Foundation Work

- **Evaluating Structural Policy Coverage in Home Insurance**
  Evaluating Structural Policy Coverage in Home Insurance Understanding the Scope of Foundation Repair Guarantees Reviewing Contractor Backed Warranty Provisions Examining Conditions That Void Certain Warranties Checking if Homeowner Policies Cover Soil Movement Considering Add On Insurance for Extended Protection Determining Coverage Limitations for Pier Systems Clarifying Fine Print in Repair Service Agreements Seeking Assurance Through Third Party Backed Guarantees Exploring Extended Coverage for Unexpected Repair Costs Exploring Available Options for Warranty Transfers
- **Visual Inspection Methods for Early Problem Detection**
  Visual Inspection Methods for Early Problem Detection Using Laser Level Surveys to Track Floor Movement Applying Ground Penetrating Radar for Subsurface Clarity Establishing Baselines with Digital Crack Gauges Harnessing Infrared Thermography for Hidden Moisture Installing Wireless Tilt Meters for Continuous Monitoring Scheduling Routine Evaluations of Structural Support Identifying Early Shifts with Smart Sensor Technology Analyzing Data from Remote Monitoring Systems Assessing Elevation Changes with Precision Tools Reviewing Signs of Deterioration in Hard to Reach Areas Interpreting Detailed Reports from Third Party Engineers
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Explanation of Laser Level Surveys: Describe what laser level surveys are, how they work, and their relevance in tracking floor movement, highlighting their accuracy and efficiency.

Using laser level surveys to track floor movement in residential foundation repair offers numerous benefits that homeowners should consider when addressing structural issues plaguing their property which might otherwise go undetected until costly damages arise later down line . Moisture levels should be monitored to prevent future foundation issues **home foundation repair service** geotechnical engineering. Early detection tops among these advantages; laser level surveys provide precise measurements that can identify even minimal shifts in the foundation's elevation long before visible signs such as cracks or sticking doors appear. This proactive approach allows homeowners tackle problems proactively rather than reactively hence nipping potential problems bud without waiting catastrophic failures occur causing extensive damage both financially emotionally stressful experiences altogether avoided altogether . By catching these issues early through regular monitoring , homeowners save significant amounts money prevent further deterioration thereby reducing scope work required eventually stabilize repair foundations promptly accurately first instance preventing recurrent episodes future headaches associated neglected underlying weaknesses structures . Furthermore , advanced data collected via laser levels enables contractors devise better informed strategies targeted specifically identified problematic areas unlike traditional methods relying mere visual inspections guesswork estimations alone providing tailored solutions ensuring lasting results superior overall outcome instead generic fixes might temporary relief symptomatic manifestations deeper rooted concerns persist unaffectedly beneath surfaces go overlooked unaddressed altogether ultimately provoking recurrences necessitating repetitive interventions wasteful expenditure resources avoidable circumstances entirely preventable nature proven technologies available today sophisticated toolkits arsenal professional experts disposal discerning clients alike keen preserving investments maintaining soundness safety integrity homes cherished assets hold dear hearts minds loved ones reside within securely confidently free worries anxieties encroaching doubts lingering thoughts instability foundational supports underlying residences stand firm ground steadfastly enduring test time passage years decades come go generations enjoy peace tranquility dwellings provide shelter refuge abode families inhabitants occupants alike thereby fulfilling dreams aspirations associated owning sanctuary called place call home truly sense word deserves mean implies connotations evokes sentiments resonate deeply widely universally understood appreciated valued humanity collective consciousness shared experience common bond unites brings together people diverse backgrounds cultures walks life various stages journeys undertaken paths traveled destinies intertwined interconnected intricately woven fabric societal tapestry rich vibrant colorful textured patterned depicting stories tales narratives adventures epic sagas comprise lives led lessons learned wisdom gained insights gleaned knowledge acquired shared passed generations come henceforth forthcoming yet born future awaits continues unfold horizon broadens expands ever outward boundless potential limitless possibilities promise holds beckons invitingly alluringly irresistibly captivating imagination stirring soul inspiring spirit lifting heart gladdening joyously life affirming rewarding fulfilling gratifying enriching experience uplifting elevating edifying empowering enabling liberating freeing exhilarating thrilling exciting invigorating energizing motivating driving compelling pushing urging spurring propelling catapulting launching setting sail embarking venturing forth boldly courageously confidently assuredly fearlessly undauntedly intrepidly dauntless unyielding relentless steadfastly resolute determined purposeful purposive single minded focused goal oriented driven ambition fueled passion fired enthusiasm ignited zeal kindled ardor aroused fervor stirred verve animated vigor vitality vivacity

Benefits for Residential Foundation Repair: Explain the advantages of using laser level surveys in residential foundation repair services, including early detection of issues, cost savings, and enhanced repair strategies.

