



- **Understanding Expansive Clay and Its Impact on Foundations**
Understanding Expansive Clay and Its Impact on Foundations Examining Sandy Loam for Residential Support Identifying Areas Vulnerable to Soil Erosion Evaluating Soil Moisture Fluctuations Beneath Homes Approaches for Chemical Soil Stabilization Techniques for Addressing Soil Heave Issues Managing Settlement with Targeted Soil Compaction Recognizing Soil Drainage Limitations Investigating Soil Stress Testing in Residential Sites Incorporating Root Barriers to Prevent Shifts Examining Seasonal Swelling and Shrinking of Soil Employing Sustainable Methods for Long Term Soil Health
- **Planning French Drains for Effective Water Control**
Planning French Drains for Effective Water Control Setting Up Sump Pumps to Prevent Basement Flooding Extending Gutter Downspouts for Extra Protection Excavation Basics for Residential Construction Projects Coordinating Soil Compaction Methods on Site Limiting Erosion Through Proper Grading Techniques Evaluating Perimeter Drain Systems for Dry Foundations Installing Exterior Waterproof Barriers for Walls Adapting Site Plans to Local Rainfall Patterns Understanding Swale Placement for Controlled Water Flow Enhancing Overall Site Drainage with Gravel Trenches Minimizing Subsurface Water Accumulation Around Foundations
- **About Us**



Explanation of soil composition and its impact on foundation stability

Understanding soil composition is crucial when assessing the stability of foundations in residential sites. Helical piers provide added support for homes needing foundation expert service [foundation repair service market](#) I-beam. Soil is a complex mixture of minerals, organic matter, water, and air. The primary components of soil are sand, silt, and clay, each with distinct properties that influence the soil's behavior under stress.

Sand, composed of larger particles, provides good drainage and is relatively stable but lacks cohesion. Silt, with medium-sized particles, holds more water and nutrients but can become compacted, affecting its stability. Clay, consisting of fine particles, has high cohesion and can retain water, leading to swelling and shrinking issues that impact foundation stability.

The proportion of these components determines the soil type, which can be classified as sandy, silty, clayey, or a combination thereof. For instance, clayey soils can expand when wet and contract when dry, exerting pressure on foundations and causing cracks. Conversely, sandy soils drain well but offer less support, making them prone to erosion.

Moreover, the presence of organic matter, such as decomposed plant material, influences soil structure and fertility. While beneficial for plant growth, excessive organic matter can lead to soil instability, especially when it decomposes and alters the soil's volume.

Water content is another critical factor. Saturated soils lose strength and can lead to issues like liquefaction during seismic activity, compromising foundation integrity. Therefore, proper soil stress testing is essential to evaluate these factors and ensure that foundations are designed to withstand the specific stresses imposed by the soil composition.

In conclusion, a thorough understanding of soil composition and its behavior under various conditions is vital for ensuring the stability and longevity of residential foundations. Soil stress testing helps identify potential issues early, allowing for informed decisions in foundation design and construction.

Overview of common soil stress testing methods used in the industry

When it comes to constructing residential sites, understanding the behavior of the underlying soil is crucial. Soil stress testing helps engineers and builders assess the stability, load-bearing capacity, and potential settlement of the ground. Several common methods are employed in the industry to evaluate soil stress, each with its own advantages and applications. Here's an overview of these methods:

1. **Standard Penetration Test (SPT):**

The SPT is one of the most widely used methods for assessing soil properties. It involves driving a split-spoon sampler into the soil using a standardized hammer and counting the

number of blows required to penetrate a certain depth. The number of blows, known as the "N-value," provides insights into the soil's density and strength. SPT is relatively quick and cost-effective, making it a popular choice for preliminary investigations.

2. **Cone Penetration Test (CPT)**:

The CPT is a more advanced method that involves pushing a cone-shaped probe into the soil at a constant rate. As the cone penetrates, sensors measure the resistance and friction along the shaft. This test provides continuous data on soil layers, making it ideal for identifying variations in soil properties with depth. CPT is particularly useful in soft soils and can offer detailed information about soil strength and stratification.

