foundation are sinking at different rates. Not good.

Another type to watch out for are cracks that run diagonally across your floor. These often indicate structural movement and can be related to foundation issues. Also, pay attention to cracks that are getting bigger over time. Put a pencil mark at the end of the crack and date it. Check back in a few weeks or months. If the crack has extended past your mark, that's a sign it's actively growing and likely needs professional attention.

Finally, and this is a big one, if you see cracks in your concrete floor *combined* with other issues, like doors or windows that are sticking, walls that are noticeably bowed, or even just a general feeling that the house isn't quite "square" anymore, then you absolutely need to call a foundation specialist. These are all clues that point to a larger, underlying problem with your foundation.

Bottom line? A few hairline cracks? Probably okay. Large, uneven, growing, diagonal cracks, especially when paired with other structural oddities? Time to get a professional opinion. It's better to be safe than sorry when it comes to your home's foundation. Ignoring a serious issue can lead to much bigger (and much more expensive) problems down the road.

*** Identifying Shifts and Unevenness in Concrete Floors.**

Hey, so you're trying to figure out what's up with your concrete floor, huh? Specifically, you're looking at cracks and, more worryingly, shifts and unevenness. Let's talk about those shifts and uneven spots – they're a bit more concerning than a simple hairline crack, and here's why.

Think of it like this: a small crack might just be the concrete flexing its muscles a bit, settling over time. But a shift or unevenness? That's like the muscle tearing, or the whole foundation groaning. It suggests something more substantial is going on underneath.

Identifying these shifts isn't always easy. Sometimes it's obvious – you stub your toe on a raised edge, or you see a clear dip in the floor. Other times, it's more subtle. You might notice furniture rocking slightly, even though the legs are level. Or maybe a door that used to swing freely now catches on the floor. A marble or ball rolling in a direction it shouldn't is a good, low-tech way to spot subtle slopes.

Unevenness can also show up as changes in the height of the floor relative to walls or other structures. Is the floor suddenly higher or lower than the baseboard in a certain area? That's a red flag.

What causes this stuff? Well, it's usually about what's happening beneath the concrete. Soil shifting, settling, or even being washed away can lead to these problems. Poor drainage, tree roots, or just the natural compacting of the earth over decades can all play a role. Sometimes, it's related to the original construction – maybe the soil wasn't properly compacted before the concrete was poured.

The important thing is that if you spot these shifts and uneven areas, don't ignore them. While a small crack might be cosmetic, unevenness often points to a structural issue that could worsen over time. It's a good idea to get a professional to take a look and figure out the underlying cause. Ignoring it could lead to bigger problems down the road, and that's definitely something you want to avoid.

*** Potential Causes of Concrete Floor Damage in Residential Settings.**

Recognizing Cracks and Shifts in Concrete Floors: Potential Causes of Concrete Floor Damage in Residential Settings

You're walking across your living room, maybe barefoot, and suddenly you feel it – a slight dip, a hairline fracture under your toe. Or perhaps you glance down and notice a crack snaking its way across the concrete slab. These aren't just cosmetic issues; they're whispers, subtle clues that something might be amiss beneath the surface. Before you panic and start envisioning a total foundation collapse, let's explore some potential causes of concrete floor damage in residential settings. Understanding these culprits can help you assess the severity of the problem and determine the best course of action.

One of the most common offenders is simple settling. Our homes, even relatively new ones, are constantly adjusting to the earth beneath them. Soil compacts, shifts due to water content changes, and this movement can exert pressure on the concrete slab. Hairline cracks, often appearing shortly after construction, are frequently the result of this natural settling process. While usually not structurally significant, monitoring them for widening is crucial.

Speaking of water, it plays a significant, often destructive, role. Excessive moisture in the soil can lead to expansion and contraction, putting stress on the concrete. Poor drainage around the foundation, leaky pipes, or even just consistently heavy rainfall can all contribute to this problem. Conversely, extremely dry conditions can cause the soil to shrink, creating voids beneath the slab and leading to cracking and unevenness.

Then there's the matter of the concrete mix itself. If the original mixture was improperly proportioned – too much water, insufficient cement, or the wrong type of aggregate – the resulting slab may be inherently weaker and more prone to cracking. Similarly, inadequate curing during the initial setting process can compromise the concrete's strength and durability.

Finally, consider the loads placed upon the floor. While a residential concrete slab is designed to withstand a reasonable amount of weight, excessive point loads – think of a heavily loaded bookshelf concentrated on a small area – can exceed its capacity and lead to localized cracking or sinking. Similarly, significant vibrations from nearby construction or heavy machinery can also contribute to damage over time.

Recognizing cracks and shifts is the first step. By understanding these potential causes, you can start to piece together the puzzle and determine whether the issue is a minor cosmetic flaw or a sign of a more serious underlying problem that requires professional attention. Don't ignore those whispers from your floor; they might be telling you something important.

*** When to Contact a Foundation Repair Specialist: Red Flags.**

Okay, so you're strolling through your house, maybe barefoot, maybe just admiring your handiwork (or lack thereof), and you notice something...off. That perfectly smooth concrete floor you remember seems to have sprouted a crack. Or maybe that gentle slope you always attributed to your imagination is, well, still there, but maybe a little *more* there. That's when the little alarm bells in your head should start to tingle.

Recognizing cracks and shifts in your concrete floor is like deciphering a secret code your house is trying to tell you. Not all cracks are created equal. Hairline cracks, those tiny little guys that look like someone drew on the floor with a very fine pencil, are usually just cosmetic. They happen as the concrete cures and shrinks, and most of the time, you can fill 'em and forget 'em.

But. Big but here. If you're seeing cracks that are wider than, say, a quarter of an inch, or if they're jagged, or if they're accompanied by one side of the crack being higher than the other (that's the "shift" part we're talking about), then Houston, we might have a problem.

Think of it like this: your concrete floor isn't just sitting there. It's the foundation for everything else. If it's cracking and shifting, it suggests the ground underneath is moving, settling unevenly, or experiencing some kind of pressure it wasn't designed to handle. That could be due to poor drainage, expansive soil, or, worst case scenario, a foundation problem brewing.

Ignoring these bigger, more noticeable cracks is like ignoring a toothache. It might start as a little twinge, but left untreated, it can turn into a root canal nightmare. The same goes for your foundation. A small crack now could lead to major structural issues down the road, costing you a whole lot more time, money, and stress. So, those red flags? Those are your house's way of saying, "Hey, it's time to call in the professionals." Don't ignore them. Your wallet (and your house) will thank you.

