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*** Understanding local noise ordinances and construction hour restrictions.**

Okay, so you're trying to build something in the city, huh? Excavation is necessary for deep foundation repair in unstable soil conditions [foundation wall repair service](#) structural failure. Or maybe you're just planning a rocking party. Either way, understanding local noise ordinances and construction hour restrictions is absolutely crucial. Think of it like this: the city has rules for a reason. It's all about balancing the needs of different people living in close proximity.

Those noise ordinances? They're not just some random rules made up to annoy you. They're there to protect your neighbors' right to peace and quiet, especially during specific times. Imagine trying to put your baby to sleep while someone's jackhammering outside – not fun, right? These ordinances often dictate decibel limits at certain times of the day, and they can vary significantly from neighborhood to neighborhood. What's perfectly acceptable noise in an industrial zone could land you in hot water in a quiet residential area.

And construction hour restrictions? They're often even stricter. Cities usually limit loud construction activities to specific daytime hours, and they're pretty serious about enforcing them. Trying to start your demolition at 5 AM might seem like a good way to beat the heat, but it's almost guaranteed to draw complaints and potentially hefty fines. The reasons are twofold: noise, of course, but also the general disruption to the surrounding area. Consider the impact of trucks rumbling through the streets at dawn.

Ignoring these regulations is a recipe for trouble. You'll likely get a warning, then a fine, and potentially even a stop-work order if you're a construction project. Plus, it's just good neighborly behavior to be respectful of the people around you. So, before you fire up that power saw or crank up the volume, take the time to research your local ordinances. A little bit of planning and consideration can save you a lot of headaches (and money) in the long run. Do your homework; your neighbors (and your wallet) will thank you.

*** Permitting requirements related to foundation repair and potential environmental impact.**

Okay, so you're trying to keep the peace and quiet in the city while getting some serious foundation work done, right? It's a tricky balancing act, and one often overlooked piece of the puzzle is the permitting process for foundation repair. It's not just about noise and debris, although those are definitely major headaches. You've also got to think about the environmental angle, and that's where things can get a little complex.

Think about it: foundation repair often involves digging. Digging means potentially disturbing the soil, and if you're in an area with known soil contamination – maybe from a previous industrial site or even just older building materials – you could be accidentally stirring up

some nasty stuff. That's where environmental impact assessments come in, and they might be required as part of your permitting. You might need to show that you're taking steps to prevent any harmful substances from leaching into the groundwater or becoming airborne.

And then there's the issue of runoff. Heavy rains can wash away exposed soil during the repair process, carrying sediment and potentially pollutants into the storm drains. That's a big no-no. Your permit might stipulate erosion control measures, like silt fences or temporary drainage systems, to prevent this.

Beyond the immediate environmental impact, the type of repair you're doing can also trigger specific permitting requirements. Installing pilings, for example, might require a different set of approvals compared to simply patching cracks. The local permitting office will have guidelines based on the scope and scale of the project.

The key takeaway? Don't skip the permit process! It might seem like a bureaucratic hurdle, but it's there for a reason. Research your local regulations thoroughly, and if you're unsure about anything, talk to a qualified contractor or consultant who understands the permitting landscape. They can help you navigate the process, identify potential environmental concerns early on, and ensure that your foundation repair work is not only structurally sound but also environmentally responsible. It's about being a good neighbor and a good steward of the environment, all while keeping your building standing strong.

*** Dust and debris control methods to minimize neighborhood disruption during repair.**

Okay, so you're ripping up the street, fixing a building, or doing some other kind of construction in the middle of a neighborhood. Great! But nobody wants to live in a perpetual dust cloud, right? And that's where good dust and debris control comes in. It's not just about being nice; it's about being a good neighbor and following the rules, usually outlined in local ordinances.

Think about it: dust gets everywhere. It gets in people's homes, their cars, their lungs. Same goes for debris – flying bits of concrete or wood are a hazard and nobody wants them landing in their backyard. So, what can you do?

First, watering things down is a classic. Regularly spraying down demolition sites, stockpiles of materials, and even just the roads around the work zone can really cut down on airborne dust. Then there's using things like silt fences or dust screens – simple barriers that catch a lot of the stuff before it drifts too far. Enclosing the work area, even partially, is another good option, especially for bigger projects.

