- **Identifying Common Issues and Symptoms of residential foundations**
  Identifying Common Issues and Symptoms of residential foundations Spotting Early Warning Signs of Foundation Stress Recognizing Cracks and Shifts in Concrete Floors Understanding Sticky Doors and Window Alignment Pinpointing Sinking Spots around the Foundation Perimeter Tracking Water Intrusion as a Contributor to Structural Damage How Uneven Floors Reveal Deeper Foundation Concerns Identifying Subtle Changes in Exterior Walls When Hairline Drywall Cracks Indicate Movement Monitoring Seasonal Soil Movement for Foundation Clues Evaluating Soil Erosion and Its Impact on Stability Noting Shifting Porches and Deck Attachments Examining Sloping Floors for Underlying Settlement
- **Soil and Environmental Factors influencing home foundations**
  Soil and Environmental Factors influencing home foundations Examining Expansive Clay in Residential Areas Understanding Sandy Loam and Drainage Properties Measuring Soil Moisture for Stabilizing Foundations Impact of Freeze Thaw Cycles on Concrete Slabs Recognizing Erosion Patterns that Undermine Support Coordinating Landscaping to Control Soil Shifts Evaluating Groundwater Levels for Long Term Stability Identifying Seasonal Soil Movement in Coastal Regions Reviewing Impact of Tree Roots on Foundation Integrity Forecasting Effects of Prolonged Drought on Soil Behavior Managing Flood Risk through Strategic Elevation Observing Climate Trends for Anticipating Soil Swell
- **About Us**

*** Understanding Soil Shifts and Foundation Problems**

Okay, so picture this: your house, your lovely home, sitting pretty. Slab and pier foundations require specialized repair solutions from experts foundation repair expert service gypsum drywall. But underneath all that curb appeal, there's a silent drama unfolding – the shifting soil. We're talking about the very ground your foundation rests on, the stuff that's supposed to be stable and supportive, deciding to move around a bit. And that little shift? Well, it can lead to some not-so-lovely foundation problems.

Think of soil like a sponge. It expands when it gets wet and shrinks when it dries out. Now, imagine that happening unevenly around your foundation. One side swells, the other side contracts. That's stress, pure and simple, on your concrete. Over time, this constant push and pull can cause cracks, settling, even bowing in your foundation walls. Suddenly, you're dealing with sticking doors, uneven floors, and a general feeling of "something's not quite right."

Different types of soil are more prone to this than others. Clay soil, for example, is notorious for its expansion and contraction tendencies. Sandy soil drains quickly but offers less support. And then there's expansive soil, which can really wreak havoc. Knowing what kind of soil you have around your property is the first step in understanding the potential for soil shifts.

Now, why is this important when we're talking about landscaping? Because strategically planned landscaping can be a powerful tool in controlling moisture levels in the soil around your foundation. We're not just talking about pretty flowers here; we're talking about using plants, grading, and drainage solutions to create a more stable environment for your home. Think about it – well-placed trees can help regulate soil moisture, proper grading can direct water away from the foundation, and efficient drainage systems can prevent water from pooling and saturating the ground. Essentially, landscaping can act as a protective shield against the damaging effects of soil shifts, helping to keep your foundation happy and your house secure for years to come. It's all about understanding the interplay between the soil, the foundation, and the plants that live around them.

*** The Role of Landscaping in Soil Moisture Management**

Okay, let's talk about landscaping and how it plays a surprisingly big role in keeping our soil happy and stable, especially when we're worried about it shifting around. Think of your landscaping as more than just pretty plants; it's a whole system that can help manage the amount of water in the soil and prevent problems.

The connection is pretty straightforward. Plants, especially trees and shrubs, act like natural sponges. Their roots soak up water from the soil, reducing the water content and therefore the weight that can contribute to soil movement, especially on slopes. It's like they're doing some underground heavy lifting! The type of plants you choose matters too. Native plants are often best because they're already adapted to the local climate and soil conditions, meaning they're more efficient at using water and less likely to need constant watering from you, which can actually exacerbate soil problems.

