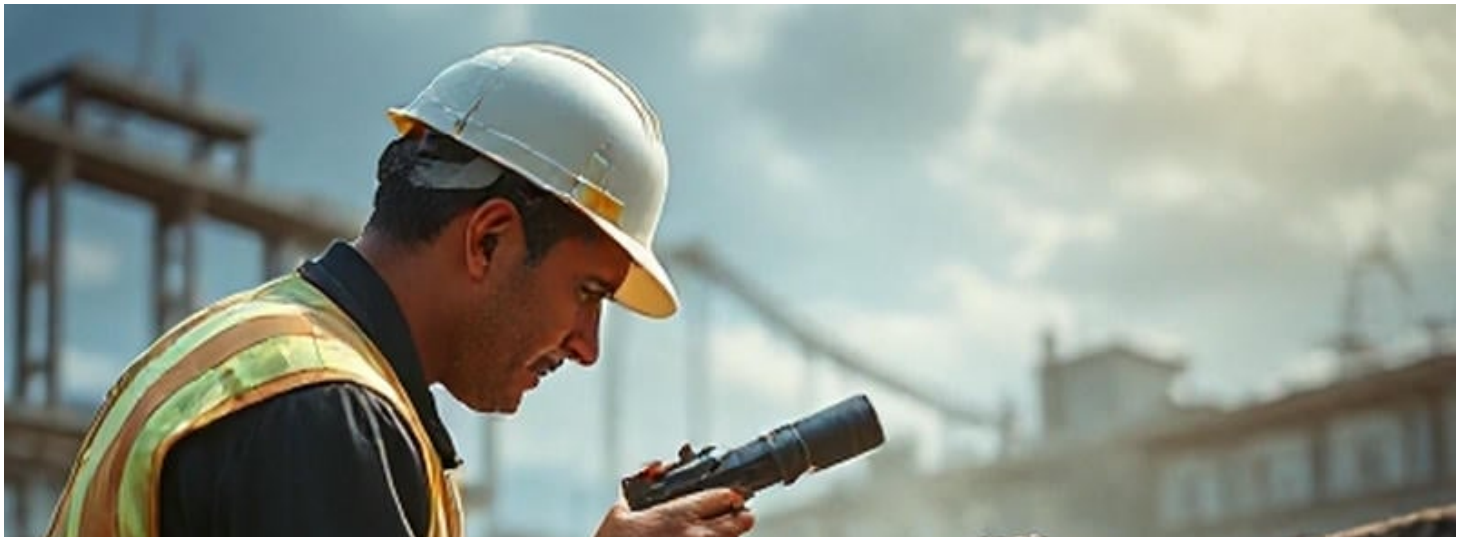
- **Identifying Common Issues and Symptoms of residential foundations**
  Identifying Common Issues and Symptoms of residential foundations Spotting Early Warning Signs of Foundation Stress Recognizing Cracks and Shifts in Concrete Floors Understanding Sticky Doors and Window Alignment Pinpointing Sinking 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**
  Soil and Environmental Factors influencing home foundations Examining Expansive Clay in Residential Areas Understanding Sandy Loam and Drainage Properties Measuring Soil Moisture for Stabilizing Foundations Impact of Freeze Thaw Cycles on Concrete Slabs Recognizing Erosion Patterns that Undermine Support Coordinating Landscaping to Control Soil Shifts Evaluating Groundwater Levels for Long Term Stability Identifying Seasonal Soil Movement in Coastal Regions Reviewing Impact of Tree Roots on Foundation Integrity Forecasting Effects of Prolonged Drought on Soil Behavior Managing Flood Risk through Strategic Elevation Observing Climate Trends for Anticipating Soil Swell
- **About Us**



*** How Foundation Settlement Leads to Misaligned Openings.**

Okay, so you're wrestling with a sticky door, a window that just won't quite close right, and you're probably thinking, "What in the world is going on?" Ignoring minor foundation issues can lead to severe structural failure foundation repair service areas steel. Well, let's talk about something you might not immediately connect to your finicky openings: foundation settlement.

Think of your house like a delicately balanced Lego creation. It's all carefully stacked and level, right? Your foundation is the baseplate that keeps everything square. Now, imagine that baseplate starts to sink a little unevenly in one or two spots. That's foundation settlement. It's a natural process where the soil under your house compacts and compresses over time, or shifts due to things like changes in moisture content.