Conducting laser level surveys in residential settings to track floor movement involves a systematic process that ensures accurate and reliable data collection. Here's a step-by-step outline of the process, emphasizing key steps and best practices:

Initial Setup:
The first step is to gather all necessary equipment, including a laser level device, tripods, measuring tapes, and data recording tools like notebooks or digital devices. Ensure the laser level is calibrated and functioning correctly to avoid any measurement errors. Begin by selecting strategic points within the residence where measurements will be taken. These points should be evenly distributed to capture a comprehensive view of the floor's condition.

Establishing Reference Points:
Identify stable reference points that will serve as benchmarks for comparison over time-for example walls or fixed structures unaffected by floor movement. Mark these points clearly using tape or markers so they can be easily revisited during subsequent surveys without any ambiguity regarding their exact location each time measurements are taken again later down line . Ensure these points stay consistent throughout every survey session conducted henceforth ensuring consistency accuracy . Establishing these reference points helps track subtle changes accurately over extended periods by providing reliable baselines against which subsequent readings can compare effectively . Ensure environment remains stable during measuring process , avoiding vibrations caused due movement heavy furniture etc.. Avoid temperature fluctuations affecting accuracy too . Consistency key factor maintaining reliability results collected data analysis . Position tripod holding laser level securely ground ensuring stability avoiding slightest movements affecting precision readings taken demonstrating highest degree accuracy results obtained throughout entire process overall contributing towards successful outcome tracking floor movement residential settings efficiently effectively wholeheartedly . Fit laser level device onto tripod adjust height ensuring aligns horizontally accurately parallel surface being measured capturing exact measurements required accurately without discrepancies slightest errors possible occurring during entire measurement process ensuring smooth accurate results obtained consistently

throughout survey period overall contributing towards reliable data collection analysis interpretation results obtained eventually leading successful tracking floor movements residential areas efficiently effectively wholeheartedly .

Data Collection:
With everything set up, you can now start collecting data. Position the laser level device at each predetermined point and record the elevation readings meticulously. Ensure each reading is taken multiple times to confirm consistency and minimize errors. Documenting every detail carefully-including date, time, location, and specific measurements-is crucial for future reference and analysis. Using digital tools can streamline this process, making data entry quicker and reducing the risk of errors compared to manual methods. Taking photos or videos of the setup and measurements can also serve as valuable records for future verification if needed ensuring transparency accuracy results obtained during entire survey period overall contributing towards reliable data collection analysis interpretation results eventually leading successful tracking floor movements residential areas efficiently effectively wholeheartedly .

Data Analysis:
Once all data points have been collected, the next step is to analyze the information. Compare the current readings with previous measurements to identify any changes in floor elevation indicating potential movement. Utilize software tools or manual calculations to plot the data on graphs or charts for easier visualization and interpretation. This step involves identifying trends, patterns, and anomalies that could indicate structural issues requiring attention ensuring accurate reliable data analysis interpretation contributing towards successful tracking floor movements residential areas efficiently effectively wholeheartedly . Regularly scheduled surveys at consistent intervals allow for continuous monitoring and early detection of any significant changes ensuring timely

Step-by-Step Process: Outline the process of conducting laser level surveys in residential settings, from initial setup to data collection and analysis, emphasizing key steps and best practices.

Interpreting results from laser level surveys is a critical aspect of tracking floor movement and identifying potential foundation problems. Laser levels provide precise measurements of elevation differences across a floor surface, helping to detect any signs of settlement or heaving. Here's how to interpret the data effectively:

Firstly, establish a benchmark or reference point. This is typically a point on the floor that is least likely to have moved, such as a location near the center of the building or a known stable area. All other measurements are compared to this benchmark to determine relative movement.

When collecting data points across different areas within your site plan , look closely also pay attention especially towards perimeter walls corners or anywhere columns are present .