Beyond just plants, things like mulch and groundcover are also important. Mulch helps to slow down evaporation from the soil surface, keeping the moisture levels more consistent. Groundcover plants, like creeping thyme or clover, create a dense mat that helps to hold the soil in place and prevent erosion from rainfall.

But it's not just about planting stuff and hoping for the best. Smart landscaping means understanding how water flows across your property. Grading the land to direct water away from vulnerable areas, installing drainage systems like French drains, and even creating rain gardens to capture excess runoff are all ways to actively manage soil moisture.

Basically, landscaping is a powerful tool for preventing soil shifts. By choosing the right plants, using appropriate ground covers and mulch, and managing water flow effectively, you can create a landscape that's not only beautiful but also helps to keep your soil stable and your property safe. It's all about working with nature, not against it, to create a healthier and more resilient environment.

*** Plant Selection for Soil Stabilization and Water Control**

Okay, so you're dealing with land that wants to move around, right? Soil shifting, erosion, maybe even water pooling where it shouldn't. It's a common problem, and honestly, one of the smartest solutions starts with choosing the *right* plants. I mean, think about it: plants are nature's anchors. Their roots grab onto the soil, holding it together like a giant, underground web.

But it's not just about *any* plant. You need to be strategic. For soil stabilization, you're looking for species with deep, fibrous root systems. Things like native grasses are fantastic because they spread out and really lock the soil in place. Shrubs with dense root systems are another good option, especially on slopes. They act like tiny dams, slowing down water runoff and preventing erosion.

Then there's the water control aspect. Some plants are thirsty and excellent at soaking up excess moisture. Consider rain gardens planted with native wildflowers and grasses that can handle both wet and dry conditions. These can act like sponges, absorbing rainwater before it has a chance to cause problems. Similarly, trees strategically placed can intercept rainfall before it even hits the ground, reducing runoff.

The key is to think about your specific situation. What kind of soil do you have? How steep is the slope? What's the climate like? Native plants are usually a great bet because they're already adapted to the local conditions and require less maintenance. Talk to your local nursery or extension office. They can give you personalized recommendations for plants that will thrive in your area and effectively stabilize your soil and manage water. It's all about working *with* nature, not against it, to create a landscape that's both beautiful and functional.

*** Grading and Drainage Solutions Around the Foundation**

Okay, let's talk about keeping your house from, well, shifting. We're not talking about moving it with a crane, but the slow, subtle, and often destructive shift caused by soil expanding and contracting around your foundation. Landscaping plays a *huge* role in this, and it all boils down to grading and

drainage.

Think of your foundation as the steady anchor of your home. Rainwater, though, is like a persistent little gremlin trying to undermine it. If water pools around your foundation, the soil gets saturated, expands, and pushes against the concrete. Then, when it dries out, it shrinks, leaving gaps. Over time, this constant push-pull can lead to cracks, settling, and all sorts of expensive headaches.

That's where proper grading and drainage come in. Grading simply means the slope of the land around your house. Ideally, you want the ground to slope *away* from the foundation. This way, rainwater naturally flows away, preventing it from soaking into the soil right next to your walls. It's like giving the gremlin a clear path to somewhere else to cause trouble.

But grading isn't always enough, especially if you have heavy clay soil or a high water table. That's where drainage solutions come into play. Think French drains – buried perforated pipes that collect water and channel it away. Or surface drains that catch runoff from patios and walkways. These act like little water highways, directing the gremlin away from your precious foundation.

Now, landscaping ties into all this. Plant trees and shrubs too close to the foundation, and their roots can exacerbate the problem by either sucking too much moisture out of the soil (causing it to shrink) or by physically pushing against the concrete. Choose plants that are appropriate for the soil conditions and keep them a reasonable distance from the house. Consider using permeable paving materials for patios and walkways to allow water to drain naturally into the ground instead of running towards the foundation.

Essentially, coordinating your landscaping with soil control in mind means working with nature, not against it. Understand how water flows around your property, create a system to direct it away from your foundation, and choose plants that won't cause problems. It's an investment in the long-term health and stability of your home. And honestly, a little planning now can save you a whole lot of heartache (and money) later.