3. **Plate Load Test**:

The plate load test is a direct method for evaluating the load-bearing capacity of soil. A steel plate is placed on the ground, and a known load is applied. The settlement of the plate under the load is measured, allowing engineers to determine the soil's bearing capacity and modulus of deformation. This test is often used to validate design assumptions and ensure that the soil can support the intended structures.

4. **Vane Shear Test**:

The vane shear test is specifically designed for cohesive soils like clay. A four-bladed vane is inserted into the soil, and torque is applied until the soil fails in shear. The torque required to cause failure is measured, providing data on the soil's undrained shear strength. This test is particularly useful in assessing the stability of clay soils in embankments and foundations.

5. **Laboratory Testing**:

In addition to field tests, laboratory tests on soil samples can provide valuable data. Common lab tests include the triaxial test, which measures the shear strength of soil under controlled conditions, and the consolidation test, which assesses how soil compacts under load over time. These tests offer precise measurements but require careful sample collection and handling.

Each of these methods offers unique insights into soil behavior, and often, a combination of tests is used to get a comprehensive understanding. By employing these soil stress testing methods, engineers can make informed decisions to ensure the safety and stability of residential constructions.

Discussion of the benefits of soil stress testing for homeowners and contractors

Sure, here's a short essay on the benefits of soil stress testing for homeowners and contractors:

Discussing the Benefits of Soil Stress Testing for Homeowners and Contractors

Soil stress testing is an essential practice that offers numerous benefits to both homeowners and contractors. By evaluating the mechanical behavior of soil under various loads, this testing method provides critical insights that contribute to the safety, durability, and cost-effectiveness of residential construction projects.

For homeowners, the primary benefit of soil stress testing is enhanced structural safety. Understanding the soil's capacity to bear loads helps ensure that the foundation of a home is built on stable ground. This reduces the risk of structural issues such as settling, cracking, or even collapse, which can be costly and dangerous. Moreover, informed soil data allows homeowners to make better decisions about the type of foundation that best suits their property, whether it be a slab, pier, or crawl space.

From a financial perspective, soil stress testing can lead to significant cost savings. By identifying potential soil problems early in the construction process, homeowners can avoid expensive repairs down the line. For instance, if the test reveals expansive soils that are prone to swelling and shrinking with moisture changes, appropriate measures can be taken during construction to mitigate these effects, thus preventing future damage to the home.

For contractors, soil stress testing is a valuable tool that enhances project efficiency and client satisfaction. Accurate soil data allows contractors to design foundations that are tailored to the specific conditions of the site, leading to more robust and reliable structures. This precision not only improves the quality of the work but also builds trust with clients, as they see the thoroughness and professionalism invested in their project.

Additionally, soil stress testing can streamline the construction process. With a clear understanding of the soil's properties, contractors can avoid unexpected delays caused by unforeseen ground conditions. This leads to more accurate project timelines and budgeting, which are crucial for maintaining client relationships and securing future business.

In conclusion, soil stress testing offers indispensable benefits to both homeowners and contractors. For homeowners, it ensures the safety and longevity of their investment, while for contractors, it enhances project outcomes and client satisfaction. As residential construction continues to evolve, the importance of thorough soil analysis through stress testing cannot be overstated.

Case studies showcasing successful soil stress testing and foundation repair projects

Soil stress testing plays a critical role in ensuring the stability and longevity of residential constructions. By analyzing the load-bearing capacity and stress distribution in the soil, engineers and builders can make informed decisions that prevent structural failures. Several case studies have highlighted the efficacy of soil stress testing in residential sites, showcasing not only the importance of thorough soil analysis but also the successful outcomes of foundation repair projects.

One notable case study involves a suburban neighborhood where homeowners reported uneven settling and minor cracks in their homes. After conducting a detailed soil stress analysis, engineers discovered that the soil beneath the foundations varied significantly in composition and load-bearing capacity. Some areas had pockets of loose, sandy soil, while others contained more stable, clay-rich soil. By identifying these variations, the engineers were able to design a customized foundation repair plan. This included underpinning certain sections with additional support and adjusting the load distribution across the foundation. Post-repair assessments showed a marked improvement in structural stability, and homeowner satisfaction increased as the issues of settling and cracking were effectively addressed.