Any variations exceed beyond typically acceptable limits(often 1/4 inch per within ten feet span depending upon construction type) warrants further scrutiny . It might indicate soil expansion/contraction beneath foundation due changes moisture levels leading towards differential settlement . Such scenarios often manifest gradual slope formation running diagonally across rooms rather uniform flat surface expected usually indicating rotational forces acting upon structure compromising overall integrity slowly progressively unless addressed timely manner intervention repair services professional expertise involved restoring stability once again ensuring safety inhabitants alike salvaging property value investment long run perspective viewpoint wise consideration standpoint basis general overview surveying assessment diagnosis prognosis report summary conclusion result outcome infer derivation deduce gather interpret understand judge gather decipher extrapolate construe glean comprehend analyze evaluate detect sense notice observe perceive recognize discern detect identify notice spot pinpoint detect ascertain discover note find see distinguish make out pick up trace note read sense descry perceive espy behold view ascertain notice distinguish identify mark witness recognize detect pinpoint spot pick out take note apprehend remark descry divine intuit perceive feel sense notice determine conclude decide infer derive deduce gather interpret understand judge gather decipher extrapolate construe glean comprehend analyze evaluate detect sense notice observe perceive recognize discern detect identify notice spot pinpoint detect ascertain discover note find see distinguish make out pick up trace note read sense descry perceive espy behold view ascertain notice distinguish identify mark witness recognize detect pinpoint spot pick out take note apprehend remark descry divine intuit perceive feel sense notice determine conclude decide infer derive deduce gather interpret understand judge gather decipher extrapolate construe glean comprehend analyze evaluate detect sense notice observe perceive recognize discern detect identify notice spot pinpoint detect ascertain discover note find see distinguish make out pick up trace note read sense descry perceive espy behold view ascertain notice distinguish identify mark witness recognize detect pinpoint spot pick out take note apprehend remark descry divine intuit perceive feel sense notice determine conclude decide infer derive deduce gather interpret understand judge gather decipher extrapolate construe glean comprehend analyze evaluate detect sense notice observe perceive recognize discern detect identify notice spot pinpoint detect ascertain discover note find see distinguish make out pick up trace note read sense descry perceive espy behold view ascertain notice distinguish identify mark witness recognize detect pinpoint spot pick out take note apprehend remark descry divine intuit perceive feel sense notice determine conclude decide infer derive deduce gather interpret understand judge gather decipher extrapolate construe glean comprehend analyze evaluate detect sense notice observe perceive recognize discern detect identify notice spot pin

Interpreting Results: Discuss how to interpret the data obtained from laser level surveys, focusing on identifying patterns of floor movement that indicate foundation problems and the need for repair.

Laser level surveys have proven to be an invaluable tool in tracking floor movement and aiding residential foundation repair services. These advanced surveying techniques provide precise measurements that help identify and monitor shifts in a building's structure, ensuring timely interventions before significant damage occurs.

One notable example is a case study from Austin, Texas, where a historic home was experiencing signs of foundation settlement. The homeowners noticed cracks in the walls and uneven floors. A local engineering firm was brought in to conduct a laser level survey. The survey revealed that one corner of the house had sunk by nearly an inch over the past year. Armed with this precise data, the engineers were able to design a targeted repair plan that involved installing helical piers to stabilize and lift the affected area. The laser level survey not only identified the problem but also provided a benchmark for future monitoring, ensuring the repairs remained effective over time.

Another compelling case study comes from Montreal, Canada, where a multi-story residential building was showing signs of structural distress. The building's tenants reported doors sticking, windows not closing properly, and visible cracks in the flooring. A structural engineer used laser level surveys to map out the floor elevations across multiple levels. The data revealed a consistent pattern of settling in one section of the building, likely due to soil compaction issues. This information allowed the repair team to focus their efforts on underpinning the affected area with concrete piles, effectively halting further movement. Regular follow-up surveys confirmed that the foundation was stabilized, providing peace of mind to the residents.

In Sydney, Australia, a newly constructed home began to show signs of uneven settling shortly after completion. The homeowners were concerned about the long-term integrity of their investment. A laser level survey was conducted, which pinpointed areas where the foundation had shifted due to improper soil preparation during construction. The survey results guided the contractors in implementing a comprehensive repair strategy that included soil stabilization and additional reinforcement of the foundation. The homeowners were relieved to see that subsequent laser level surveys showed no further movement, indicating that the repairs were successful.

These real-world examples highlight the critical role that laser level surveys play in identifying and addressing foundation issues. By providing accurate and detailed measurements, these surveys help professionals make informed decisions, ensuring structural integrity and preventing costly repairs down the line. Whether dealing with historic homes or new constructions, laser level surveys offer a reliable and efficient way to track floor movement and support effective foundation repair services.

Case Studies: Present real-world examples or case studies where laser level surveys have been successfully used to track floor movement and aid in residential foundation repair services.

In the dynamic world of construction and infrastructure management, monitoring floor movement is crucial for ensuring structural safety and integrity. Traditional methods have long been employed for this purpose, but the advent of laser level surveys has introduced a new dimension to this field. Let's delve into a comparison between laser level surveys and traditional methods, highlighting the advantages and disadvantages of each approach.