Beyond that, it's about responsible practices. Covering trucks carrying debris, cleaning up spills immediately, and sweeping streets regularly are all important. And communication is key! Let people know what's going on, what measures you're taking, and who to contact if

they have concerns. Being proactive and showing that you care about minimizing the impact on the neighborhood goes a long way. It's all about being mindful and respectful of the people who live and work around your construction site. A little effort makes a big difference in keeping the peace and avoiding complaints.

*** Communication strategies for informing residents about potential noise and inconvenience.**

Okay, so you're managing noise and debris in a city, which means, let's be honest, you're going to be making some people unhappy. Construction happens, infrastructure needs fixing, and sometimes, that means jackhammers at 7 AM. The key isn't to eliminate the noise (impossible!), it's to manage expectations and communicate effectively.

Think about it: nobody likes surprises, especially noisy, disruptive ones. A sudden, unexpected construction project outside your window is a recipe for frustration. So, the first strategy is simply: be upfront. Give residents a heads-up. Start well in advance. Use multiple channels. A simple flyer tacked to a lamppost might reach some, but a well-crafted email, a notice on the city's website, and maybe even a good-old-fashioned community meeting can reach a wider audience. Explain what's happening, why it's happening, and how long it's expected to last. Honesty is vital. Don't sugarcoat it. "Minor inconvenience" that lasts for six months will breed resentment faster than you can say "soundproof windows."

Next, be specific. "Road work" tells residents nothing. "Water main replacement on Elm Street between Oak and Maple, lasting approximately three weeks, affecting traffic flow and potentially causing brief water service interruptions" is much more helpful. Include contact information for someone they can reach with questions or concerns. A real person, not just a generic email address that never gets checked.

Finally, and this is crucial, be responsive. When people do reach out, acknowledge their concerns. Even if you can't solve the problem, simply listening and offering a sincere apology for the inconvenience can go a long way. Provide updates as the project progresses. If the timeline changes, or if there are unexpected issues, let people know immediately. Transparency builds trust, and trust makes even the most annoying noise a little more bearable. Because let's face it, you're not going to make everyone happy, but you can at least make them feel heard and respected. And that's half the battle.

*** Proper disposal of construction waste and adherence to recycling regulations.**

Okay, so we're talking about keeping cities livable amidst all the construction, right? And a big part of that is managing noise and debris. We can't just let jackhammers blare at 3 AM and piles of brick sit on sidewalks for weeks. That's where regulations come in, and within that whole messy picture, proper disposal and recycling of construction waste is absolutely crucial.

Think about it: construction generates a *ton* of stuff. Wood scraps, concrete chunks, metal bits, packaging... it all adds up fast. If it all just winds up in landfills, we're talking about a serious waste problem, not to mention wasting valuable resources. That's where recycling regulations step in. They basically nudge (or sometimes outright require) builders to sort through the debris, salvage what can be reused, and send recyclable materials to the right places.

This isn't just some tree-hugging idealism, either. Properly disposing of waste and recycling actually makes good economic sense. Reusing materials can lower costs, and avoiding hefty fines for illegal dumping is always a plus. Plus, a construction site that's organized and actively recycling just *looks* better, which can improve a company's reputation in the community.

Ultimately, it's all about being a good neighbor. Managing construction noise and debris, and especially making sure waste is handled responsibly, shows that builders aren't just thinking about their bottom line, but also about the people who live and work around their projects. It's about making cities grow without drowning them in noise and trash.

*** Utilizing noise-reducing equipment and techniques during foundation work.**

Okay, so we're talking about keeping the peace, right? Specifically, when you're building something new in a city, and that means dealing with the noise. Foundation work is a beast. It's jackhammers, pile drivers, the whole shebang. And frankly, nobody wants to listen to that all day, especially if they're trying to work from home, or have a baby, or just, you know, exist peacefully.