Another compelling example comes from a coastal residential area prone to soil erosion and shifting due to tidal influences. Soil stress testing revealed that the soil's capacity to support the homes was compromised during high tide periods when water content increased. To combat this, engineers implemented a two-pronged approach: reinforcing the foundations with helical piers that extended deep into more stable soil layers and installing a sophisticated drainage system to manage water flow around the foundations. The result was a significant reduction in soil erosion and a more stable foundation, ensuring the homes remained safe and habitable despite the challenging environmental conditions.

In a third case, a residential development project in an area with expansive clay soils faced substantial issues during the construction phase. Expansive clays are known for their tendency to swell when wet and shrink when dry, leading to foundation movement and structural damage. Initial soil stress tests indicated high potential for soil expansion, prompting the construction team to adopt a proactive approach. They utilized a combination of soil stabilization techniques, including chemical treatments to reduce the clay's expansive properties and the installation of foundation systems designed to accommodate movement. The project not only proceeded without major incidents but also set a new standard for building in similar soil conditions, demonstrating the value of comprehensive soil stress testing.

These case studies underscore the importance of soil stress testing in residential construction. They illustrate how tailored solutions based on thorough soil analysis can lead to successful foundation repair projects, ensuring the safety and durability of homes. As building practices evolve, the integration of advanced soil stress testing techniques will continue to be essential in mitigating risks and enhancing the resilience of residential structures.

Tips for selecting a reputable soil testing and foundation repair company

When it comes to building or renovating a home, ensuring the stability and safety of your foundation is paramount. One crucial step in this process is soil stress testing, which helps determine the load-bearing capacity of the soil beneath your property. To get accurate and reliable results, it's essential to select a reputable soil testing and foundation repair company. Here are some tips to help you make an informed decision.

First and foremost, do your research. Start by looking for companies with a solid reputation in the industry. Check online reviews, ask for recommendations from friends or family, and seek out any professional affiliations or certifications the company may have. A reputable company will often display their credentials proudly, so take note of any awards, memberships, or industry recognitions.

Experience matters. Look for a company with a proven track record in soil testing and foundation repair. Experienced professionals are more likely to have encountered a variety of soil conditions and foundation issues, making them better equipped to provide accurate assessments and effective solutions. Don't hesitate to ask about the company's history and the specific projects they have completed in your area.

Transparency is key. A reputable soil testing and foundation repair company should be open and honest about their processes, pricing, and any potential risks involved. They should provide you with a clear and detailed estimate before any work begins, outlining the scope of the project, the costs involved, and the expected timeline. Avoid companies that pressure you into making quick decisions or those that provide vague or inconsistent information.

Communication is vital. Effective communication is essential throughout the soil testing and foundation repair process. Choose a company that keeps you informed at every step, from the initial assessment to the final report. They should be responsive to your questions and concerns, providing clear explanations and updates as needed. A company that values open and honest communication is more likely to deliver a satisfactory outcome.

Consider their equipment and technology. Soil testing and foundation repair require specialized equipment and technology to ensure accurate results and effective solutions. A reputable company will invest in up-to-date tools and machinery, as well as employ trained professionals who are skilled in using them. This commitment to quality equipment and technology demonstrates their dedication to providing the best possible service.

Lastly, trust your instincts. If something feels off or you have concerns about a particular company, it's essential to trust your gut. A reputable soil testing and foundation repair company should make you feel confident and comfortable throughout the process. If you encounter any red flags or have doubts, don't hesitate to explore other options.

In conclusion, selecting a reputable soil testing and foundation repair company is crucial for ensuring the stability and safety of your residential site. By conducting thorough research, prioritizing experience and transparency, valuing effective communication, considering their equipment and technology, and trusting your instincts, you can make an informed decision and feel confident in your choice. Remember, investing in a reputable company will ultimately contribute to the long-term success and stability of your home.

Common misconceptions about soil stress testing and foundation repair

When it comes to soil stress testing and foundation repair, there are several common misconceptions that can lead to misunderstandings and ineffective solutions. One prevalent

myth is that all soil stress tests are the same. In reality, soil stress testing methods can vary significantly depending on the specific conditions of the site and the type of soil present. Some tests might be more suitable for sandy soils, while others are better for clay or silt. Understanding the nuances of these tests is crucial for accurate assessment and effective repair strategies.