*** Hardscaping Techniques to Prevent Erosion and Water Pooling**

Okay, so we're talking about keeping our yards from turning into mud pits and preventing the precious soil from just washing away, right? And we're focusing on the "hardscaping" side of things – think rocks, pavers, walls, not so much the plants. Well, hardscaping can be a real hero when it comes to erosion control and getting rid of those annoying puddles.

Think about it: well-placed retaining walls. They're not just pretty; they're literally holding back the earth, especially on slopes. They terrace the land, breaking up long, uninterrupted inclines into smaller, manageable sections. This slows down the water runoff, giving it a chance to soak into the ground instead of carrying away topsoil.

Then there's permeable paving. Instead of solid concrete or asphalt that just sends water rushing off, permeable pavers or gravel driveways allow water to filter through. That water goes back into the ground, replenishing groundwater and reducing the strain on storm drains. It's like a built-in drainage system!

And don't underestimate the power of strategically placed rocks and boulders. They can act as natural barriers, diverting water flow and preventing it from concentrating in one area. Think of a dry creek bed, even if it's purely decorative, it channels water effectively during heavy rains, keeping it away from vulnerable areas like foundations.

Proper grading is also key. Making sure the land slopes gently away from your house is the first line of defense against water pooling around the foundation. It sounds simple, but it's incredibly effective.

So, hardscaping isn't just about aesthetics; it's about using smart design and materials to work with nature, not against it. When done right, it can be a powerful tool in the fight against erosion and water pooling, creating a more stable and beautiful landscape.

*** Maintaining Optimal Soil Moisture Levels Through Irrigation**

Okay, so we're talking about keeping the ground from going all wobbly and shifting around, right? And a big piece of that puzzle, especially when you've got landscaping involved, is how you water things. Specifically, maintaining optimal soil moisture levels through irrigation. It sounds all science-y, but really it's just about giving your plants the right amount of drink so the soil stays happy and stable.

Think of it this way: soil that's constantly bone dry is going to shrink and crack. That's bad news for foundations, patios, and anything else sitting on top of it. On the flip side, soil that's perpetually waterlogged is going to become mushy and lose its structural integrity. Again, not ideal if you want your landscape to stay put.

Irrigation, when done right, is the Goldilocks solution. We're aiming for “just right” moisture. This means understanding your soil type – sandy soil drains like a sieve, clay soil holds water like a sponge, and loam is somewhere in between. Knowing this helps you choose the right irrigation method. A sprinkler system might be fine for some lawns, but drip irrigation, which delivers water slowly and directly to the roots, might be better for trees and shrubs, especially on slopes where water runoff is a concern.

It's also about timing. Watering deeply and less frequently encourages roots to grow deeper, anchoring the soil better. Short, frequent watering just keeps the surface damp, which can lead to shallow root systems and make the soil more susceptible to erosion. And let's not forget the weather! Obvious, I know, but paying attention to rainfall and adjusting your irrigation schedule accordingly is crucial. You don't want to be watering the lawn right before a downpour.

Ultimately, smart irrigation is a key component of coordinating landscaping to control soil shifts. It's not just about keeping your plants alive; it's about using water strategically to keep the ground stable, prevent erosion, and protect your property from the potentially costly consequences of shifting soil. It's about working *with* the earth, not against it.

*** Professional Landscaping Services for Foundation Protection**

Okay, let's talk about keeping your house from sliding into the neighbor's yard, or, you know, just gently rearranging itself over the course of decades. We're talking about soil shifts, and how a

thoughtful landscape professional can be your best defense against them.

See, a lot of folks think landscaping is all about pretty flowers and a perfectly manicured lawn. And sure, it can be. But a really good landscaping service, one that understands foundation protection, is thinking about so much more. They're thinking about water flow, soil composition, root systems, and how all of that interacts with the very structure of your home.