That's where noise-reducing equipment and techniques come in. It's not just about being nice; it's often the law. But think about it: swapping out that old, super-loud jackhammer for a newer, quieter model makes a huge difference. Using things like noise barriers – those big screens you sometimes see around construction sites – can block a lot of the sound from reaching nearby homes and businesses. And even simple things like scheduling the noisiest activities for less sensitive times of day (avoiding early mornings or late evenings) can make a world of difference.

It's all about being considerate, really. A little planning and investment in quieter methods can prevent a lot of headaches – and potentially, a lot of fines. It's about finding that balance between getting the job done and not completely disrupting the lives of everyone around you. Because at the end of the day, we're all in this urban environment together.

*** Addressing and resolving noise complaints effectively and promptly.**

Okay, so you're talking about noise in the city, right? It's a constant hum, sometimes a roar. And when it crosses the line, when it's keeping you up at night or making it impossible to

concentrate, you complain. And rightly so. But what happens after that complaint? That's where the rubber really meets the road, and where effective management of noise regulations truly shines.

It's not enough to just have rules on the books about acceptable decibel levels. Those rules are useless if they're not enforced, and enforcement starts with actually listening to the people who are being affected. Addressing noise complaints effectively means having a system in place that's easy to access, easy to understand, and, most importantly, responsive. Nobody wants to shout into a void. They want to know their complaint has been heard and is being taken seriously.

And "promptly" is key. Noise is an immediate irritant. It's not like a pothole that can wait a few weeks to be filled. The longer the noise persists, the more stressed and frustrated people become. A quick response, even if it's just an acknowledgement that the complaint is being investigated, can make a huge difference.

Ultimately, effectively and promptly addressing noise complaints isn't just about enforcing rules; it's about building trust between citizens and the authorities. It's about showing that the city cares about the quality of life of its residents. It's about creating a more livable, more peaceful urban environment for everyone. And that's worth striving for.

*** Legal liabilities and consequences of violating noise and debris regulations.**

Okay, so let's talk about what happens when noise and debris regulations get ignored in our cities. It's not just a case of annoying the neighbors, though that's definitely part of it. There are real legal liabilities and consequences that can hit individuals, businesses, and even local governments.

Think about it: excessive noise, whether it's from construction, late-night parties, or industrial activity, can violate noise ordinances. And when that happens, you're looking at potential fines. These fines can range from a slap-on-the-wrist amount for a first offense to some seriously hefty sums for repeat offenders, especially if the noise is particularly egregious or goes on for an extended period. Businesses, in particular, can face significant financial penalties that can impact their bottom line.

Then there's the debris side of things. Unsecured construction materials blowing around, illegal dumping, overflowing dumpsters – these are all violations that can lead to legal trouble. Beyond the fines, you might be looking at clean-up orders, meaning you're legally obligated to remove the debris at your own expense. That can involve hiring contractors and dealing with disposal fees, which can quickly add up.

But it goes deeper than just money. Repeat or severe violations can sometimes lead to more serious consequences. In some cases, businesses might face permit suspensions or even revocation, essentially shutting them down until they comply with the regulations. Individuals could potentially face criminal charges, particularly for illegal dumping of hazardous materials.

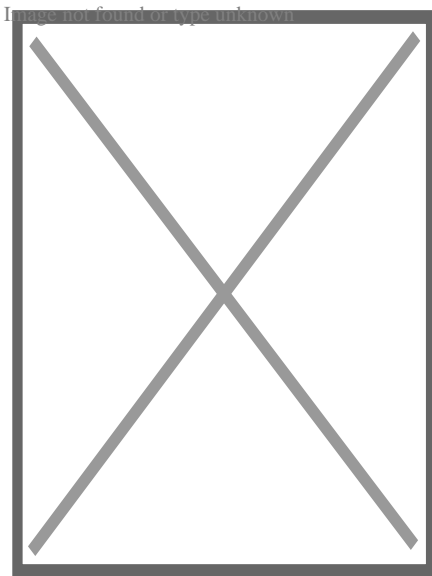
And let's not forget the potential for civil lawsuits. If your noise or debris causes damage to someone else's property, or if someone is injured as a result, you could be sued for negligence. Imagine a piece of debris from a construction site hitting a pedestrian – that's a lawsuit waiting to happen.