*** The Role of Soil and Drainage in Concrete Floor Stability.**

Okay, so you're checking out your concrete floor and you see a crack. Or maybe the whole thing looks like it's shifted a bit. Before you panic about a major structural disaster, let's talk about what might be going on beneath the surface, literally. I'm talking about the soil underneath and how well your floor is draining. Because believe it or not, those two things play a HUGE role in whether your concrete floor stays put or starts acting up.

Think of your concrete slab as a boat. That boat needs stable water to float on, right? Well, the soil is that "water." If the soil is uneven, poorly compacted, or just plain unstable, your concrete floor is going to feel it. Imagine building a house on sand – it's going to shift and settle. The same principle applies here. Soil that expands and contracts with moisture changes can put a ton of stress on the concrete. Clay soils are notorious for this. They swell when wet and shrink when dry, leading to cracks and movement in the slab above. Proper soil preparation, including compaction and sometimes even soil replacement, is crucial *before* the concrete is ever poured.

Then there's drainage. Picture this: you've got water constantly pooling around the foundation of your house. That water eventually seeps into the soil, saturating it. This saturation can weaken the soil's supporting capacity and, again, lead to movement. Poor drainage can also cause hydrostatic pressure, which is basically water pushing upwards on the underside of the slab. Over time, this pressure can crack the concrete or even lift sections of it. Gutters that aren't diverting water properly, landscaping that slopes towards the foundation, or even just poor grading around the house can all contribute to drainage problems.

So, when you're looking at those cracks and shifts, don't just focus on the concrete itself. Take a look around. Is there standing water near the foundation after it rains? Is the ground sloping towards the house? Are your gutters clean and functioning? These are all clues that can help you figure out if the soil and drainage are the culprits behind your concrete woes. Addressing these underlying issues is often the key to preventing further damage and ensuring the long-term stability of your concrete floor. Ignoring them is like trying to patch a leaky boat without fixing the hole – it's just a temporary fix that won't solve the real problem.

*** Foundation Repair Solutions for Cracked or Shifting Concrete Floors.**

Okay, so you've got cracks in your concrete floor, maybe even some shifting going on. That sinking feeling in your stomach? I get it. It's not just about aesthetics; it's about the stability of your whole house. But before you panic and start picturing your home sliding into the earth, let's talk about recognizing what's going on.

First off, not all cracks are created equal. Think of them like wrinkles – some are just signs of aging, others are a signal something deeper is happening. Hairline cracks, the super thin ones, are pretty common, especially in new concrete as it cures. Usually, they're not a huge concern. But if you see cracks wider than, say, an eighth of an inch, or if they're jagged and uneven, that's when you need to pay closer attention.

Then there's the shifting. Does a door suddenly stick? Are windows harder to open or close? Look at where the floor meets the walls. Are there gaps that weren't there before? These are all clues that your foundation might be moving. Sometimes, it's subtle; other times, it's pretty obvious – a noticeable slope in the floor, for example.

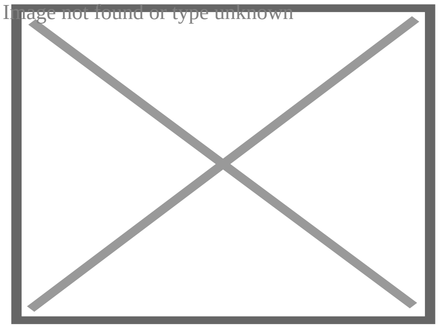
Don't just rely on your eyes, though. Feel the floor. Is there a dip in one area compared to another? Get down on your hands and knees (yes, really!) and shine a flashlight across the surface. This will highlight any unevenness you might miss standing up.

And finally, keep an eye on things over time. Take pictures of the cracks. Measure the width of the cracks if you can. Note any changes in the shifting. This will give you a baseline and help you track whether the problem is getting worse.

Recognizing these signs early is key. The sooner you address foundation issues, the better the chances of finding a cost-effective repair solution and preventing further damage. So, walk around, take a good look, and trust your gut. If something feels off, it probably is.

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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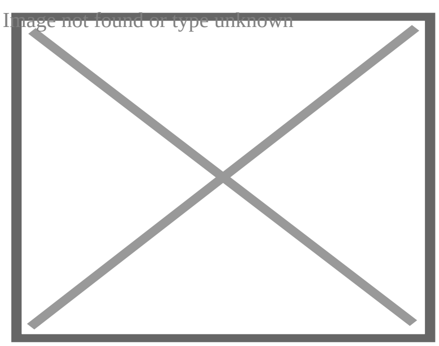

Man painting a fence

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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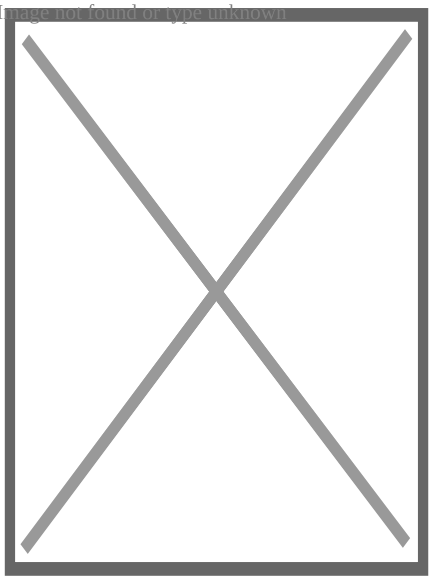

Screws and bolts in an OBI home improvement store in Poland

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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[edit]

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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

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

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About home inspection

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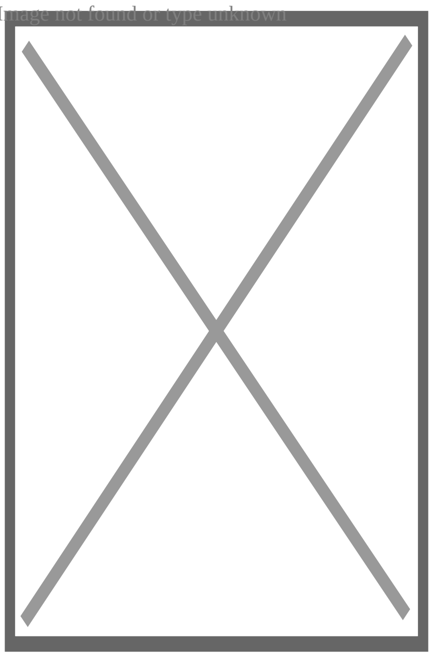

A disaster inspector at work in the United States assessing tornado damage to a house

A **home inspection** is a limited, non-invasive examination of the condition of a home, often in connection with the sale of that home. Home inspections are usually conducted by a **home inspector** who has the training and certifications to perform such inspections. The inspector prepares and delivers to the client a written report of findings. In general, home inspectors recommend that potential purchasers join them during their onsite visits to provide context for the comments in their written reports. The client then uses the knowledge gained to make informed decisions about their pending real estate purchase. The home inspector describes the condition of the home at the time of inspection but does not guarantee future condition, efficiency, or life expectancy of systems or components.