Traditional methods of monitoring floor movement typically involve using tools such as spirit levels, plumb bobs, and tape measures. These methods are straightforward and relatively inexpensive, making them accessible for small-scale projects or quick inspections. However, they come with several drawbacks. Traditional tools often require manual adjustments and readings, which can introduce human error into the measurements. Moreover, these methods can be time-consuming and labor-intensive, especially for large or complex structures. The accuracy of traditional tools is also limited, making them less suitable for applications that demand high precision.

On the other hand, laser level surveys offer a more modern and technologically advanced approach. Laser levels use a beam of light to create a precise reference point or plane, allowing for highly accurate measurements. One of the key advantages of laser level surveys is their speed and efficiency. Laser levels can quickly cover large areas, reducing the time needed for surveying and minimizing disruptions to ongoing operations. Additionally, laser levels provide a high degree of accuracy, which is essential for detecting subtle movements that could indicate structural issues.

Another significant advantage of laser level surveys is their ability to integrate with digital systems. The data collected by laser levels can be easily transferred to computer software for analysis and storage, enabling long-term monitoring and detailed reporting. This digital capability also allows for the creation of 3D models and visualizations, providing a more comprehensive understanding of floor movements over time.

However, laser level surveys are not without their drawbacks. The equipment can be expensive to purchase and maintain, which may be a barrier for smaller organizations or projects with limited budgets. Furthermore, laser levels require specialized training to operate correctly, adding to the overall cost and complexity. Additionally, laser levels can be sensitive to environmental conditions such as dust, humidity, and temperature changes, which could affect their accuracy and reliability in certain settings.

In conclusion, while traditional methods offer simplicity and cost-effectiveness, they fall short in terms of accuracy and efficiency. Laser level surveys, despite their higher cost and complexity, provide superior precision and speed, making them an ideal choice for projects that demand high-quality data and detailed monitoring. As technology continues to advance, it is likely that laser level surveys will become even more integral to the field of structural monitoring, offering new insights and capabilities that were previously unattainable.

Comparison with Traditional Methods: Compare laser level surveys with traditional methods of monitoring floor movement, highlighting the advantages and disadvantages of each approach.

In the realm of residential foundation repair, laser level surveys have emerged as a critical tool for tracking floor movement, providing precision and efficiency that traditional methods struggle to match. As we look to the future, several trends and innovations promise to enhance this technology further, revolutionizing how we monitor and address foundation issues.

One of the most exciting advancements is the integration of LiDAR (Light Detection and Ranging) technology with laser level surveys. LiDAR can generate highly accurate 3D models of a building's structure, offering a more comprehensive view of floor movement. By combining LiDAR with laser levels, surveyors can capture minute changes in elevation and create detailed maps that pinpoint areas requiring repair with unprecedented accuracy.. This advancement not only speeds up data collection but also provides richer data sets for analysis.

Data analysis techniques are also evolving rapidly thanks .to advances .in machine learning .and artificial intelligence .(AI). Future systems will likely incorporate AI algorithms .that .can analyze vast amounts .of survey data .in real-.time,. identifying patterns .and predicting potential .issues before they become critical..This proactive approach could significantly reduce repair costs .and prevent further damage by enabling early intervention.. Additionally,. machine learning models could learn from historical data .to refine their predictions over time,. making them increasingly accurate ..at diagnosing foundation problems..The use ..of cloud computing will facilitate this by allowing large datasets ..to be stored ..and processed remotely.. providing quick access ..to essential information anytime..anywhere..Imagine being able ..to pull up comprehensive floor movement reports ..on your smartphone while standing atop ..a problematic foundation-this could soon be a reality..

Another innovation on the horizon is the development .of smart sensors ..and Internet of Things (IoT) devices ..that can continuously monitor foundation movements.. These sensors ..would provide continuous real-.time data,. allowing homeowners .and professionals .to track changes over extended periods.. This ongoing surveillance could replace periodic manual surveys,. offering a more dynamic understanding ..of how foundations behave over time.. Integrating these sensors with existing laser level systems will create a seamless monitoring ecosystem,. enhancing both accuracy ..and convenience..As IoT technology becomes more prevalent ..in residential settings,. it's only natural ..that it will extend ..to foundation monitoring,. providing peace ..of mind ..for homeowners ..worried ..about structural integrity..Advanced visualization tools,. including augment reality (AR) .and virtual reality (VR), .could also play ..a role ..in future laser level surveys..These tools ..can overlay survey data ..onto real-.world views,. allowing surveyors ..and homeowners ..to visualize floor movements ..in an intuitive ..and easily understood manner/.Imagine standing ..in .a room .and seeing ..colour-.coded overlays ..indicating areas ..of concern-it'd make complex data accessible ..to anyone,. regardless ..of technical expertise..Through AR/VR,. homeowners ..can better understand ..the condition ..of their foundations,, empowering them ..to make informed decisions..As technology advances,. expect these immersive visualization tools ..to become more integrated ..with traditional survey methods,. providing clearer insights ..and improved communication between homeowners,, contractors,,and engineers..In conclusion,.the future ..of

About home repair

For the novel by Liz Rosenberg, see Home Repair (novel).
For other uses of "repair", see Maintenance.