Finally, it's worth remembering that local governments themselves can be held accountable if they fail to enforce these regulations effectively. If a city turns a blind eye to widespread noise and debris problems, residents might take legal action, arguing that the city is failing to protect their quality of life.

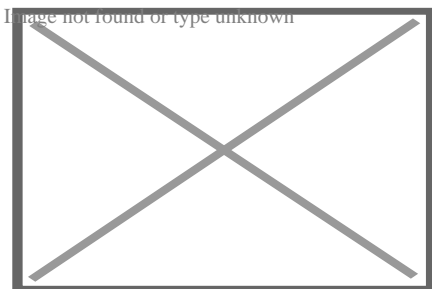
So, ignoring noise and debris regulations isn't just about being inconsiderate. It's a legal minefield with potentially expensive and damaging consequences. Staying informed and compliant is crucial for everyone living and working in urban areas.

About Water damage

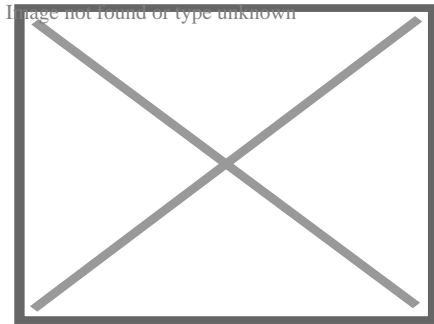
The examples and perspective in this article **may not represent a worldwide view of the subject**. You may improve this article, discuss the issue on the talk page, or create a new article, as appropriate. *(March 2011) (Learn how and when to remove this message)*



Interior of part of a damaged home in New Orleans after Hurricane Katrina



Family photographs damaged by flooding



A smaller and more minor water spot caused by rainwater leaking through a roof

Water damage describes various possible losses caused by water intruding where it will enable attack of a material or system by destructive processes such as rotting of wood, mold growth, bacteria growth, rusting of steel, swelling of composite woods, de-laminating of materials such as plywood, short-circuiting of electrical devices, etc.

The damage may be imperceptibly slow and minor such as water spots that could eventually mar a surface, or it may be instantaneous and catastrophic such as burst pipes and flooding. However fast it occurs, water damage is a major contributor to loss of property.

An insurance policy may or may not cover the costs associated with water damage and the process of water damage restoration. While a common cause of residential water damage is often the failure of a sump pump, many homeowner's insurance policies do not cover the associated costs without an addendum which adds to the monthly premium of the policy. Often the verbiage of this addendum is similar to "Sewer and Drain Coverage".

In the United States, those individuals who are affected by wide-scale flooding may have the ability to apply for government and FEMA grants through the Individual Assistance program.^[1] On a larger level, businesses, cities, and communities can apply to the FEMA Public Assistance program for funds to assist after a large flood. For example, the city of Fond du Lac Wisconsin received \$1.2 million FEMA grant after flooding in June 2008. The program allows the city to purchase the water damaged properties, demolish the structures, and turn the former land into public green space.^[citation needed]

Causes

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Water damage can originate by different sources such as a broken dishwasher hose, a washing machine overflow, a dishwasher leakage, broken/leaking pipes, flood waters, groundwater seepage, building envelope failures (leaking roof, windows, doors, siding, etc.) and clogged toilets. According to the Environmental Protection Agency, 13.7% of all water used in the home today can be attributed to plumbing leaks.^[2] On average that is approximately 10,000 gallons of water per year wasted by leaks for each US home. A tiny, 1/8-

inch crack in a pipe can release up to 250 gallons of water a day.^[3] According to *Claims Magazine* in August 2000, broken water pipes ranked second to hurricanes in terms of both the number of homes damaged and the amount of claims (on average \$50,000 per insurance claim^[citation needed]) costs in the US.^[4] Experts suggest that homeowners inspect and replace worn pipe fittings and hose connections to all household appliances that use water at least once a year. This includes washing machines, dishwashers, kitchen sinks, and bathroom lavatories, refrigerator icemakers, water softeners, and humidifiers. A few US companies offer whole-house leak protection systems utilizing flow-based technologies. A number of insurance companies offer policyholders reduced rates for installing a whole-house leak protection system.