Sometimes confused with a real estate appraiser, a home inspector determines the condition of a structure, whereas an appraiser determines the value of a property. In the United States, although not all states or municipalities regulate home inspectors, there are various professional associations for home inspectors that provide education, training, and networking opportunities. A professional home inspection is an examination of the current condition of a house. It is not an inspection to verify compliance with appropriate codes; building inspection is a term often used for building code compliance inspections in the United States. A similar but more complicated inspection of commercial buildings is a property condition assessment. Home inspections identify problems but building diagnostics identifies solutions to the found problems and their predicted outcomes. A property inspection is a detailed visual documentation of a property's structures, design, and fixtures. Property Inspection provides a buyer, renter, or other information consumer with valuable insight into the property's conditions prior to purchase. House-hunting can be a difficult task especially when you can't seem to find one that you like. The best way to get things done is to ensure that there is a property inspection before buying a property.

North America

[edit]

In Canada and the United States, a contract to purchase a house may include a contingency that the contract is not valid until the buyer, through a home inspector or other agents, has had an opportunity to verify the condition of the property. In many states and provinces, home inspectors are required to be licensed, but in some states, the profession is not regulated. Typical requirements for obtaining a license are the completion of an approved training course and/or a successful examination by the state's licensing board. Several states and provinces also require inspectors to periodically obtain continuing education credits in order to renew their licenses.[*citation need*
Unless specifically advertised as part of the home inspection, items often needed to satisfy mortgage or tile requirements such as termite ("pest") inspections must be obtained separately from licensed and regulated companies.

In May 2001, Massachusetts became the first state to recognize the potential conflict of interest when real estate agents selling a home also refer or recommend the home inspector to the potential buyer.[*citation needed*] As a result, the real estate licensing law in Massachusetts was amended[1][*non-primary source needed*] to prohibit listing real estate agents from directly referring home inspectors. The law also prohibits listing agents from giving out a "short" name list of inspectors. The only list that can be given out is the complete list of all licensed home inspectors in the state.

In September 2018, the California state legislature passed Senate Bill 721 (SB 721),[2] which requires buildings with specific conditions, such as having exterior elevated structures, to undergo inspections by licensed professionals. These inspections must be conducted by qualified individuals, such as structural engineering firms,[3] and a detailed report must be issued. Failure to comply with these requirements can result in penalties for property owners.

Ancillary services such as inspections for wood destroying insects, radon testing, septic tank inspections, water quality, mold, (or excessive moisture which may lead to mold), and private well inspections are sometimes part of home inspector's services if duly qualified.

In many provinces and states, home inspection standards are developed and enforced by professional associations, such as, worldwide, the International Association of Certified Home Inspectors (InterNACHI); in the United States, the American Society of Home Inspectors (ASHI), and the National Association of Home Inspectors (NAHI)(No Longer active 10/2017); and, in Canada, the Canadian Association of Home and Property Inspectors (CAHPI), the Professional Home & Property Inspectors of Canada (PHPIC) and the National Home Inspector Certification Council (NHICC).

Currently, more than thirty U.S. states regulate the home inspection industry in some form.

Canada saw a deviation from this model when in 2016 an association-independent home inspection standard was completed. This was developed in partnership with industry professionals, consumer advocates, and technical experts, by the Canadian Standards Association. The CAN/CSA A770-16 Home Inspection Standard was funded by three provincial governments with the intent to be the unifying standard for home inspections carried out within Canada. It is the only home inspection standard that has been endorsed by the Standards Council of Canada.

In Canada, there are provincial associations which focus on provincial differences that affect their members and consumers. Ontario has the largest population of home inspectors which was estimated in 2013 as part of a government survey at being around 1500.[4]

To date, Ontario Association of Certified Home Inspectors is the only association which has mandated that its members migrate to the CAN/CSA A770-16 Home Inspection Standard, with a date of migration set as February 28, 2020. Other national and provincial associations have set it as an option to be added to other supported standards.

In Canada, only Alberta and British Columbia have implemented government regulation for the home inspection profession. The province of Ontario has proceeded through the process, with the passage of regulatory procedure culminating in the Home Inspection Act, 2017 to license Home Inspectors in that province. It has received royal assent but is still awaiting the development of regulations and proclamation to become law.

In Ontario, there are two provincial Associations, OAHI (the Ontario Association of Home Inspectors) and OntarioACHI (the Ontario Association of Certified Home Inspectors). Both claim to be the largest association in the province. OAHI, formed by a private member's Bill in the

Provincial Assembly, has the right in law to award the R.H.I. (Registered Home Inspector) designation to anyone on its membership register. The R.H.I. designation, however, is a reserved designation, overseen by OAHI under the Ontario Association of Home Inspectors Act, 1994. This Act allows OAHI to award members who have passed and maintained strict criteria set out in their membership bylaws and who operate within Ontario. Similarly, OntarioACHI requires equally high standards for the award of their certification, the Canadian-Certified Home Inspector (CCHI) designation. To confuse things, Canadian Association of Home and Property Inspectors (CAHPI) own the copyright to the terms Registered Home Inspector and RHI. Outside of Ontario, OAHI Members cannot use the terms without being qualified by CAHPI.

The proclamation of the Home Inspection Act, 2017, requires the dissolution of the Ontario Association of Home Inspectors Act, 1994, which will remove the right to title in Ontario of the RHI at the same time removing consumer confusion about the criteria for its award across Canada.

United Kingdom

[edit]

A home inspector in the United Kingdom (or more precisely in England and Wales), was an inspector certified to carry out the Home Condition Reports that it was originally anticipated would be included in the Home Information Pack.