Think about it. Rainwater needs somewhere to go. If it's just sheeting off your roof and pooling around your foundation, you're setting yourself up for trouble. That water can saturate the soil, making it expand and contract, putting pressure on your foundation walls. Over time, that pressure can lead to cracks, leaks, and even structural damage. A professional landscaper will grade the soil away from your house, install proper drainage systems, and maybe even suggest plants that help absorb excess moisture.

Then there's the root factor. A giant oak tree may look majestic, but its roots can wreak havoc on underground pipes and even push against your foundation. A landscaping expert can advise on the right types of trees and shrubs to plant, and where to plant them, to avoid these problems. They'll consider the mature size of the plants and their root systems, ensuring they won't become a liability down the road.

Coordinating landscaping to control soil shifts is really about creating a balanced ecosystem around your home. It's about understanding how plants, water, and soil interact, and using that knowledge to protect your biggest investment. So, while you're admiring those blooming azaleas, you can also rest easy knowing that your foundation is getting the support it needs, thanks to a little professional landscaping savvy. It's not just about curb appeal; it's about long-term structural integrity. And that's something worth investing in.

About basement waterproofing

This article **needs additional citations for verification**. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed.
Find sources: "Basement waterproofing" – news · newspapers · books · scholar · JSTOR *(April 2017) (Learn how and when to remove this message)*

Basement waterproofing involves techniques and materials used to prevent water from penetrating the basement of a house or a building. Waterproofing a basement that is below ground level can require the application of sealant materials, the installation of drains and sump pumps, and more.

Purpose

[edit]

Waterproofing is usually required by building codes for structures that are built at or below ground level. Waterproofing and drainage considerations are especially important in cases where ground water is likely to build up in the soil or where there is a high water table.

Water in the soil causes hydrostatic pressure to be exerted underneath basement floors and walls. This hydrostatic pressure can force water in through cracks, which can cause major structural damage as well as mold, decay, and other moisture-related problems.

Methods

[edit]

Several measures exist to prevent water from penetrating a basement foundation or to divert water that has penetrated a foundation:

French Drain

- Image not found or type unknown
  French drain

Interior wall and floor sealers

- Interior water drainage
- Exterior drainage
- Exterior waterproofing coatings
- Box type waterproofing[1]
- Foundation crack injections
- French drains
- Sump pump

Interior sealants

[edit]

In poured concrete foundations, cracks and pipe penetrations are the most common entry points for seepage. These openings can be sealed from the interior. Epoxies, which are strong adhesives, or urethanes can be pressure injected into the openings, thus penetrating the foundation through to the exterior and cutting off the path of the seepage.

In masonry foundations, interior sealers will not provide permanent protection from water infiltration where hydrostatic pressure is present. However, interior sealers are good for preventing high atmospheric humidity inside the basement from absorbing into the porous masonry and causing spalling. Spalling is a condition where constant high humidity or moisture breaks down masonry surfaces, causing deterioration and shedding of the concrete surfaces.

Other coatings can be effective where condensation is the main source of wetness. It is also effective if the problem has minor dampness. Usually, interior waterproofing will not stop major leaks.

Interior water drainage

[edit]

Although interior water drainage is not technically waterproofing, it is a widely accepted technique in mitigating basement water and is generally referred to as a basement waterproofing solution. Many interior drainage systems are patented and recognized by Building Officials and Code Administrators(BOCA) as being effective in controlling basement water.

A common system for draining water that has penetrated a basement involves creating a channel around the perimeter of the basement alongside the foundation footers. A French drain, PVC pipe, or other drainage system is installed in the newly made channel. The installed drain is covered with new cement.

The drainage system collects any water entering the basement and drains it to an internally placed sump pump system, which will then pump the water out of the basement. The Federal Emergency Management Agency (FEMA) recommends basement waterproofing with a water alarm and "battery-operated backup pump" as a preventive measure against the high cost of flooding.[2] Wall conduits (such as dimple boards or other membranes) are fastened to the foundation wall and extend over the new drainage to guide any moisture down into the system.

Exterior waterproofing

[edit]

Waterproofing a structure from the exterior is the only method the U.S. International Building Code (IBC) recognizes as adequate to prevent structural damage caused by water intrusion.