The problem is, even a small amount of settlement can have a ripple effect throughout the entire structure. Walls that were once perfectly plumb start to lean or shift. This is because the frame of your house is designed to distribute weight evenly. When that weight distribution gets thrown off by a sinking foundation, things get wonky.

So, how does this relate to your sticky doors and misaligned windows? Well, the door and window frames are built into these walls. As the walls shift and warp due to the settling foundation, the frames twist and distort along with them. Suddenly, your once perfectly square door frame isn't square anymore. The door rubs against the jamb, making it hard to open or close. The same thing happens with windows. The sash gets out of alignment within the frame, making it difficult to latch or seal properly.

It's not always a dramatic, overnight collapse. Often, it's a slow, creeping process. That's why you might notice your doors and windows gradually becoming more difficult to operate over time. It can be frustrating, but understanding that foundation settlement might be the culprit is the first step toward getting things back in line. So, before you start blaming your door or window hardware, take a good look at what might be happening with the foundation underneath your feet. It could save you a lot of unnecessary hassle and expense in the long run.

*** Identifying the Signs: More Than Just a Sticky Door.**

Okay, so you've got a sticky door. Annoying, right? You might just think, "Ugh, this old thing needs some WD-40." But honestly, a sticky door, or a window that's suddenly hard to close, can be a little red flag waving at you. It's trying to tell you something is up with your house beyond just needing a quick fix.

Think of it like this: your house is a living thing, subtly shifting and settling over time. A sticky door often isn't about the door itself, but about the frame it sits in. Maybe the foundation is settling unevenly. Maybe the humidity is playing havoc with the wood. Maybe, just maybe, there's a bigger issue with the structural integrity of that wall.

It's not just about the inconvenience of wrestling with the thing. Pay attention to things like cracks in the drywall around the door frame, or if the door seems to be rubbing more at the top than the bottom (or vice versa). Are your windows suddenly harder to latch? Are they sticking too? These are all pieces of the puzzle.

Sometimes, it *is* just humidity, and a good dehumidifier will solve the problem. But if the sticking persists, or you see other signs like those cracks, don't ignore it. It might be worth getting a professional to take a look. Ignoring those subtle signs now could mean a bigger, more expensive problem down the road. So, next time you're fighting with that door, remember it might be saying more than just "I need some oil." Listen to what your house is telling you!

*** Common Foundation Problems Causing Door and Window Issues.**

Okay, so you're wrestling with a sticky door or a window that just won't close right. Frustrating, right? Before you start hacking away at the frame or blaming the manufacturer, take a deep breath. A lot of the time, those stubborn doors and windows are actually screaming about something bigger: foundation problems. Think of it this way: your house is a giant, interconnected structure, and the foundation is, well, the foundation. If that base starts shifting, settling, or cracking, everything above it gets thrown out of whack.

Common foundation issues like settling, heaving, or bowing walls can exert pressure on the framing around your doors and windows. That pressure can warp the frames themselves, making it difficult for the door or window to sit properly. Maybe the frame is no longer square, or maybe it's pushing against the door or window sash. Either way, the result is that sticking, jamming, or misalignment that drives you crazy.

Cracks in the foundation, even hairline ones, can let moisture in. This moisture can then affect the wood framing, causing it to swell or rot. Swollen wood can bind against the door or window, making it hard to operate. Rot, of course, weakens the frame and can lead to further misalignment.

So, next time you're battling a recalcitrant door or window, don't just focus on the symptom. Consider the possibility of underlying foundation problems. A professional foundation inspection might be a worthwhile investment to diagnose the root cause and prevent more serious issues down the road. It's often easier and cheaper to address foundation problems early on than to deal with the cascading effects they can have on the rest of your home.

*** The Importance of Professional Foundation Inspection.**

Okay, so your door's sticking, huh? And your window's suddenly decided to be all crooked and stubborn? Before you start blaming gremlins (though, let's be honest, it *feels* like gremlins), let's talk about what's really going on: your foundation. Now, I know what you're thinking: "Foundation? What does the concrete under my house have to do with my bedroom door?" More than you might realize, actually.