Home inspectors were required to complete the ABBE Diploma in Home Inspection to show they met the standards set out for NVQ/VRQ competency-based assessment (Level 4). The government had suggested that between 7,500 and 8,000 qualified and licensed home inspectors would be needed to meet the annual demand of nearly 2,000,000 Home Information Packs. In the event, many more than this entered training, resulting in a massive oversupply of potential inspectors.

With the cancellation of Home Information Packs by the coalition Government in 2010, the role of the home inspector in the United Kingdom became permanently redundant.

Inspections of the home, as part of a real estate transaction, are still generally carried out in the UK in the same manner as they had been for years before the Home Condition Report process. Home Inspections are more detailed than those currently offered in North America. They are generally performed by a chartered member of the Royal Institution of Chartered Surveyors.

India

[edit]

The concept of home inspection in India is in its infancy. There has been a proliferation of companies that have started offering the service, predominantly in Tier-1 cities such as Bangalore, Chennai, Kolkata, Pune, Mumbai, etc. To help bring about a broader understanding among the general public and market the concept, a few home inspection companies have come together and formed the Home Inspection Association of India.[5]

After RERA came into effect, the efficacy and potency of home inspection companies has increased tremendously. The majority of homeowners and potential home buyers do not know what home inspection is or that such a service exists.

The way that home inspection is different in India[6] than in North America or United Kingdom is the lack of a government authorised licensing authority. Apart from the fact that houses in India are predominantly built with kiln baked bricks, concrete blocks or even just concrete walls (predominantly in high rise apartments) this means the tests conducted are vastly different. Most home inspection companies conduct non-destructive testing of the property, in some cases based on customer requirement, tests that require core-cutting are also performed.

The majority of homeowners are not aware of the concept of home inspection in India. The other issue is that the balance of power is highly tilted toward the builder; this means the home buyers are stepping on their proverbial toes, because in most cases, the home is the single most expensive purchase in their lifetime, and the homeowners do not want to come across as antagonising the builders.

Home inspection standards and exclusions

[edit]

Some home inspectors and home inspection regulatory bodies maintain various standards related to the trade. Some inspection companies offer 90-day limited warranties to protect clients from unexpected mechanical and structural failures; otherwise, inspectors are not responsible for future failures.[a] A general inspection standard for buildings other than residential homes can be found at the National Academy of Building Inspection Engineers.

Many inspectors may also offer ancillary services such as inspecting pools, sprinkler systems, checking radon levels, and inspecting for wood-destroying organisms. The CAN/CSA-A770-16 standard allows this (in-fact it demands swimming pool safety inspections as a requirement) and also mandates that the inspector be properly qualified to offer these. Other standards are silent on this.

Types of inspections

[edit]

Home buyers and home sellers inspections

[edit]

Home inspections are often used by prospective purchasers of the house in question, in order to evaluate the condition of the house prior to the purchase. Similarly, a home seller can elect to have an inspection on their property and report the results of that inspection to the prospective buyer.

Foreclosure inspection

[edit]

Recently foreclosed properties may require home inspections.

Four point inspection

[edit]

An inspection of the house's roof, HVAC, and electrical and plumbing systems is often known as a "four-point inspection", which insurance companies may require as a condition for homeowner's insurance.

Disaster inspection

[edit]

Home inspections may occur after a disaster has struck the house. A disaster examination, unlike a standard house inspection, concentrates on damage rather than the quality of everything visible and accessible from the roof to the basement.

Inspectors go to people's homes or work places who have asked for FEMA disaster aid.

Section 8 inspection

[edit]

In the United States, the federal and state governments provide housing subsidies to low-income people through the Section 8 program. The government expects that the housing will be "fit for habitation" so a Section 8 inspection identifies compliance with HUD's Housing Quality Standards (HQS).

Pre-delivery inspection

[edit]
See also: Pre-delivery inspection

An inspection may occur in a purchased house prior to the deal's closure, in what is known as a "pre-delivery" inspection.

Structural inspection

[edit]

The house's structure may also be inspected. When performing a structural inspection, the inspector will look for a variety of distress indications that may result in repair or further evaluation recommendations.

In the state of New York, only a licensed professional engineer or a registered architect can render professional opinions as to the sufficiency structural elements of a home or building.[11] Municipal building officials can also make this determination, but they are not performing home inspections at the time they are rendering this opinion. Municipal officials are also not required to look out for the best interest of the buyer. Some other states may have similar provisions in their licensing laws. Someone who is not a licensed professional engineer or a registered architect can describe the condition of structural elements (cracked framing, sagged beams/roof, severe rot or insect damage, etc.), but are not permitted to render a professional opinion as to how the condition has affected the structural soundness of the building.

Various systems of the house, including plumbing and HVAC, may also be inspected.[12]

Thermal imaging Inspection

[edit]

A thermal imaging inspection using an infrared camera can provide inspectors with information on home energy loss, heat gain/loss through the exterior walls and roof, moisture leaks, and improper electrical system conditions that are typically not visible to the naked eye. Thermal imaging is not considered part of a General Home Inspection because it exceeds the scope of inspection Standards of Practice.

Pool and spa inspection

[edit]

Inspection of swimming pools and spas is not considered part of a General Home Inspection because their inspection exceeds the scope of inspection Standards of Practice. However, some home inspectors are also certified to inspect pools and spas and offer this as an ancillary service.[13]

Tree health inspection

[edit]

Inspection of trees on the property is not considered part of a General Home Inspection because their inspection exceeds the scope of inspection Standards of Practice. This type of inspection is typically performed by a Certified Arborist and assesses the safety and condition of the trees on a property before the sales agreement is executed.[14]

Property inspection report for immigration

[edit]

The UKVI (United Kingdom Visa and Immigration) issued guidance on the necessity of ensuring that properties must meet guidelines so that visa applicants can be housed in properties which meet environmental and health standards. Part X of the Housing Act 1985 provides the legislative grounding for the reports - primarily to ensure that a property is not currently overcrowded, that the inclusion of further individuals as a result of successful visa applications - whether spouse visa, dependent visa, indefinite leave to remain or visitor visa, can house the applicants without the property becoming overcrowded. Reports are typically prepared by environmental assessors or qualified solicitors in accordance with HHSRS (Housing Health and Safety Rating Scheme). Property inspection reports are typically standard and breakdown the legal requirements.