Waterproofing an existing basement begins with excavating to the bottom sides of the footings. Once excavated, the walls are then power washed and allowed to dry. The dry walls are sealed with a waterproofing membrane,[3] and new drainage tiles (weeping tiles) are placed at the side of the footing.

A French drain, PVC pipe, or other drainage system is installed and water is led further from the basement.

Polymer

[edit]

Over the past ten years, polymer-based waterproofing products have been developed. Polymer-based products last for the lifetime of the building and are not affected by soil pH. Polymer-based waterproofing materials can be sprayed directly onto a wall, are very fast curing, and are semi-flexible, allowing for some movement of the substrate.

Causes of water seepage and leaks

[edit]

Water seepage in basement and crawl spaces usually occurs over long periods of time and can be caused by numerous factors.

- Concrete is one of the most commonly used materials in home construction. When pockets of air are not removed during construction, or the mixture is not allowed to cure properly, the concrete can crack, which allows water to force its way through the wall.
- Foundations (footings) are horizontal pads that define the perimeter of foundation walls. When footings are too narrow or are not laid deep enough, they are susceptible to movement caused by soil erosion.
- Gutters and downspouts are used to catch rain water as it falls and to discharge it away from houses and buildings. When gutters are clogged or downspouts are broken, rainwater is absorbed by the soil near the foundation, increasing hydrostatic pressure.
- Weeping tile is a porous plastic drain pipe installed around the perimeter of the house. The main purpose of external weeping tile is preventing water from getting into a basement. However, these pipes can become clogged or damaged, which causes excess water to put pressure on internal walls and basement floors.
- Water build up inside window wells, after heavy rain or snow, can lead to leaks through basement window seams. Window well covers can be used to prevent water from accumulating in the window well.
- Ground saturation is another common form of basement leaks. When the footing drain fails the ground around the basement can contain too much water and when the saturation point is met flooding can occur.

Warning signs of water damage

[edit]

Signs that water is seeping into a basement or crawlspace often take years to develop and may not be easily visible. Over time, multiple signs of damage may become evident and could lead to structural failure.

- Cracked walls: Cracks may be horizontal, vertical, diagonal or stair-stepped. Severe pressure or structural damage is evident by widening cracks.
- Buckling walls: Usually caused by hydrostatic pressure. Walls appear to be bowed inward.
- Peeling paint: Water seeping through walls may lead to bubbling or peeling paint along basement walls.[4]
- Efflorescence: White, powdery residue found on basement walls near the floor.
- Mold: Fungi that usually grow in damp, dark areas and can cause respiratory problems after prolonged exposure.

Foundation crack injections

[edit]

Foundation crack injections are used when poured concrete foundations crack, either from settlement or the expansion and contraction of the concrete. Epoxy crack injections are typically used for structural purposes while hydrophobic or hydrophilic polyurethane injections are used to seal cracks to prevent penetration of moisture or water. Concrete is both strong and inexpensive, making it an ideal product in construction. However, concrete is not waterproof.

References

[edit]

1. **^** *Waheed, M. A. (11 July 2014). "Top tips to optimally use conventional waterproofing techniques". Business Standard India. Archived from the original on 5 July 2022. Retrieved 28 May 2021.*
2. **^** *"FloodSmart | How to Prepare for a Flood and Minimize Losses". Archived from the original on 9 May 2020. Retrieved 20 March 2020.*
3. **^** *Carter, Tim. "How to redirect water around a damp garage". The Washington Post. Archived from the original on 15 August 2016. Retrieved 2 November 2015.*
4. **^** *Chodorov, Jill. "Basement flooding may put a damper on your home sale". The Washington Post. Archived from the original on 18 May 2018. Retrieved 2 November 2015.*

About soil compaction

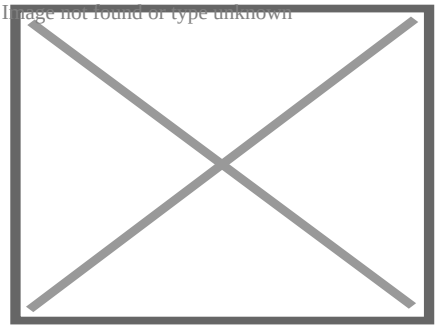
For soil compaction in agriculture and compaction effects on soil biology, see soil compaction (agriculture), for natural compaction on a geologic scale, see compaction (geology); for

consolidation near the surface, see consolidation (soil).