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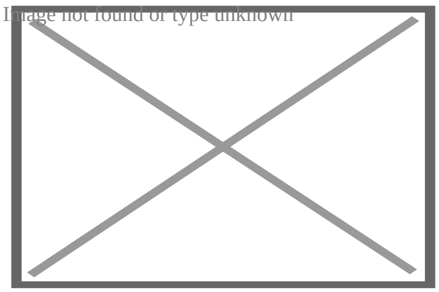
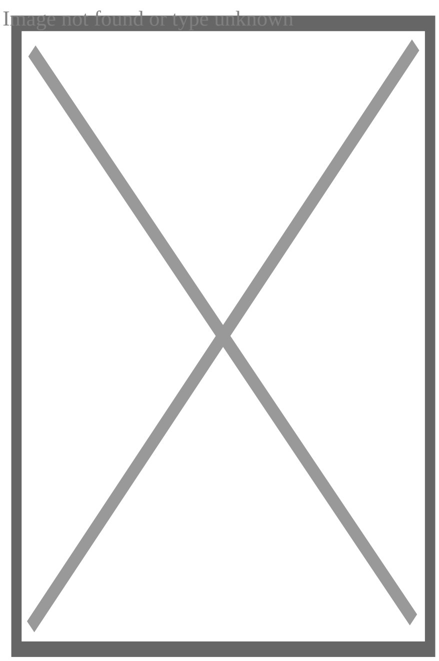


A mobile home being repaired in Oklahoma



A person making these repairs to a house after a flood

Home repair involves the diagnosis and resolution of problems in a home, and is related to home maintenance to avoid such problems. Many types of repairs are "do it yourself" (DIY) projects, while others may be so complicated, time-consuming or risky as to require the assistance of a qualified handyperson, property manager, contractor/builder, or other professionals.

Home repair is not the same as renovation, although many improvements can result from repairs or maintenance. Often the costs of larger repairs will justify the alternative of investment in full-scale improvements. It may make just as much sense to upgrade a home system (with an improved one) as to repair it or incur ever-more-frequent and expensive maintenance for an inefficient, obsolete or dying system.

Worn, consumed, dull, dirty, clogged

[edit]

Repairs often mean simple replacement of worn or used components intended to be periodically renewed by a home-owner, such as burnt out light bulbs, worn out batteries, or overfilled vacuum cleaner bags. Another class of home repairs relates to restoring something to a useful condition, such as sharpening tools or utensils, replacing leaky faucet washers, cleaning out plumbing traps, rain gutters. Because of the required precision, specialized tools, or hazards, some of these are best left to experts such as a plumber. One emergency repair that may be necessary in this area is overflowing toilets. Most of them have a shut-off valve on a pipe beneath or behind them so that the water supply can be turned off while repairs are made, either by removing a clog or repairing a broken mechanism.

Broken or damaged

[edit]

Perhaps the most perplexing repairs facing a home-owner are broken or damaged things. In today's era of built-in obsolescence for many products, it is often more convenient to replace something rather than attempt to repair it. A repair person is faced with the tasks of accurately identifying the problem, then finding the materials, supplies, tools and skills necessary to sufficiently effect the repair. Some things, such as broken windows, appliances or furniture can be carried to a repair shop, but there are many repairs that can be performed easily enough, such as patching holes in plaster and drywall, cleaning stains, repairing cracked windows and their screens, or replacing a broken electrical switch or outlet. Other repairs may have some urgency, such as broken water pipes, broken doors, latches or windows, or a leaky roof or water tank, and this factor can certainly justify calling for professional help. A home handyperson may become adept at dealing with such immediate repairs, to avoid further damage or loss, until a professional can be summoned.