Pre-Listing Home Inspection

[edit]

A pre-listing inspection focuses on all major systems and components of the house including HVAC, electrical, plumbing, siding, doors, windows, roof and structure. It's a full home inspection for the seller to better understand the condition of their home prior to the buyer's own inspection.

See also

[edit]

- List of real estate topics
- Real estate appraisal

Notes

[edit]

1. **^** A general list of exclusions include but are not limited to: code or zoning violations, permit research, property measurements or surveys, boundaries, easements or right of way, conditions of title, proximity to environmental hazards, noise interference, soil or geological conditions, well water systems or water quality, underground sewer lines, waste disposal systems, buried piping, cisterns, underground water tanks and sprinkler systems. A complete list of standards and procedures for home inspections can be found at NAHI,[7] ASHI,[8] InterNACHI,[9] or IHINA[10] websites.

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[edit]

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13. **^** *"InterNACHI's Standards of Practice for Inspecting Pools & Spas - InterNACHI". www.nachi.org. Archived from the original on 2019-03-21. Retrieved 2019-04-09.*
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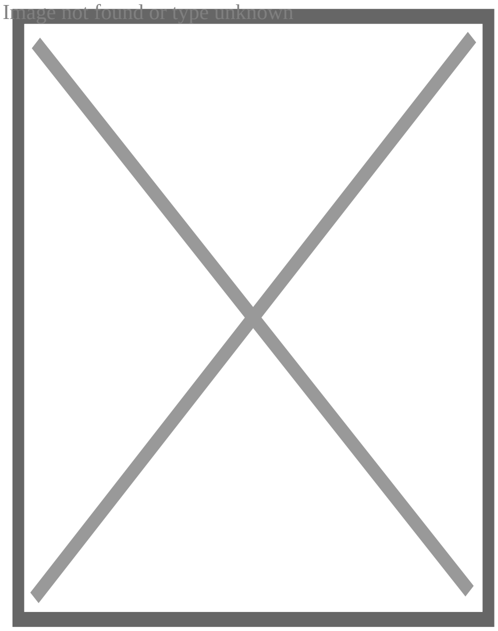
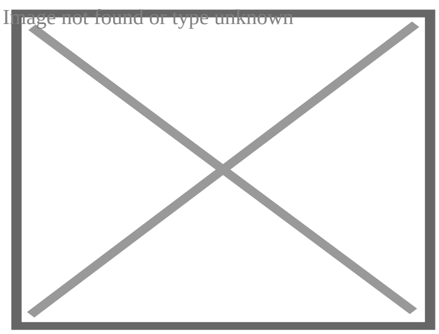
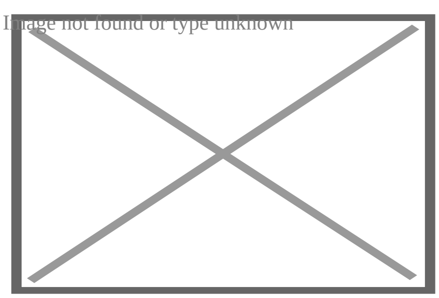
About geotechnical engineering



Boston's Big Dig presented geotechnical challenges in an urban environment.



Precast concrete retaining wall



A typical cross-section of a slope used in two-dimensional analyzes.

Geotechnical engineering, also known as **geotechnics**, is the branch of civil engineering concerned with the engineering behavior of earth materials. It uses the principles of soil mechanics and rock mechanics to solve its engineering problems. It also relies on knowledge of geology, hydrology, geophysics, and other related sciences.

Geotechnical engineering has applications in military engineering, mining engineering, petroleum engineering, coastal engineering, and offshore construction. The fields of geotechnical engineering and engineering geology have overlapping knowledge areas. However, while geotechnical engineering is a specialty of civil engineering, engineering geology is a specialty of geology.

History

[edit]

Humans have historically used soil as a material for flood control, irrigation purposes, burial sites, building foundations, and construction materials for buildings. Dykes, dams, and canals dating back to at least 2000 BCE—found in parts of ancient Egypt, ancient Mesopotamia, the Fertile Crescent, and the early settlements of Mohenjo Daro and Harappa in the Indus valley—provide evidence for early activities linked to irrigation and flood control. As cities expanded, structures were erected and supported by formalized foundations. The ancient Greeks notably constructed pad footings and strip-and-raft foundations. Until the 18th century, however, no theoretical basis for soil design had been developed, and the discipline was more of an art than a science, relying on experience.[1]

Several foundation-related engineering problems, such as the Leaning Tower of Pisa, prompted scientists to begin taking a more scientific-based approach to examining the subsurface. The earliest advances occurred in the development of earth pressure theories for the construction of retaining walls. Henri Gautier, a French royal engineer, recognized the "natural slope" of different soils in 1717, an idea later known as the soil's angle of repose. Around the same time, a rudimentary soil classification system was also developed based on a material's unit weight, which is no longer considered a good indication of soil type.[1][2]

The application of the principles of mechanics to soils was documented as early as 1773 when Charles Coulomb, a physicist and engineer, developed improved methods to determine the earth pressures against military ramparts. Coulomb observed that, at failure, a distinct slip plane would form behind a sliding retaining wall and suggested that the maximum shear stress on the slip plane, for design purposes, was the sum of the soil cohesion, c, and friction $\sigma \tan(\phi)$, where σ is the normal stress on the slip plane and ϕ is the friction angle of the soil. By combining Coulomb's theory with Christian Otto Mohr's 2D stress state, the theory became known as Mohr-Coulomb theory. Although it is now recognized that precise determination of cohesion is impossible because c is not a fundamental soil property, the Mohr-Coulomb theory is still used in practice today.[3]

In the 19th century, Henry Darcy developed what is now known as Darcy's Law, describing the flow of fluids in a porous media. Joseph Boussinesq, a mathematician and physicist, developed theories of stress distribution in elastic solids that proved useful for estimating stresses at depth in the ground. William Rankine, an engineer and physicist, developed an alternative to Coulomb's earth pressure theory. Albert Atterberg developed the clay consistency indices that are still used today for soil classification.[1][2] In 1885, Osborne Reynolds recognized that shearing causes volumetric dilation of dense materials and contraction of loose granular materials.