As far as insurance coverage is concerned, damage caused by surface water intrusion to the dwelling is considered flood damage and is normally excluded from coverage under traditional homeowners' insurance. Surface water is water that enters the dwelling from the surface of the ground because of inundation or insufficient drainage and causes loss to the dwelling. Coverage for surface water intrusion^[5] to the dwelling would usually require a separate flood insurance policy.

Categories

[edit]

There are three basic categories of water damage, based on the level of contamination.

Category 1 Water - Refers to a source of water that does not pose substantial threat to humans and classified as "**clean water**". Examples are broken water supply lines, tub or sink overflows or appliance malfunctions that involves water supply lines.

Category 2 Water - Refers to a source of water that contains a significant degree of chemical, biological or physical contaminants and causes discomfort or sickness when consumed or even exposed to. Known as "**grey water**". This type carries microorganisms and nutrients of micro-organisms. Examples are toilet bowls with urine (no feces), sump pump failures, seepage due to hydrostatic failure and water discharge from dishwashers or washing machines.

Category 3 Water - Known as "**black water**" and is grossly unsanitary. This water contains unsanitary agents, harmful bacteria and fungi, causing severe discomfort or sickness. Type 3 category are contaminated water sources that affect the indoor environment. This category includes water sources from sewage, seawater, rising water from rivers or streams, storm surge, ground surface water or standing water. Category 2 Water or Grey Water that is not promptly removed from the structure and or have remained stagnant may be re classified as Category 3 Water. Toilet back flows that originates from beyond the toilet trap is considered black water contamination regardless of visible content or color.^[6]

Classes

[edit]

Class of water damage is determined by the probable rate of evaporation based on the type of materials affected, or wet, in the room or space that was flooded. Determining the class of water damage is an important first step, and will determine the amount and type of equipment utilized to dry-down the structure.^[7]

Class 1 - Slow Rate of Evaporation. Affects only a portion of a room. Materials have a low permeance/porosity. Minimum moisture is absorbed by the materials. **IICRC s500 2016 update adds that class 1 be indicated when <5% of the total square footage of a room (ceiling+walls+floor) are affected **

Class 2 - Fast Rate of Evaporation. Water affects the entire room of carpet and cushion. May have wicked up the walls, but not more than 24 inches. **IICRC s500 2016 update adds that class 2 be indicated when 5% to 40% of the total square footage of a room (ceiling+walls+floor) are affected **

Class 3 - Fastest Rate of Evaporation. Water generally comes from overhead, affecting the entire area; walls, ceilings, insulation, carpet, cushion, etc. **IICRC s500 2016 update adds that class 3 be indicated when >40% of the total square footage of a room (ceiling+walls+floor) are affected **

Class 4 - Specialty Drying Situations. Involves materials with a very low permeance/porosity, such as hardwood floors, concrete, crawlspaces, gypcrete, plaster, etc. Drying generally requires very low specific humidity to accomplish drying.

Restoration

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See also: Convectant drying

Water damage restoration can be performed by property management teams, building maintenance personnel, or by the homeowners themselves; however, contacting a certified professional water damage restoration specialist is often regarded as the safest way to restore water damaged property. Certified professional water damage restoration specialists utilize psychrometrics to monitor the drying process.^[8]

Standards and regulation

[edit]

While there are currently no government regulations in the United States dictating procedures, two certifying bodies, the Institute of Inspection Cleaning and Restoration Certification (IICRC) and the RIA, do recommend standards of care. The current IICRC standard is ANSI/IICRC S500-2021.^[9] It is the collaborative work of the IICRC, SCRT, IEI, IAQA, and NADCA.

Fire and Water Restoration companies are regulated by the appropriate state's Department of Consumer Affairs - usually the state contractors license board. In California, all Fire and Water Restoration companies must register with the California Contractors State License Board.^[10] Presently, the California Contractors State License Board has no specific classification for "water and fire damage restoration."