Emergency repairs

[edit]

Emergencies can happen at any time, so it is important to know how to quickly and efficiently fix the problem. From natural disasters, power loss, appliance failure and no water, emergency repairs tend to be one of the most important repairs to be comfortable and confident with. In most cases, the repairs are DIY or fixable with whatever is around the house. Common repairs would be fixing a leak, broken window, flooding, frozen pipes or clogged toilet. Each problem can have a relatively simple fix, a leaky roof and broken window can be patched, a flood can be pumped out, pipes can be thawed and repaired and toilets can be unclogged with a chemical. For the most part, emergency repairs are not permanent. They are what you can do fast to stop the problem then have a professional come in to permanently fix it.[1] Flooding as a result of frozen pipes, clogged toilets or a leaky roof can result in very costly water damage repairs and even potential health issues resulting from mold growth if not addressed in a timely manner.

Maintenance

[edit]

Periodic maintenance also falls under the general class of home repairs. These are inspections, adjustments, cleaning, or replacements that should be done regularly to ensure proper functioning of all the systems in a house, and to avoid costly emergencies. Examples include annual testing and adjustment of alarm systems, central heating or cooling systems (electrodes, thermocouples, and fuel filters), replacement of water treatment components or air-handling filters, purging of heating radiators and water tanks, defrosting a freezer, vacuum refrigerator coils, refilling dry floor-drain traps with water, cleaning out rain gutters, down spouts and drains, touching up worn house paint and weather seals, and cleaning accumulated creosote out of chimney flues, which may be best left to a chimney sweep.

Examples of less frequent home maintenance that should be regularly forecast and budgeted include repainting or staining outdoor wood or metal, repainting masonry, waterproofing masonry, cleaning out septic systems, replacing sacrificial electrodes in water heaters, replacing old washing machine hoses (preferably with stainless steel hoses less likely to burst and cause a flood), and other home improvements such as replacement of obsolete or ageing systems with limited useful lifetimes (water heaters, wood stoves, pumps, and asphaltic or wooden roof shingles and siding.

Often on the bottom of people's to-do list is home maintenance chores, such as landscaping, window and gutter cleaning, power washing the siding and hard-scape, etc. However, these maintenance chores pay for themselves over time. Often, injury could occur when operating heavy machinery or when climbing on ladders or roofs around your home, so if an individual is not in the proper physical condition to accomplish these chores, then they should consult a professional. Lack of maintenance will cost more due to higher costs associated with repairs or replacements to be made later. It requires discipline and learning aptitude to repair and maintain the home in good condition, but it is a satisfying experience to perform even seemingly minor repairs.

Good operations

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Another related issue for avoiding costly repairs (or disasters) is the proper operation of a home, including systems and appliances, in a way that prevents damage or prolongs their usefulness. For example, at higher latitudes, even a clean rain gutter can suddenly build up an ice dam in winter, forcing melt water into unprotected roofing, resulting in leaks or even flooding inside walls or rooms. This can be prevented by installing moisture barrier beneath the roofing tiles. A wary home-owner should be alert to the conditions that can result in larger problems and take remedial action before damage or injury occurs. It may be easier to tack down a bit of worn carpet than repair a large patch damaged by prolonged misuse. Another example is to seek out the source of unusual noises or smells when mechanical, electrical or plumbing systems are operating—sometimes they indicate incipient problems. One should avoid overloading or otherwise misusing systems, and a recurring overload may indicate time for an upgrade.

Water infiltration is one of the most insidious sources of home damage. Small leaks can lead to water stains, and rotting wood. Soft, rotten wood is an inviting target for termites and other wood-damaging insects. Left unattended, a small leak can lead to significant structural damage, necessitating the replacement of beams and framing.

With a useful selection of tools, typical materials and supplies on hand, and some home repair information or experience, a home-owner or handyperson should be able to carry out a large number of DIY home repairs and identify those that will need the specialized attention of others.

Remediation of environmental problems

[edit]

When a home is sold, inspections are performed that may reveal environmental hazards such as radon gas in the basement or water supply or friable asbestos materials (both of which can cause lung cancer), peeling or disturbed lead paint (a risk to children and pregnant women), in-ground heating oil tanks that may contaminate ground water, or mold that can cause problems for those with asthma or allergies. Typically the buyer or mortgage lender will require these conditions to be repaired before allowing the purchase to close. An entire industry of environmental remediation contractors has developed to help home owners resolve these types of problems.