Modern geotechnical engineering is said to have begun in 1925 with the publication of *Erdbaumechanik* by Karl von Terzaghi, a mechanical engineer and geologist. Considered by many to be the father of modern soil mechanics and geotechnical engineering, Terzaghi developed the principle of effective stress, and demonstrated that the shear strength of soil is controlled by effective stress.[4] Terzaghi also developed the framework for theories of bearing capacity of foundations, and the theory for prediction of the rate of settlement of clay layers due to consolidation.[1][3][5] Afterwards, Maurice Biot fully developed the three-dimensional soil consolidation theory, extending the one-dimensional model previously developed by Terzaghi to more general hypotheses and introducing the set of basic equations of Poroelasticity.

In his 1948 book, Donald Taylor recognized that the interlocking and dilation of densely packed particles contributed to the peak strength of the soil. Roscoe, Schofield, and Wroth, with the publication of *On the Yielding of Soils* in 1958, established the interrelationships between the volume change behavior (dilation, contraction, and consolidation) and shearing behavior with the theory of plasticity using critical state soil mechanics. Critical state soil mechanics is the basis for many contemporary advanced constitutive models describing the behavior of soil.[6]

In 1960, Alec Skempton carried out an extensive review of the available formulations and experimental data in the literature about the effective stress validity in soil, concrete, and rock in order to reject some of these expressions, as well as clarify what expressions were appropriate according to several working hypotheses, such as stress-strain or strength behavior, saturated or non-saturated media, and rock, concrete or soil behavior.

Roles

[edit]

Geotechnical investigation

[edit]
Main article: Geotechnical investigation

Geotechnical engineers investigate and determine the properties of subsurface conditions and materials. They also design corresponding earthworks and retaining structures, tunnels, and structure foundations, and may supervise and evaluate sites, which may further involve site monitoring as well as the risk assessment and mitigation of natural hazards.[7][8]

Geotechnical engineers and engineering geologists perform geotechnical investigations to obtain information on the physical properties of soil and rock underlying and adjacent to a site to design earthworks and foundations for proposed structures and for the repair of distress to earthworks and structures caused by subsurface conditions. Geotechnical investigations involve surface and subsurface exploration of a site, often including subsurface sampling and laboratory testing of retrieved soil samples. Sometimes, geophysical methods are also used to obtain data, which include measurement of seismic waves (pressure, shear, and Rayleigh waves), surface-wave methods and downhole methods, and electromagnetic surveys (magnetometer, resistivity, and ground-penetrating radar). Electrical tomography can be used to survey soil and rock properties and existing underground infrastructure in construction projects.[9]

Surface exploration can include on-foot surveys, geologic mapping, geophysical methods, and photogrammetry. Geologic mapping and interpretation of geomorphology are typically completed in consultation with a geologist or engineering geologist. Subsurface exploration usually involves in-situ testing (for example, the standard penetration test and cone penetration test). The digging of test pits and trenching (particularly for locating faults and slide planes) may also be used to learn about soil conditions at depth. Large-diameter borings are rarely used due to safety concerns and expense. Still, they are sometimes used to allow a geologist or engineer to be lowered into the borehole for direct visual and manual examination of the soil and rock stratigraphy.

Various soil samplers exist to meet the needs of different engineering projects. The standard penetration test, which uses a thick-walled split spoon sampler, is the most common way to collect disturbed samples. Piston samplers, employing a thin-walled tube, are most commonly used to collect less disturbed samples. More advanced methods, such as the Sherbrooke block sampler, are superior but expensive. Coring frozen ground provides high-quality undisturbed samples from ground conditions, such as fill, sand, moraine, and rock fracture zones.[10]

Geotechnical centrifuge modeling is another method of testing physical-scale models of geotechnical problems. The use of a centrifuge enhances the similarity of the scale model tests involving soil because soil's strength and stiffness are susceptible to the confining pressure. The centrifugal acceleration allows a researcher to obtain large (prototype-scale) stresses in small physical models.

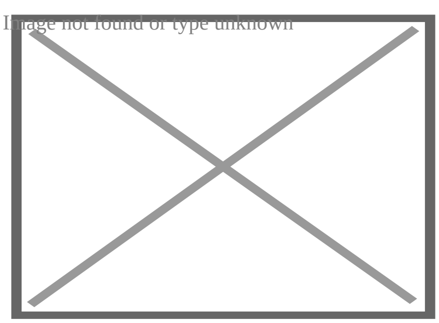
Foundation design

[edit]
Main article: Foundation (engineering)

The foundation of a structure's infrastructure transmits loads from the structure to the earth. Geotechnical engineers design foundations based on the load characteristics of the structure and the properties of the soils and bedrock at the site. Generally, geotechnical engineers first estimate the magnitude and location of loads to be supported before developing an investigation plan to explore the subsurface and determine the necessary soil parameters through field and lab testing. Following this, they may begin the design of an engineering foundation. The primary considerations for a geotechnical engineer in foundation design are bearing capacity, settlement, and ground movement beneath the foundations.[11]

Earthworks

[edit]



A compactor/roller operated by U.S. Navy Seabees

See also: Earthworks (engineering)

Geotechnical engineers are also involved in the planning and execution of earthworks, which include ground improvement,[11] slope stabilization, and slope stability analysis.

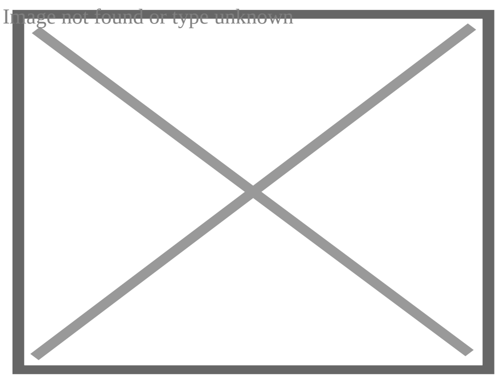
Ground improvement

[edit]

Various geotechnical engineering methods can be used for ground improvement, including reinforcement geosynthetics such as geocells and geogrids, which disperse loads over a larger area, increasing the soil's load-bearing capacity. Through these methods, geotechnical engineers can reduce direct and long-term costs.[12]

Slope stabilization

[edit]



Simple slope slip section.

Main article: Slope stability

Geotechnical engineers can analyze and improve slope stability using engineering methods. Slope stability is determined by the balance of shear stress and shear strength. A previously stable slope may be initially affected by various factors, making it unstable. Nonetheless, geotechnical engineers can design and implement engineered slopes to increase stability.