Procedures

[edit]

Water damage restoration is often prefaced by a loss assessment and evaluation of affected materials. The damaged area is inspected with water sensing equipment such as probes and other infrared tools in order to determine the source of the damage and possible extent of areas affected. Emergency mitigation services are the first order of business. Controlling the source of water, removal of non-salvageable materials, water extraction and pre-cleaning of impacted materials are all part of the mitigation process. Restoration services would then be rendered to the property in order to dry the structure, stabilize building materials, sanitize any affected or cross-contaminated areas, and deodorize all affected areas and materials. After the labor is completed, water damage equipment including air movers, air scrubbers, dehumidifiers, wood floor drying systems, and sub-floor drying equipment is left in the residence. The goal of the drying process is to stabilize the moisture content of impacted materials below 15%, the generally accepted threshold for microbial amplification. Industry standards state that drying vendors should return at regular time intervals, preferably every twenty-four hours, to monitor the equipment, temperature, humidity, and moisture content of the affected walls and contents.^[6] In conclusion, key aspects of water damage restoration include fast action, adequate equipment, moisture measurements, and structural drying. Dehumidification is especially crucial for structural components affected by water damage, such as wooden beams, flooring, and drywall.

See also

[edit]

- Indoor mold

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[edit]

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About basement waterproofing

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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

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

French Drain

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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

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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

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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

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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.

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About soil compaction

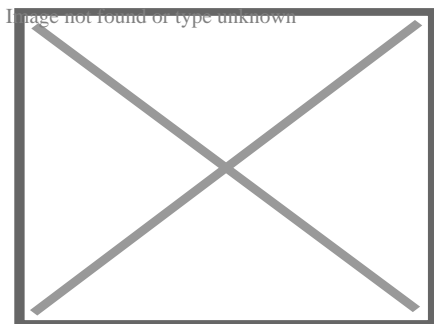
For soil compaction in agriculture and compaction effects on soil biology, see soil compaction (agriculture), for natural compaction on a geologic scale, see compaction (geology); for consolidation near the surface, see consolidation (soil).

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

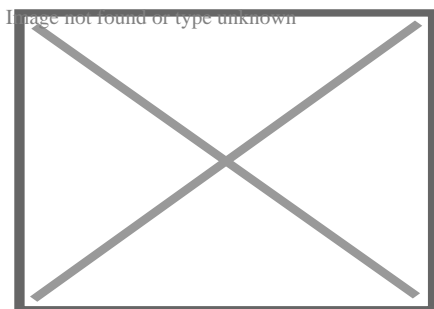
the soil grains, then consolidation, not compaction, has occurred. Normally, compaction is the result of heavy machinery compressing the soil, but it can also occur due to the passage of, for example, animal feet.

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.

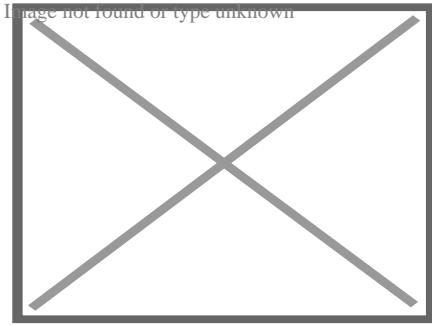
Before soils can be compacted in the field, some laboratory tests are required to determine their engineering properties. Among various properties, the maximum dry density and the optimum moisture content are vital and specify the required density to be compacted in the field.^[2]



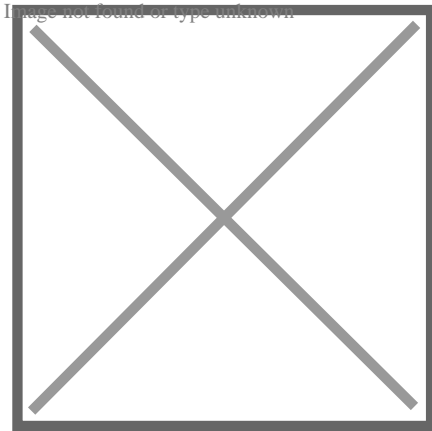
A 10 tonne excavator is here equipped with a narrow sheepfoot roller to compact the fill over newly placed sewer pipe, forming a stable support for a new road surface.