Think of your foundation like the skeleton of your house. It's the thing that's supposed to keep

everything straight, level, and properly supported. When that skeleton starts to shift or settle unevenly, everything built on top of it starts to feel the strain. That's where sticky doors and misaligned windows come in. They're often early warning signs that your foundation is experiencing some issues.

Now, you *could* try to fix the door yourself. Maybe shave off a bit here, tighten a screw there. But if the underlying problem is a shifting foundation, you're just putting a band-aid on a broken leg. The door will stick again, maybe even worse, and other problems might start popping up.

That's where a professional foundation inspection comes in. A qualified inspector knows what to look for: cracks in the foundation walls, signs of water damage, uneven floors, and other subtle clues that indicate a problem. They have the tools and expertise to properly assess the situation and determine the extent of the damage.

They're not just going to tell you "your foundation is bad." They'll diagnose *why* it's bad. Is it poor drainage? Soil erosion? Tree roots pushing against the foundation? Knowing the cause is crucial for finding the right solution.

Investing in a professional foundation inspection might seem like an unnecessary expense, especially when you're just dealing with a sticky door. But trust me, it's an investment in the long-term health and stability of your home. It's about catching a small problem before it becomes a huge, expensive nightmare. It's about making sure your house stays straight and true, and that your doors and windows actually, you know, work. So, before you reach for the sandpaper and start carving away at that door, consider calling a professional. It could save you a lot of headaches (and money) in the long run.

*** Repair Solutions: Addressing the Root Cause, Not Just the Symptom.**

Okay, so you've got a sticky door, huh? Or maybe a window that feels like it's fighting you every time you try to close it. Annoying, right? Most folks just reach for the WD-40, give it a quick spray, and call it a day. Problem solved… temporarily. But that's like putting a band-aid on a broken leg. The squeak's gone, sure, but the underlying issue? Still there, lurking, waiting to resurface.

Think of it like this: that sticking door isn't just being difficult for kicks. It's trying to tell you something. Maybe the house has settled, the frame's warped slightly, or the hinges are loose and starting to sag. Maybe the wood's absorbed moisture and expanded. Ignoring those root causes is like ignoring the check engine light in your car – eventually, something bigger and more expensive is going to break.

That's where "Repair Solutions: Addressing the Root Cause, Not Just the Symptom" comes in. It's about getting to the heart of the matter. Instead of just lubricating the symptom (the stickiness), we need to figure out *why* the door or window is behaving that way. Is it a structural issue? A problem with the hardware? Once we understand the "why," we can actually fix the problem, preventing it from coming back and saving you headaches (and money) down the road. So, next time you grapple with a stubborn door or window, remember: dig a little deeper. Don't just treat the squeak; fix the foundation. Your house will thank you for it.

*** Preventing Future Problems: Foundation Maintenance Tips.**

Okay, so you've got a sticky door, a window that just won't quite close right. Annoying, right? It's more than just an inconvenience; it's often a little signal your house is sending. And that signal is usually about your foundation. Think of it like this: your house is a body, and the foundation is its spine. If the spine's out of whack, everything else is going to feel it.

That's where foundation maintenance comes in. It's not glamorous, I know, but it's like taking your vitamins or getting regular checkups for your house. Preventing future problems with sticky doors and misaligned windows starts with keeping your foundation happy. What does that *mean*, though?

Well, things like proper drainage are HUGE. Water is a foundation's worst enemy. Make sure your gutters are clear and diverting water *away* from the house. Check the grading around your foundation; it should slope away, not towards it. Consider adding extensions to your downspouts if they're dumping water too close to the foundation.

Then there's the whole soil moisture thing. In dry climates, the soil around your foundation can shrink, causing it to settle unevenly. Soaker hoses, used responsibly, can help maintain consistent moisture levels. Conversely, in areas with excessive rain, you might need to improve drainage to prevent water from pooling.

Finally, regular inspections. Walk around your house, look for cracks in the foundation, both inside and out. Small hairline cracks are often normal, but larger cracks, especially those that are widening, are a red flag. If you spot something concerning, don't wait! Call a foundation specialist. It's always better to address a problem early, before it turns into a major headache (and a much bigger expense). Fixing a sticky door might seem small, but it could be a clue that points to something bigger happening beneath your feet. Taking care of your foundation is an investment in the long-term health and stability of your home – and it'll definitely make those doors and windows behave a lot better.