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

In soil science and agronomy, **soil compaction** is usually a combination of both engineering compaction and consolidation, so may occur due to a lack of water in the soil, the applied stress being internal suction due to water evaporation[1] as well as due to passage of animal feet. Affected soils become less able to absorb rainfall, thus increasing runoff and erosion. Plants have difficulty in compacted soil because the mineral grains are pressed together, leaving little space for air and water, which are essential for root growth. Burrowing animals also find it a hostile environment, because the denser soil is more difficult to penetrate. The ability of a soil to recover from this type of compaction depends on climate, mineralogy and fauna. Soils with high shrink–swell capacity, such as vertisols, recover quickly from compaction where moisture conditions are variable (dry spells shrink the soil, causing it to crack). But clays such as kaolinite, which do not crack as they dry, cannot recover from compaction on their own unless they host ground-dwelling animals such as earthworms—the Cecil soil series is an example.

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



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

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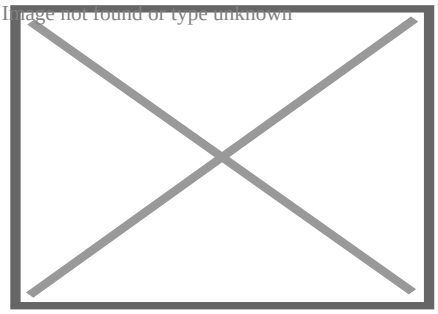

A compactor/roller fitted with a sheepsfoot drum, operated by U.S. Navy Seabees

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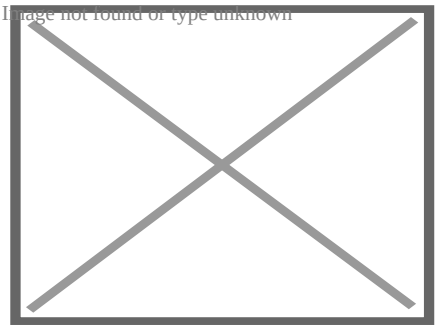

Vibrating roller with plain drum as used for compacting asphalt and granular soils

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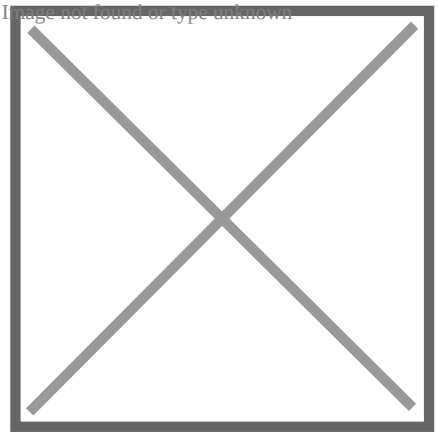


Vibratory rammer in action

In construction

[edit]

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

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

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

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

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

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

Compaction methods

[edit]

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

The available techniques can be classified as:

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

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

Test methods in laboratory

[edit]

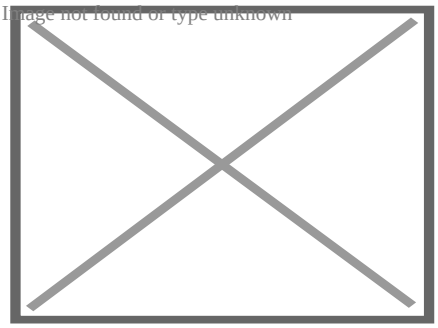
Soil compactors are used to perform test methods which cover laboratory compaction methods used to determine the relationship between molding water content and dry unit weight of soils. Soil placed as engineering fill is compacted to a dense state to obtain satisfactory engineering properties such as,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

See also

[edit]