Slope stability analysis

[edit]
Main article: Slope stability analysis

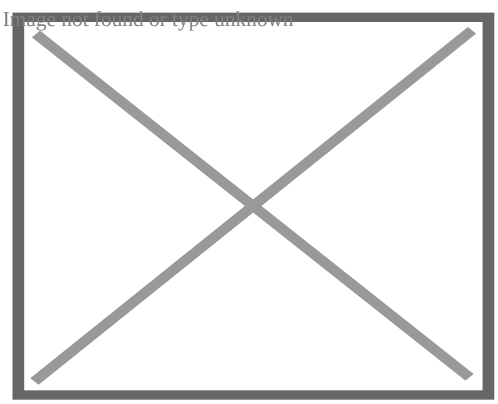
Stability analysis is needed to design engineered slopes and estimate the risk of slope failure in natural or designed slopes by determining the conditions under which the topmost mass of soil will slip relative to the base of soil and lead to slope failure.[13] If the interface between the mass and the base of a slope has a complex geometry, slope stability analysis is difficult and numerical solution methods are required. Typically, the interface's exact geometry is unknown, and a simplified interface geometry is assumed. Finite slopes require three-dimensional models to be analyzed, so most slopes are analyzed assuming that they are infinitely wide and can be represented by two-dimensional models.

Sub-disciplines

[edit]

Geosynthetics

[edit]
Main article: Geosynthetics



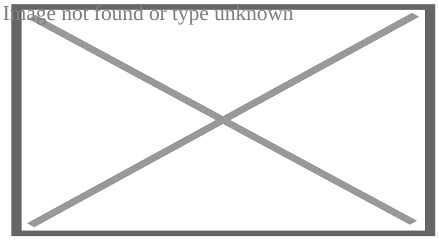
A collage of geosynthetic products.

Geosynthetics are a type of plastic polymer products used in geotechnical engineering that improve engineering performance while reducing costs. This includes geotextiles, geogrids, geomembranes, geocells, and geocomposites. The synthetic nature of the products make them suitable for use in the ground where high levels of durability are required. Their main functions include drainage, filtration, reinforcement, separation, and containment.

Geosynthetics are available in a wide range of forms and materials, each to suit a slightly different end-use, although they are frequently used together. Some reinforcement geosynthetics, such as geogrids and more recently, cellular confinement systems, have shown to improve bearing capacity, modulus factors and soil stiffness and strength.[14] These products have a wide range of applications and are currently used in many civil and geotechnical engineering applications including roads, airfields, railroads, embankments, piled embankments, retaining structures, reservoirs, canals, dams, landfills, bank protection and coastal engineering.[15]

Offshore

[edit]
Main article: Offshore geotechnical engineering



Platforms offshore Mexico.

Offshore (or *marine*) *geotechnical engineering* is concerned with foundation design for human-made structures in the sea, away from the coastline (in opposition to *onshore* or *nearshore* engineering). Oil platforms, artificial islands and submarine pipelines are examples of such structures.[16]

There are a number of significant differences between onshore and offshore geotechnical engineering.[16][17] Notably, site investigation and ground improvement on the seabed are more expensive; the offshore structures are exposed to a wider range of geohazards; and the environmental and financial consequences are higher in case of failure. Offshore structures are exposed to various environmental loads, notably wind, waves and currents. These phenomena may affect the integrity or the serviceability of the structure and its foundation during its operational lifespan and need to be taken into account in offshore design.

In subsea geotechnical engineering, seabed materials are considered a two-phase material composed of rock or mineral particles and water.[18][19] Structures may be fixed in place in the seabed—as is the case for piers, jetties and fixed-bottom wind turbines—or may comprise a floating structure that remains roughly fixed relative to its geotechnical anchor point. Undersea mooring of human-engineered floating structures include a large number of offshore oil and gas platforms and, since 2008, a few floating wind turbines. Two common types of engineered design for anchoring floating structures include tension-leg and catenary loose mooring systems.[20]

Observational method

[edit]

First proposed by Karl Terzaghi and later discussed in a paper by Ralph B. Peck, the observational method is a managed process of construction control, monitoring, and review, which enables modifications to be incorporated during and after construction. The method aims to achieve a greater overall economy without compromising safety by creating designs based on the most probable conditions rather than the most unfavorable.[21] Using the observational method, gaps in available information are filled by measurements and investigation, which aid in assessing the behavior of the structure during construction, which in turn can be modified per the findings. The method was described by Peck as "learn-as-you-go".[22]

The observational method may be described as follows:[22]

1. General exploration sufficient to establish the rough nature, pattern, and properties of deposits.

2. Assessment of the most probable conditions and the most unfavorable conceivable deviations.
3. Creating the design based on a working hypothesis of behavior anticipated under the most probable conditions.
4. Selection of quantities to be observed as construction proceeds and calculating their anticipated values based on the working hypothesis under the most unfavorable conditions.
5. Selection, in advance, of a course of action or design modification for every foreseeable significant deviation of the observational findings from those predicted.
6. Measurement of quantities and evaluation of actual conditions.
7. Design modification per actual conditions

The observational method is suitable for construction that has already begun when an unexpected development occurs or when a failure or accident looms or has already happened. It is unsuitable for projects whose design cannot be altered during construction.[22]

See also

[edit]

- icon Image not found or type unknown Engineering portal

- Civil engineering
- Deep Foundations Institute
- Earthquake engineering
- Earth structure
- Effective stress
- Engineering geology
- Geological Engineering
- Geoprofessions
- Hydrogeology
- International Society for Soil Mechanics and Geotechnical Engineering
- Karl von Terzaghi
- Land reclamation
- Landfill
- Mechanically stabilized earth
- Offshore geotechnical engineering
- Rock mass classifications
- Sediment control
- Seismology
- Soil mechanics
- Soil physics
- Soil science

Notes

[edit]

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External links

[edit]

- Worldwide Geotechnical Literature Database

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Engineering

- History
- Outline
- List of engineering branches

Civil

- Architectural
- Coastal
- Construction
- Earthquake
- Ecological
- Environmental
  - Sanitary
- Geological
- Geotechnical
- Hydraulic
- Mining
- Municipal/urban
- Offshore
- River
- Structural
- Transportation
  - Traffic
  - Railway

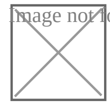
Mechanical

- Acoustic
- Aerospace
- Automotive
- Biomechanical
- Energy
- Manufacturing
- Marine
- Naval architecture
- Railway
- Sports
- Thermal
- Tribology