Another misconception is that foundation issues are always visible. In truth, many foundation problems occur below the surface and may not manifest as obvious cracks or shifts. This is why soil stress testing is so important-it can detect hidden issues before they become major problems. Homeowners often wait until they see visible signs of damage, such as cracks in walls or uneven floors, but by then, the underlying soil issues may have worsened.

There's also a belief that foundation repair is a one-size-fits-all solution. In fact, the appropriate repair method depends on the specific soil conditions and the type of foundation. For instance, a slab foundation might require different interventions compared to a pier and beam foundation. Ignoring these differences can lead to ineffective repairs and continued issues.

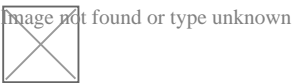
Additionally, some people think that soil stress testing is an unnecessary expense. However, skipping this crucial step can lead to more costly problems down the line. Identifying soil issues early can save homeowners time, money, and stress in the long run by preventing more severe foundation damage.

Lastly, there's a misconception that DIY solutions are effective for foundation repair. While some minor issues might be addressed by homeowners, significant foundation problems require professional expertise. Qualified engineers and contractors have the knowledge and tools to properly assess soil conditions and implement effective repair strategies.

In conclusion, dispelling these common misconceptions about soil stress testing and foundation repair can lead to better understanding and more effective solutions for residential sites. It's essential to approach these issues with the right knowledge and professional guidance to ensure the stability and safety of any home.



About foundation



Look up ***foundation*** or ***foundations*** in Wiktionary, the free dictionary.

Foundation(s) or **The Foundation(s)** may refer to:

Common uses

[edit]

- Foundation (cosmetics), a skin-coloured makeup cream applied to the face
- Foundation (engineering), the element of a structure which connects it to the ground, and transfers loads from the structure to the ground

- Foundation (evidence), a legal term
- Foundation (nonprofit), a type of charitable organization
 - Foundation (United States law), a type of charitable organization in the U.S.
 - Private foundation, a charitable organization that might not qualify as a public charity by government standards

Arts, entertainment, and media

[edit]

Film and TV

[edit]

- *The Foundation*, a film about 1960s-1970s Aboriginal history in Sydney, featuring Gary Foley
- *The Foundation* (1984 TV series), a Hong Kong series
- *The Foundation* (Canadian TV series), a 2009–2010 Canadian sitcom
- "The Foundation" (*Seinfeld*), an episode
- *Foundation* (TV series), an Apple TV+ series adapted from Isaac Asimov's novels

Games

[edit]

- *Foundation* (video game), a city-building game (2025)
- *Foundation*, an Amiga video game
- The Foundation, a character in 2017 game *Fortnite Battle Royale*

Literature

[edit]

- Foundation (book series), a series of science fiction books by Isaac Asimov
 - *Foundation* (Asimov novel), the first book in Asimov's series, published in 1951
- *Foundation* (b-boy book), by Joseph G. Schloss
- *Foundation* (Lackey novel), a 2008 fantasy novel by Mercedes Lackey

Music

[edit]

- The Foundations, a British soul group
- Foundations (EP), by Serj Tankian

Albums

[edit]

- *Foundation* (Brand Nubian album)
- *Foundation* (Breakage album)
- *Foundation* (Doc Watson album)
- *Foundation* (Magnum album)
- *Foundation* (M.O.P. album)
- *Foundation*, a 1997 compilation album by Die Krupps
- *The Foundation* (Geto Boys album)
- *The Foundation* (Pep Love album), 2005
- *The Foundation* (Zac Brown Band album)
- *The Foundations* (album), by 4 Corners

Songs

[edit]

- "Foundation", a 1983 song by Spandau Ballet from the album *True*
- "Foundation", a 1998 song by Brand Nubian from the eponymous album *Foundation*
- "Foundation", a 2009 song by M.O.P. from the eponymous album *Foundation*
- "Foundation", a 2010 song by Breakage from the eponymous album *Foundation*
- "Foundation", a 2015 song by Years & Years from *Communion*
- "Foundations" (song), by Kate Nash
- "The Foundation" (song), by Xzibit