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



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



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 sheepfoot 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. Gyration – 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

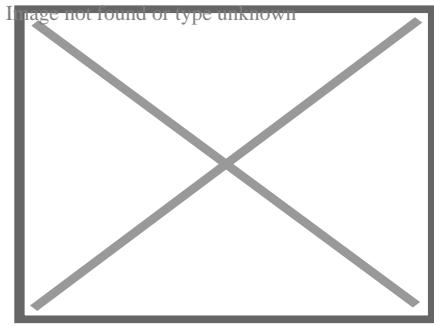
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Soil compactors are used to perform test methods which cover laboratory compaction methods used to determine the relationship between molding water content and dry unit weight of soils. Soil placed as engineering fill is compacted to a dense state 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
 -  Inclinator
 -  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

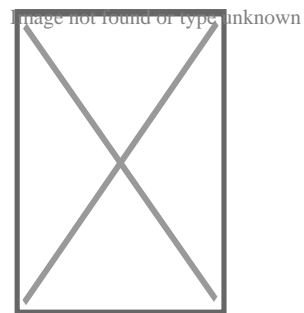
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Soil science

- 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



Soil topics

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

- **v**
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Soil classification

World Reference Base for Soil Resources (1998–)

- Acrisols
- Alisols
- Andosols
- Anthrosols
- Arenosols
- Calcisols
- Cambisols
- Chernozem
- Cryosols
- Durisols
- Ferralsols
- Fluvisols
- Gleysols
- Gypsisols
- Histosol
- Kastanozems
- Leptosols
- Lixisols
- Luvisols
- Nitisols
- Phaeozems
- Planosols
- Plinthosols
- Podzols
- Regosols
- Retisols
- Solonchaks
- Solonetz
- Stagnosol
- Technosols
- Umbrisols
- Vertisols

USDA soil taxonomy

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

Applications

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

Related fields

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

Societies, Initiatives




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

Scientific journals

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

See also

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

-  Wikipedia:WikiProject Soil
-  Category soil
- Category soil science
-  List of soil scientists

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About Cook County

Photo

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Things To Do in Cook County

Photo

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Sand Ridge Nature Center

4.8 (96)

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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

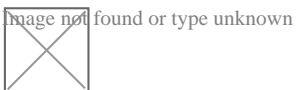
Driving Directions From Navy Pier to

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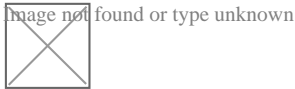
<https://www.google.com/maps/dir/Palmisano+%28Henry%29+Park/United+Structural+Systems+of+Illinois%2C+187.6490151,14z/data=!3m1!4b1!4m14!4m13!1m5!1m1!1sunknown!2m2!1d-87.6490151!2d41.8429903!1m5!1m1!1sChIJ-wSxDtinD4gRiv4kY3RRh9U!2m2!1d-88.1396465!2d42.0637725!3e1>

Reviews for



Jeffery James
(5)

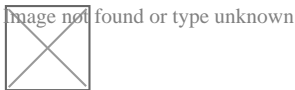
Very happy with my experience. They were prompt and followed through, and very helpful in fixing the crack in my foundation.



Sarah McNeily

(5)

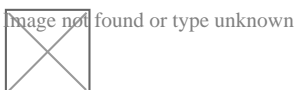
USS was excellent. They are honest, straightforward, trustworthy, and conscientious. They thoughtfully removed the flowers and flower bulbs to dig where they needed in the yard, replanted said flowers and spread the extra dirt to fill in an area of the yard. We've had other services from different companies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



Jim de Leon

(5)

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

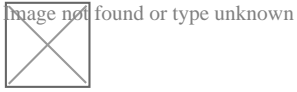


Chris Abplanalp

(5)

USS did an amazing job on my underpinning on my house, they were also very courteous to the proximity of my property line next to my neighbor. They kept things in order with all the dirt/mud they had to excavate. They were

done exactly in the timeframe they indicated, and the contract was very details oriented with drawings of what would be done. Only thing that would have been nice, is they left my concrete a little muddy with boot prints but again, all-in-all a great job



Dave Kari

(5)

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

Managing Noise and Debris Regulations in Urban Areas [View GBP](#)

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Google Business Profile

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