*** When to Contact a Residential Foundation Repair Service.**

Okay, so you've got a sticky door. Or maybe a window that just doesn't quite latch right anymore. Annoying, right? You jiggle it, you shove it, you maybe even mutter a few choice words. But before you grab the WD-40 and call it a day, take a minute to think about *why* that door or window is acting up. Sometimes, it's just old age or a bit of swelling from humidity. Other times, though, it could be a symptom of something bigger: foundation issues.

Think of your house like a carefully balanced stack of blocks. The foundation is the bottom block. If that bottom block starts to shift, crack, or sink, everything above it is going to feel the effects. Doors and windows, being precisely fitted into their frames, are often the first things to show signs of this stress. That slight misalignment, that stubborn stickiness, might be a signal that your foundation is moving.

So, when do you call in the professionals? If it's just one door, and it only happens during the muggiest part of summer, it's probably just the wood expanding. But if you're seeing multiple doors or windows affected, especially if those problems are getting worse over time, that's a red flag. Look for other signs too. Are there cracks in your walls, especially near door or window frames? Are your floors sloping in certain areas? Have you noticed cracks in the foundation itself, either inside or outside?

If you're seeing a combination of these issues, it's time to call a residential foundation repair service. Don't wait! Foundation problems don't fix themselves; they usually get worse, and addressing them early can save you a lot of money and headaches down the road. A professional can assess the situation, determine the root cause of the problem, and recommend the best course of action to get your foundation, and your doors and windows, back on track. It's better to be safe than sorry when it comes to the stability of your home.

About geotechnical engineering

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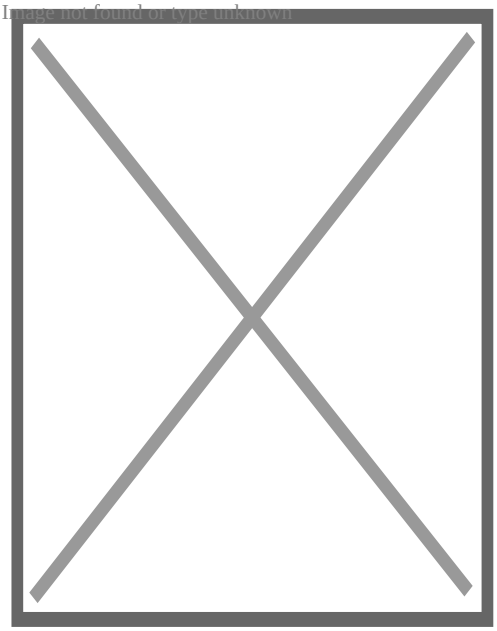

Boston's Big Dig presented geotechnical challenges in an urban environment.

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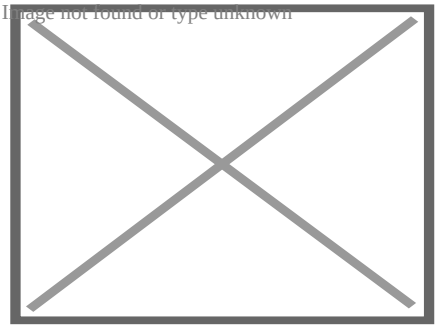

Precast concrete retaining wall

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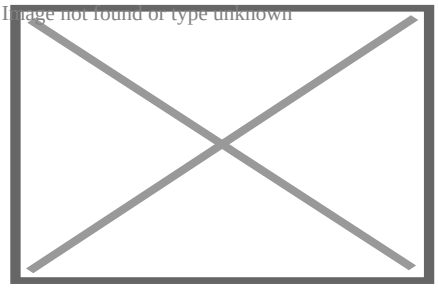

A typical cross-section of a slope used in two-dimensional analyzes.

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

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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 the product of the normal stress and the tangent of the angle of friction, $\tau = c + \sigma \tan(\phi)$, 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 it 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

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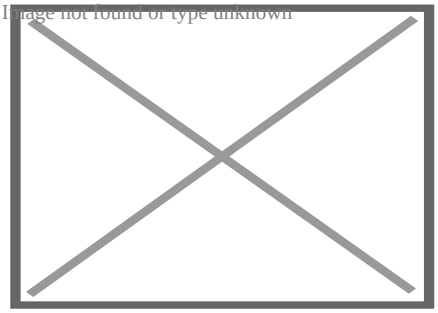


A compactor/roller operated by U.S. Navy Seabees

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.