Other uses in arts, entertainment, and media

[edit]

- *Foundation – The International Review of Science Fiction*, a literary journal
- *The Foundation Trilogy* (BBC Radio), a radio adaption of Asimov's series
- The SCP Foundation, a fictional organization that is often referred to in-universe as "The Foundation"

Education

[edit]

- Foundation degree, a British academic qualification
- Foundation school, a type of school in England and Wales
- Foundation Stage, a stage of education for children aged 3 to 5 in England
- University Foundation Programme, a British university entrance course

Science and technology

[edit]

- Foundation (framework), a free collection of tools for creating websites and web applications by ZURB
- Foundation Fieldbus, a communications system
- Foundation Kit, an Apple API

Companies

[edit]

- Foundation Medicine, a genomic profiling company

See also

[edit]

- All pages with titles beginning with *Foundation*
- All pages with titles beginning with *The Foundation*
- Foundations of mathematics, theory of mathematics

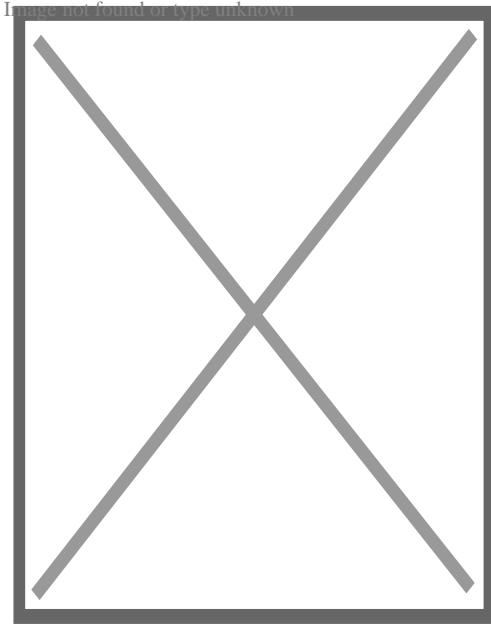
Disambiguation icon

Image not found or type unknown

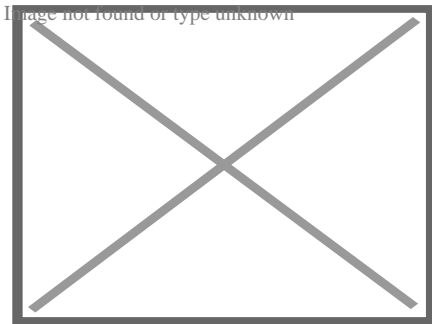
This disambiguation page lists articles associated with the title **Foundation**.

If an internal link led you here, you may wish to change the link to point directly to the intended article.

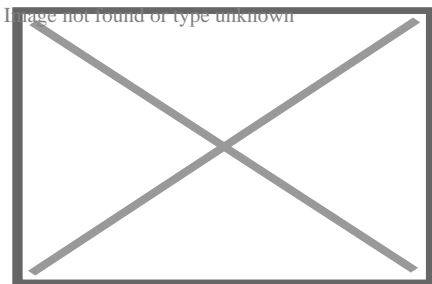
About geotechnical engineering



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 , $\displaystyle \tan(\phi)$ the normal stress on the slip plane and $\displaystyle \tan(\phi)$ the 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

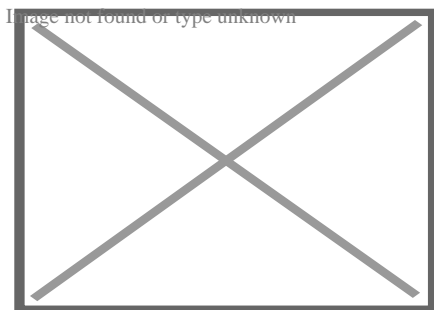
[edit]

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

[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.

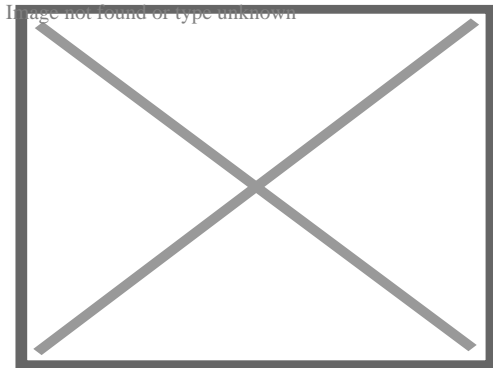
Ground improvement

[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.