Specialties and interdisciplinarity

Electrical

- Broadcast
  - outline
- Control
- Electromechanics
- Electronics
- Microwaves
- Optical
- Power
- Radio-frequency
- Signal processing
- Telecommunications



- Biochemical/bioprocess
- Biological

Engineering education	◦ Bachelor of Engineering ◦ Bachelor of Science ◦ Master's degree ◦ Doctorate ◦ Graduate certificate ◦ Engineer's degree ◦ Licensed engineer
Related topics	◦ Engineer

Glossaries	◦ Engineering
	    ◦ A–L
	    ◦ M–Z
	◦ Aerospace engineering
	◦ Civil engineering
	◦ Electrical and electronics engineering
	◦ Mechanical engineering
	◦ Structural engineering

Other

- Agricultural
- Audio
- Automation
- Biomedical
  - Bioinformatics
  - Clinical
  - Health technology
  - Pharmaceutical
  - Rehabilitation
- Building services
  - MEP
- Design
- Explosives
- Facilities
- Fire
- Forensic
- Climate
- Geomatics
- Graphics
- Industrial
- Information
- Instrumentation
  - Instrumentation and control
- Logistics
- Management
- Mathematics
- Mechatronics
- Military
- Nuclear
- Ontology
- Packaging
- Physics
- Privacy
- Safety
- Security
- Survey
- Sustainability
- Systems
- Textile

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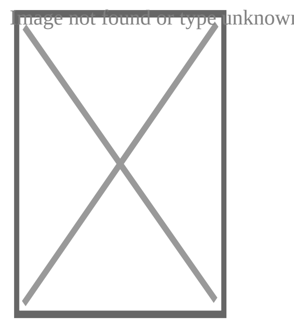
Soil science

- 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)

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 taxonomy

- Alfisols
- Andisols
- Aridisols
- Entisols
- Gelisols
- Histosols
- Inceptisols
- Mollisols
- Oxisols

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

- Image not found or type unknown Wikipedia:WikiProject Soil
- Image not found or type unknown Category soil
- Category soil science
- Image not found or type unknown List of soil scientists

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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
- Crosshole sonic logging
- Pile integrity test

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 - Deep

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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Construction

Types

- Home construction
- Offshore construction
- Underground construction
  - Tunnel construction

History

- Architecture
- Construction
- Structural engineering
- Timeline of architecture
- Water supply and sanitation

Professions	○ Architect ○ Building engineer ○ Building estimator ○ Building officials ○ Chartered Building Surveyor ○ Civil engineer ○ Civil estimator ○ Clerk of works ○ Project manager ○ Quantity surveyor ○ Site manager ○ Structural engineer ○ Superintendent
Trades workers (List)	○ Banksman ○ Boilermaker ○ Bricklayer ○ Carpenter ○ Concrete finisher ○ Construction foreman ○ Construction worker ○ Electrician ○ Glazier ○ Ironworker ○ Millwright ○ Plasterer ○ Plumber ○ Roofer ○ Steel fixer ○ Welder

Organizations	○ American Institute of Constructors (AIC) ○ American Society of Civil Engineers (ASCE) ○ Asbestos Testing and Consultancy Association (ATAC) ○ Associated General Contractors of America (AGC) ○ Association of Plumbing and Heating Contractors (APHC) ○ Build UK ○ Construction History Society ○ Chartered Institution of Civil Engineering Surveyors (CICES) ○ Chartered Institute of Plumbing and Heating Engineering (CIPHE) ○ Civil Engineering Contractors Association (CECA) ○ The Concrete Society ○ Construction Management Association of America (CMAA) ○ Construction Specifications Institute (CSI) ○ FIDIC ○ Home Builders Federation (HBF) ○ Lighting Association ○ National Association of Home Builders (NAHB) ○ National Association of Women in Construction (NAWIC) ○ National Fire Protection Association (NFPA) ○ National Kitchen & Bath Association (NKBA) ○ National Railroad Construction and Maintenance Association (NRC) ○ National Tile Contractors Association (NTCA) ○ Railway Tie Association (RTA) ○ Royal Institution of Chartered Surveyors (RICS) ○ Scottish Building Federation (SBF) ○ Society of Construction Arbitrators
By country	○ India ○ Iran ○ Japan ○ Romania ○ Turkey ○ United Kingdom ○ United States
Regulation	○ Building code ○ Construction law ○ Site safety ○ Zoning

Architecture	◦ Style
	    ◦ List
	◦ Industrial architecture
	    ◦ British
	◦ Indigenous architecture
	◦ Interior architecture
	◦ Landscape architecture
	◦ Vernacular architecture

Engineering	◦ Architectural engineering
	◦ Building services engineering
	◦ Civil engineering
	    ◦ Coastal engineering
	    ◦ Construction engineering
	    ◦ Structural engineering
	◦ Earthquake engineering
	◦ Environmental engineering
	◦ Geotechnical engineering

Methods	◦ List ◦ Earthbag construction ◦ Modern methods of construction ◦ Monocrete construction ◦ Slip forming

- Building material
  - List of building materials
  - Millwork
- Construction bidding
- Construction delay
- Construction equipment theft
- Construction loan
- Construction management
- Construction waste
- Demolition
- Design–build
- Design–bid–build
- DfMA
- Heavy equipment
- Interior design
- Lists of buildings and structures
  - List of tallest buildings and structures
- Megaproject
- Megastructure
- Plasterwork
  - Damp
    - Proofing
  - Parge coat
  - Roughcast
    - Harling
- Real estate development
- Stonemasonry
- Sustainability in construction
- Unfinished building
- Urban design
- Urban planning

Other topics

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- Czech Republic
- Israel

About Cook County

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Things To Do in Cook County

Photo

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Sand Ridge Nature Center

4.8 (96)

Photo

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River Trail Nature Center

4.6 (235)

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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

https://www.google.com/maps/dir/Navy+Pier/United+Structural+Systems+of+Illinois%2C+Inc/@41.8918633,-87.6050944,14z/data=!3m1!4b1!4m14!4m13!1m5!1m1!1sunknown!2m2!1d-87.6050944!2d41.8918633!1m5!1m1!1sChIJ-wSxDtinD4gRiv4kY3RRh9U!2m2!1d-88.1396465!2d42.0637725!3e0

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88.1396465!2d42.0637725!3e1

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.

Recognizing Cracks and Shifts in Concrete FloorsView GBP

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/

USEFUL LINKS

Residential Foundation Repair Services

home foundation repair service

Foundation Repair Service

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