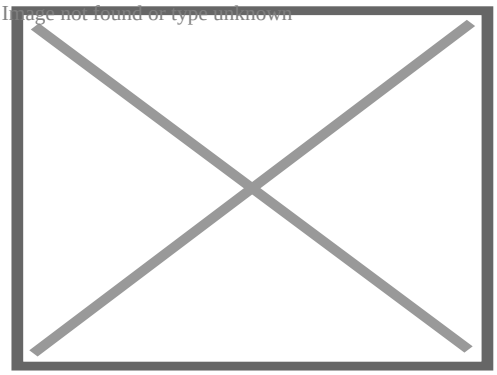
Ground improvement

[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

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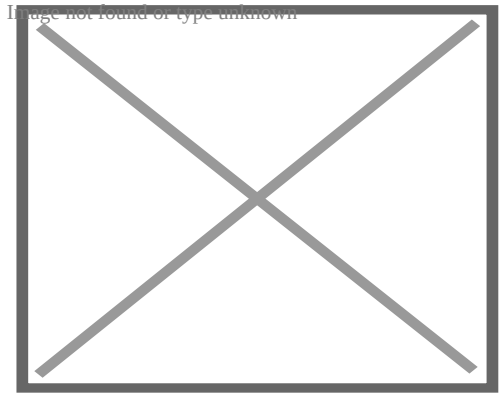
Geosynthetics

[edit]
Main article: Geosynthetics



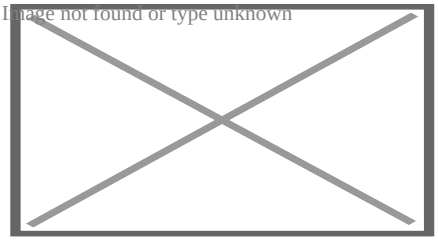
A collage of geosynthetic products.

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 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

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- Worldwide Geotechnical Literature Database

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Engineering

- History
- Outline
- List of engineering branches

Specialties and interdisciplinarity	**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
	Electrical	○ Broadcast ○ outline ○ Control ○ Electromechanics ○ Electronics ○ Microwaves ○ Optical ○ Power ○ Radio-frequency ○ Signal processing ○ Telecommunications
		○ Biochemical/bioprocess

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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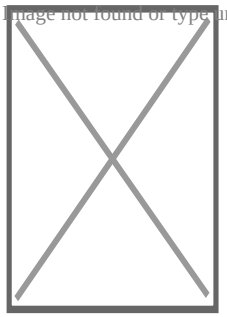
Soil science

- 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)

- **v**
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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 taxonomy	○ Alfisols ○ Andisols ○ Aridisols ○ Entisols ○ Gelisols ○ Histosols ○ Inceptisols ○ Mollisols

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
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- 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

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

Other topics

- 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



Outline Category

Authority control databases: National

- Germany
- United States
- Czech Republic
- Israel


Edit this at Wikidata

About deep foundation

Redirect to:

- Piling

This page is a redirect. The following categories are used to track and monitor this redirect:

- **From a page move**: This is a redirect from a page that has been moved (renamed). This page was kept as a redirect to avoid breaking links, both internal and external, that may have been made to the old page name.

When appropriate, protection levels are automatically sensed, described and categorized.

About Cook County

Photo

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Photo

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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)

Photo

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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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https://www.google.com/maps/dir/Palmisano+%28Henry%29+Park/United+Structural+Systems+of+Illinois%2C87.6490151,14z/data=!3m1!4b1!4m14!4m13!1m5!1m1!1sunknown!2m2!1d-87.6490151!2d41.8429903!1m5!1m1!1sChIJ-wSxDtinD4gRiv4kY3RRh9U!2m2!1d-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.

Understanding Sticky Doors and Window AlignmentView GBP

Check our other pages :

- Noting Shifting Porches and Deck Attachments
- Forecasting Effects of Prolonged Drought on Soil Behavior
- Tracking Water Intrusion as a Contributor to Structural Damage

Frequently Asked Questions

How much will it cost to fix the foundation and get my doors/windows working again?**

The cost varies greatly depending on the severity of the foundation damage, the repair method required, and the extent of door/window adjustments needed. We can provide a detailed estimate after a thorough inspection of your property.

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