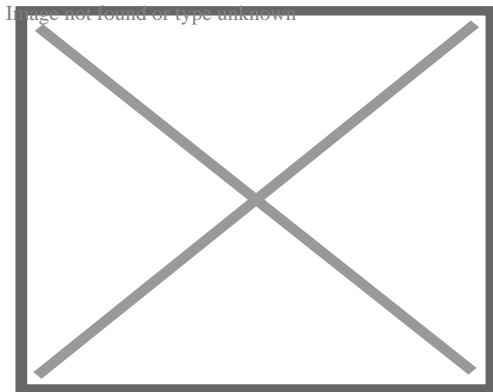
Sub-disciplines

[edit]

Geosynthetics

[edit]

Main article: Geosynthetics



A collage of geosynthetic products.

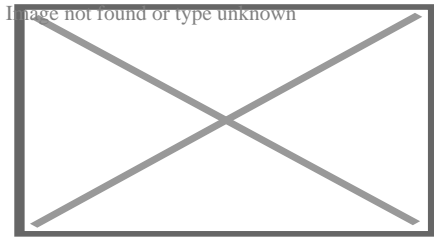
Geosynthetics are a type of plastic polymer products used in geotechnical engineering that improve engineering performance while reducing costs. This includes geotextiles, geogrids, geomembranes, geocells, and geocomposites. The synthetic nature of the products make them suitable for use in the ground 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]

-  [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]

1. ^ **a b c d** Das, Braja (2006). *Principles of Geotechnical Engineering*. Thomson Learning.
2. ^ **a b** Budhu, Muni (2007). *Soil Mechanics and Foundations*. John Wiley & Sons, Inc. ISBN 978-0-471-43117-6.
3. ^ **a b** Disturbed soil properties and geotechnical design, Schofield, Andrew N., Thomas Telford, 2006. ISBN 0-7277-2982-9
4. ^ Guerriero V., Mazzoli S. (2021). "Theory of Effective Stress in Soil and Rock and Implications for Fracturing Processes: A Review". *Geosciences*. **11** (3): 119. Bibcode:2021Geosc..11..119G. doi:10.3390/geosciences11030119.
5. ^ Soil Mechanics, Lambe, T. William and Whitman, Robert V., Massachusetts Institute of Technology, John Wiley & Sons., 1969. ISBN 0-471-51192-7
6. ^ Soil Behavior and Critical State Soil Mechanics, Wood, David Muir, Cambridge University Press, 1990. ISBN 0-521-33782-8
7. ^ Terzaghi, K., Peck, R.B. and Mesri, G. (1996), *Soil Mechanics in Engineering Practice* 3rd Ed., John Wiley & Sons, Inc. ISBN 0-471-08658-4
8. ^ Holtz, R. and Kovacs, W. (1981), *An Introduction to Geotechnical Engineering*, Prentice-Hall, Inc. ISBN 0-13-484394-0
9. ^ Deep Scan Tech (2023): Deep Scan Tech uncovers hidden structures at the site of Denmark's tallest building.
10. ^ "Geofrost Coring". *GEOFROST*. Retrieved 20 November 2020.
11. ^ **a b** Han, Jie (2015). *Principles and Practice of Ground Improvement*. Wiley. ISBN 9781118421307.
12. ^ RAJU, V. R. (2010). *Ground Improvement Technologies and Case Histories*. Singapore: Research Publishing Services. p. 809. ISBN 978-981-08-3124-0. *Ground Improvement – Principles And Applications In Asia*.
13. ^ Pariseau, William G. (2011). *Design analysis in rock mechanics*. CRC Press.
14. ^ Hegde, A.M. and Palsule P.S. (2020), Performance of Geosynthetics Reinforced Subgrade Subjected to Repeated Vehicle Loads: Experimental and Numerical Studies. *Front. Built Environ.* 6:15. <https://www.frontiersin.org/articles/10.3389/fbuil.2020.00015/full>.
15. ^ Koerner, Robert M. (2012). *Designing with Geosynthetics (6th Edition, Vol. 1 ed.)*. Xlibris. ISBN 9781462882892.
16. ^ **a b** Dean, E.T.R. (2010). *Offshore Geotechnical Engineering – Principles and Practice*. Thomas Telford, Reston, VA, 520 p.
17. ^ Randolph, M. and Gourvenec, S., 2011. *Offshore geotechnical engineering*. Spon Press, N.Y., 550 p.
18. ^ Das, B.M., 2010. *Principles of geotechnical engineering*. Cengage Learning, Stamford, 666 p.
19. ^ Atkinson, J., 2007. *The mechanics of soils and foundations*. Taylor & Francis, N.Y., 442 p.
20. ^ Floating Offshore Wind Turbines: Responses in a Sea state – Pareto Optimal Designs and Economic Assessment, P. Sclavounos et al., October 2007.
21. ^ Nicholson, D, Tse, C and Penny, C. (1999). *The Observational Method in ground engineering – principles and applications*. Report 185, CIRIA, London.