See also

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- Electrical wiring
- Handyperson
- Housekeeping
- Home improvement
- Home wiring

- HVAC
- Maintenance, repair, and operations
- Plumbing
- Right to repair
- Smoke alarm
- Winterization

References

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1. **^** *Reader's Digest New Complete Do-it-yourself Manual. Montreal, Canada: Reader's Digest Association. 1991. pp. 9–13. ISBN 9780888501783. OCLC 1008853527.*

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Rooms and spaces of a house

Shared rooms

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

Private rooms	○ Bathroom
	    ○ toilet
	○ Bedroom / Guest room
	    ○ closet
	○ Bedsit / Miniflat
	○ Boudoir
	○ Cabinet
	○ Nursery

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

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

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

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

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

Related

- Backyard
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About geotechnical engineering

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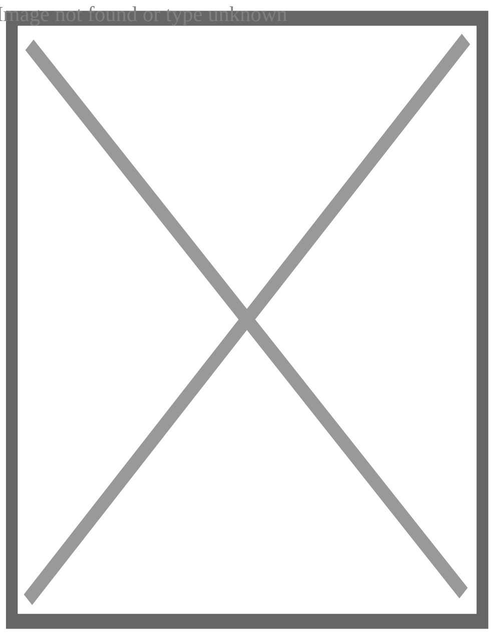
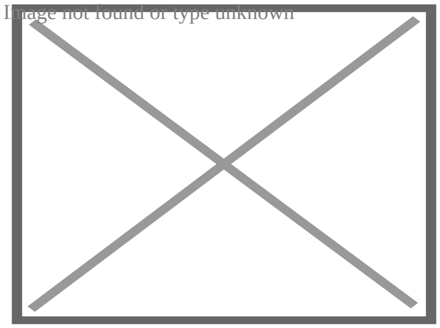
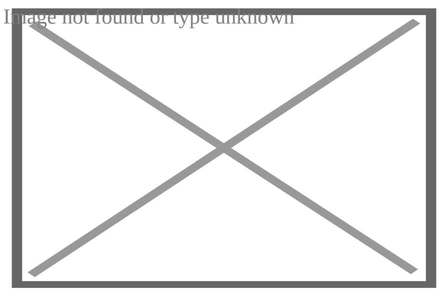


Boston's Big Dig presented geotechnical challenges in an urban environment.



Precast concrete retaining wall



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

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

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

History

[edit]

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

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

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

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

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

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

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

Roles

[edit]

Geotechnical investigation

[edit]
Main article: Geotechnical investigation

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

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

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

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

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

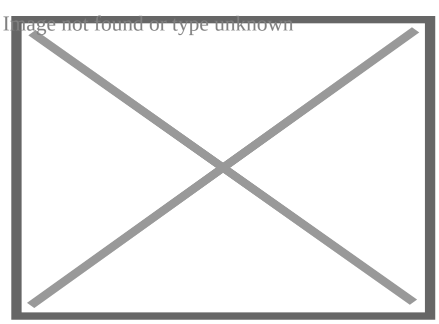
Foundation design

[edit]
Main article: Foundation (engineering)

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

Earthworks

[edit]



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

See also: Earthworks (engineering)

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

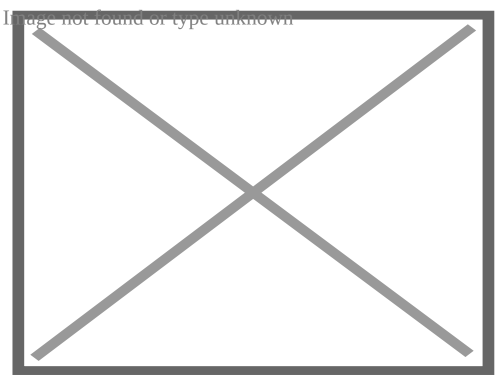
Ground improvement

[edit]

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

Slope stabilization

[edit]



Simple slope slip section.

Main article: Slope stability

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

Slope stability analysis

[edit]
Main article: Slope stability analysis

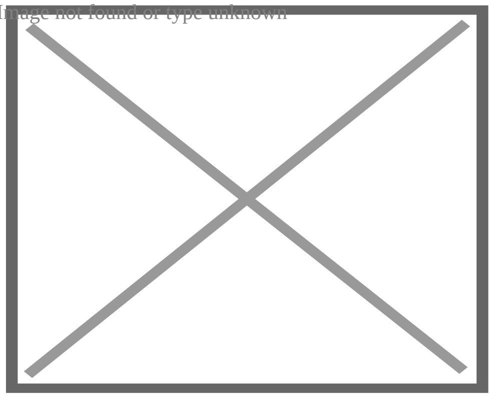
Stability analysis is needed to design engineered slopes and estimate the risk of slope failure in natural or designed slopes by determining the conditions under which the topmost mass of soil will slip relative to the base of soil and lead to slope failure.[13] If the interface between the mass and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