- Soil compaction (agriculture)
- Soil degradation
- Compactor
- Earthwork

- Soil structure
- Aeration
- Shear strength (soil)



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

References

[edit]

1. **^** Soil compaction due to lack of water in soil
2. **^** *Jia, Xiaoyang; Hu, Wei; Polaczyk, Pawel; Gong, Hongren; Huang, Baoshan (2019). "Comparative Evaluation of Compacting Process for Base Materials using Lab Compaction Methods". Transportation Research Record: Journal of the Transportation Research Board.* ***2673*** *(4): 558–567. doi:10.1177/0361198119837953. ISSN 0361-1981.*
3. **^** *McCarthy, David F. (2007). Essentials of Soil Mechanics and Foundations. Upper Saddle River, NJ: Pearson Prentice Hall. p. 595. ISBN 978-0-13-114560-3.*
4. **^** *McCarthy, David F. (2007). Essentials of Soil Mechanics and Foundations. Upper Saddle River, NJ: Pearson Prentice Hall. pp. 601–602. ISBN 978-0-13-114560-3.*
5. ^ ***a b*** *McCarthy, David F. (2007). Essentials of Soil Mechanics and Foundations. Upper Saddle River, NJ: Pearson Prentice Hall. p. 602. ISBN 978-0-13-114560-3.*
6. **^** *Das, Braja M. (2002). Principles of Geotechnical Engineering. Pacific Grove, CA: Brooks/Cole. p. 105. ISBN 0-534-38742-X.*
7. **^** *"Automatic Soil Compactor". cooper.co.uk. Cooper Research Technology. Archived from the original on 27 August 2014. Retrieved 8 September 2014.*

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Geotechnical engineering

Offshore geotechnical engineering

Investigation and instrumentation

Field (*in situ*)

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

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

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

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

	Foundations	○ Shallow ○ Deep

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

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

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

Related fields

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

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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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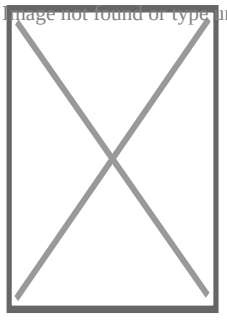

Soil topics

- 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**
- **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

Applications

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

Related fields

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

Societies, Initiatives

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

Scientific journals

- *Acta Agriculturae Scandinavica B*
- *Journal of Soil and Water Conservation*
- *Plant and Soil*
- *Pochvovedenie*
- *Soil Research*
- *Soil Science Society of America Journal*

See also

- Land use
- Land conversion
- Land management
- Vegetation
- Infiltration (hydrology)
- Groundwater
- Crust (geology)
- Impervious surface/Surface runoff
- Petrichor

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About Cook County

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Things To Do in Cook County

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Sand Ridge Nature Center

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River Trail Nature Center

4.6 (235)

Photo

Palmisano (Henry) Park

4.7 (1262)

Driving Directions in Cook County

Driving Directions From Palmisano (Henry) Park to

Driving Directions From Lake Katherine Nature Center and Botanic Gardens to

Driving Directions From Navy Pier to

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Reviews for

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Jeffery James

(5)

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

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Sarah McNeily

(5)

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

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Jim de Leon

(5)

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

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Chris Abplanalp

(5)

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

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Dave Kari

(5)

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

Coordinating Landscaping to Control Soil ShiftsView GBP

Check our other pages :

- Noting Shifting Porches and Deck Attachments
- Identifying Common Issues and Symptoms of residential foundations
- Observing Climate Trends for Anticipating Soil Swell
- Identifying Subtle Changes in Exterior Walls

Frequently Asked Questions

Whos responsible for the landscaping work – is it included in the foundation repair cost?**

Landscaping is often *not* included in the foundation repair cost. Its crucial to clarify whether the foundation repair company offers landscaping services or if youll need to hire a separate landscaping contractor. Establishing responsibility upfront is essential.

United Structural Systems of Illinois, Inc

Phone : +18473822882

City : Hoffman Estates

State : IL

Zip : 60169

Address : 2124 Stonington Ave

Google Business Profile

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

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home foundation repair service

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