22. ^ **a b c** Peck, R.B (1969). Advantages and limitations of the observational method in applied soil mechanics, *Geotechnique*, 19, No. 1, pp. 171-187.

References

[edit]

- Bates and Jackson, 1980, *Glossary of Geology*: American Geological Institute.
- Krynine and Judd, 1957, *Principles of Engineering Geology and Geotechnics*: McGraw-Hill, New York.
- Ventura, Pierfranco, 2019, *Fondazioni*, Volume 1, *Modellazioni statiche e sismiche*, Hoepli, Milano

- Holtz, R. and Kovacs, W. (1981), *An Introduction to Geotechnical Engineering*, Prentice-Hall, Inc. ISBN 0-13-484394-0
- Bowles, J. (1988), *Foundation Analysis and Design*, McGraw-Hill Publishing Company. ISBN 0-07-006776-7
- Cedergren, Harry R. (1977), *Seepage, Drainage, and Flow Nets*, Wiley. ISBN 0-471-14179-8
- Kramer, Steven L. (1996), *Geotechnical Earthquake Engineering*, Prentice-Hall, Inc. ISBN 0-13-374943-6
- Freeze, R.A. & Cherry, J.A., (1979), *Groundwater*, Prentice-Hall. ISBN 0-13-365312-9
- Lunne, T. & Long, M.,(2006), *Review of long seabed samplers and criteria for new sampler design*, *Marine Geology*, Vol 226, p. 145–165
- Mitchell, James K. & Soga, K. (2005), *Fundamentals of Soil Behavior* 3rd ed., John Wiley & Sons, Inc. ISBN 978-0-471-46302-3
- Rajapakse, Ruwan., (2005), "Pile Design and Construction", 2005. ISBN 0-9728657-1-3

- Fang, H.-Y. and Daniels, J. (2005) *Introductory Geotechnical Engineering : an environmental perspective*, Taylor & Francis. ISBN 0-415-30402-4
- NAVFAC (Naval Facilities Engineering Command) (1986) *Design Manual 7.01, Soil Mechanics*, US Government Printing Office
- NAVFAC (Naval Facilities Engineering Command) (1986) *Design Manual 7.02, Foundations and Earth Structures*, US Government Printing Office
- NAVFAC (Naval Facilities Engineering Command) (1983) *Design Manual 7.03, Soil Dynamics, Deep Stabilization and Special Geotechnical Construction*, US Government Printing Office
- Terzaghi, K., Peck, R.B. and Mesri, G. (1996), *Soil Mechanics in Engineering Practice* 3rd Ed., John Wiley & Sons, Inc. ISBN 0-471-08658-4
- Santamarina, J.C., Klein, K.A., & Fam, M.A. (2001), "Soils and Waves: Particulate Materials Behavior, Characterization and Process Monitoring", Wiley, ISBN 978-0-471-49058-6
- Firuziaan, M. and Estorff, O., (2002), "Simulation of the Dynamic Behavior of Bedding-Foundation-Soil in the Time Domain", Springer Verlag.