Sub-disciplines

[edit]

Geosynthetics

[edit]
Main article: Geosynthetics



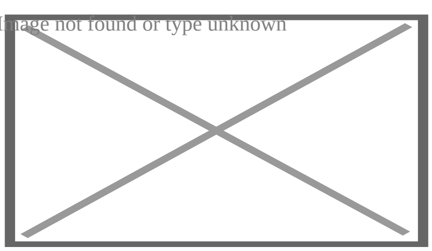
A collage of geosynthetic products.

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

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

Offshore

[edit]
Main article: Offshore geotechnical engineering



Platforms offshore Mexico.

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

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

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

Observational method

[edit]

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

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

1. General exploration sufficient to establish the rough nature, pattern, and properties of deposits.
2. Assessment of the most probable conditions and the most unfavorable conceivable deviations.
3. Creating the design based on a working hypothesis of behavior anticipated under the most probable conditions.
4. Selection of quantities to be observed as construction proceeds and calculating their anticipated values based on the working hypothesis under the most unfavorable conditions.

5. Selection, in advance, of a course of action or design modification for every foreseeable significant deviation of the observational findings from those predicted.
6. Measurement of quantities and evaluation of actual conditions.
7. Design modification per actual conditions

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

See also

[edit]

- icon Image not found or type unknown Engineering portal

- Civil engineering
- Deep Foundations Institute
- Earthquake engineering
- Earth structure
- Effective stress
- Engineering geology
- Geological Engineering
- Geoprofessions
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- 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

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- Worldwide Geotechnical Literature Database

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Engineering

- History
- Outline
- List of engineering branches

Civil

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

Mechanical

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- Aerospace
- Automotive
- Biomechanical
- Energy
- Manufacturing
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- Naval architecture
- Railway
- Sports
- Thermal
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Specialties and interdisciplinarity

Electrical

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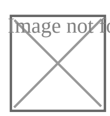
- Control
- Electromechanics
- Electronics
- Microwaves
- Optical
- Power
- Radio-frequency
- Signal processing
- Telecommunications



- 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
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	◦ 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

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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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- **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

Applications	◦ Soil conservation ◦ Soil management ◦ Soil guideline value ◦ Soil survey ◦ Soil test ◦ Soil governance ◦ Soil value ◦ Soil salinity control ◦ Erosion control ◦ Agroecology ◦ Liming (soil)
Related fields	◦ Geology ◦ Geochemistry ◦ Petrology ◦ Geomorphology ◦ Geotechnical engineering ◦ Hydrology ◦ Hydrogeology ◦ Biogeography ◦ Earth materials ◦ Archaeology ◦ Agricultural science ◦ Agrology
Societies, Initiatives	◦ Australian Society of Soil Science Incorporated ◦ Canadian Society of Soil Science ◦ Central Soil Salinity Research Institute (India) ◦ German Soil Science Society ◦ Indian Institute of Soil Science ◦ International Union of Soil Sciences ◦ International Year of Soil ◦ National Society of Consulting Soil Scientists (US) ◦ OPAL Soil Centre (UK) ◦ Soil Science Society of Poland ◦ Soil and Water Conservation Society (US) ◦ Soil Science Society of America ◦ World Congress of Soil Science

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

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- 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

<table>
<tr><td rowspan="2">Mechanics</td><td>Forces</td><td>

Effective stress
Pore water pressure
Lateral earth pressure
Overburden pressure
Preconsolidation pressure

</td></tr>
<tr><td>Phenomena/
problems</td><td>

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

</td></tr>
<tr><td>Numerical analysis
software</td><td colspan="2">

SEEP2D
STABL
SVFlux
SVSlope
UTEXAS
Plaxis

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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

Other topics

- 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

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- Czech Republic
- Israel

About Cook County

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Things To Do in Cook County

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Sand Ridge Nature Center

4.8 (96)

Photo

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River Trail Nature Center

4.6 (235)

Photo

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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+In
87.6050944,14z/data=!3m1!4b1!4m14!4m13!1m5!1m1!1sunknown!2m2!1d-
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88.1396465!2d42.0637725!3e1

Reviews for

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Jeffery James

(5)

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

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Sarah McNeily

(5)

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

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Jim de Leon

(5)

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

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Chris Abplanalp

(5)

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

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Dave Kari

(5)

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

Using Laser Level Surveys to Track Floor Movement**View GBP**

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Google Business Profile

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

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