External links

[edit]

- Worldwide Geotechnical Literature Database

- v
- t
- e

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

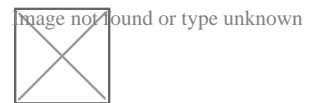
- Acoustic
- Aerospace
- Automotive
- Biomechanical
- Energy
- Manufacturing
- Marine
- Naval architecture
- Railway
- Sports
- Thermal
- Tribology

Electrical

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

**Specialties
and
interdisciplinarity**

- 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

- 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

Other

-  **Category**
-  **Commons**
-  **WikiProject**
-  **Portal**

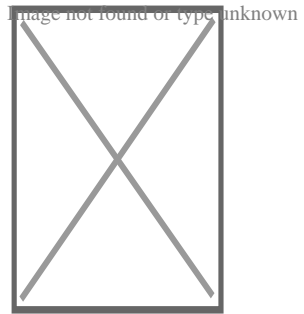
- v
- t
- e

Soil science

- History
- Index

Main fields

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



Soil topics

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

- **v**
- **t**
- **e**

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

-  [Wikipedia:WikiProject Soil](#)
-  [Category:soil](#)
- [Category soil science](#)
-  [List of soil scientists](#)





















- v
- t
- e

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
 -  Incliner
 -  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

- v
- t
- e

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

- 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
-
- India
 - Iran
 - Japan
 - Romania
 - Turkey
 - United Kingdom
 - United States
-
- 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

 [Outline](#)  [Category](#)  [Other type unknown](#)

Authority control databases: National

 [Edit this at Wikidata](#)

- Germany
- United States
- Czech Republic
- Israel

About Cook County

Photo

Image not found or type unknown

Photo

Image not found or type unknown

Photo

Image not found or type unknown

Photo

Image not found or type unknown

Things To Do in Cook County

Photo

Image not found or type unknown

Sand Ridge Nature Center

4.8 (96)

Photo

Image not found or type unknown

River Trail Nature Center

4.6 (235)

Photo

Image not found or type unknown

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

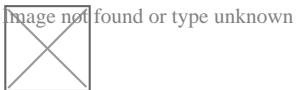
<https://www.google.com/maps/dir/Navy+Pier/United+Structural+Systems+of+Illinois%2C+87.6050944,14z/data=!3m1!4b1!4m14!4m13!1m5!1m1!1sunknown!2m2!1d-87.6050944!2d41.8918633!1m5!1m1!1sChIJ-wSxDtinD4gRiv4kY3RRh9U!2m2!1d-88.1396465!2d42.0637725!3e0>

<https://www.google.com/maps/dir/Lake+Katherine+Nature+Center+and+Botanic+Garden%2C+87.8010774,14z/data=!3m1!4b1!4m14!4m13!1m5!1m1!1sunknown!2m2!1d-87.8010774!2d41.6776048!1m5!1m1!1sChIJ-wSxDtinD4gRiv4kY3RRh9U!2m2!1d-88.1396465!2d42.0637725!3e0>

88.1396465!2d42.0637725!3e2

<https://www.google.com/maps/dir/Palmisano+%28Henry%29+Park/United+Structural+Sy87.6490151,14z/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>

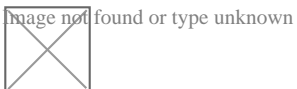
Reviews for



Jeffery James

(5)

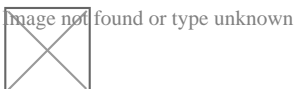
Very happy with my experience. They were prompt and followed through, and very helpful in fixing the crack in my foundation.



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.

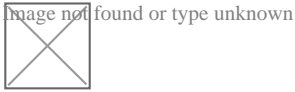


Jim de Leon

(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

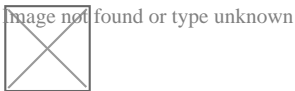
discuss updates and expectations of completion. They provided waivers of lien, certificates of insurance, properly acquired permits, and JULIE locates. From a construction background, I can tell you that I did not see any flaws in the way they operated and this an extremely professional company. The 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!



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



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.

Investigating Soil Stress Testing in Residential Sites [View 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](#)

[Sitemap](#)

[Privacy Policy](#)

[About Us](#)

