



- **Implementing Carbon Fiber Strips for Added Support**
Implementing Carbon Fiber Strips for Added Support Exploring the Function of Steel I Beams in Reinforcement Evaluating Helical Pier Installations for Stability Understanding the Role of Push Piers in Foundation Repair Assessing Poly Foam Injection as a Repair Option Addressing Wall Bowing with Specialized Bracing Systems Incorporating Reinforced Footings in Existing Structures Using Fiber Reinforced Polymers for Structural Upgrades Recognizing Different Methods for Load Bearing Enhancement Integrating Modern Engineering Software for Precise Calculations Exploring Innovative Jacking Mechanisms for Floor Leveling Seeking Guidance from Structural Engineers for Advanced Repairs
- **Obtaining Local Building Permits for Foundation Work**
Obtaining Local Building Permits for Foundation Work Meeting OSHA Regulations During Excavation Projects Understanding City Ordinances That Affect Repair Plans Coordinating Structural Engineer Reviews for Compliance Navigating Inspections from Municipal Authorities Adhering to Safety Protocols on Residential Job Sites Prioritizing Protective Equipment for Repair Crews Managing Noise and Debris Regulations in Urban Areas Recognizing Liability Concerns in Construction Zones Complying with Floodplain Requirements in Vulnerable Regions Satisfying Documentation Requirements for Property Records Maintaining Ethical Practices in Foundation Repair Services
- **About Us**



Structures

* Choosing the Right Contractor for Carbon Fiber Foundation Repair

* **Understanding Existing Foundation Issues and the Need for Reinforcement.**

Okay, so you're thinking about beefing up the footings on a building that's already standing? Obtaining proper permits is necessary for any foundation repair service **foundation repair service market** porch. Smart move. But before you even start ordering concrete and rebar, you've *got* to get a handle on what's going on down there. We're talking about understanding the current state of your foundation – the good, the bad, and the potentially ugly.

Think of it like this: your foundation is the building's backbone. If it's got aches and pains, the whole structure suffers. We're talking cracks, settling, maybe even some leaning. These aren't always just cosmetic issues. They're often signs of deeper problems, like soil erosion, poor drainage, or even seismic activity. Ignoring them is like putting a Band-Aid on a broken leg.

That's where understanding the *need* for reinforcement comes in. Why are you even considering reinforced footings in the first place? Is the existing foundation undersized for the load it's carrying? Are you planning an addition that's going to add extra weight? Or maybe you've just noticed some worrying signs of decay and want to proactively strengthen things.

Whatever the reason, a thorough assessment is crucial. That means bringing in a qualified structural engineer to do a proper inspection. They'll look at the soil conditions, the existing foundation's design, and any signs of distress. They'll also be able to tell you if reinforcement is the right solution and, if so, what kind of reinforcement is needed.

Skipping this step is like flying blind. You might end up spending a lot of money on a fix that doesn't address the real problem, or worse, that actually makes things worse. So, before you start even thinking about digging, get a clear understanding of the existing foundation issues and the *why* behind needing that reinforcement. It's the only way to ensure you're building on solid ground, literally.

* **What are Reinforced Footings and Their Benefits?**

Okay, so you're thinking about beefing up the foundation of an existing building with reinforced footings, huh? Smart move. Let's talk about what those are and why you'd even bother.

Basically, a reinforced footing is a concrete base, usually wider than the wall it supports, that's got steel reinforcement – rebar, typically – embedded inside. Think of it like adding extra muscle to your foundation. The concrete gives you compressive strength; it's great at handling being squashed. But it's not so hot at resisting tension, like bending or pulling. That's where the steel comes in. The rebar acts like internal tendons, taking up those tensile forces and keeping the whole thing from cracking or failing.

Now, why would you want to go through all the trouble of adding reinforced footings to a building that's already standing? Well, there are a few good reasons. Maybe you're planning an addition. Adding a second story, for example, puts a lot more weight on the existing foundation. Without reinforced footings, it might not be able to handle the load, leading to settling, cracks in the walls, and a whole host of other problems you definitely don't want.

Or maybe the soil conditions around your building have changed. Perhaps there's been erosion, or maybe the water table has fluctuated. These kinds of things can weaken the existing foundation over time. Reinforced footings can provide a much-needed boost in stability.

Another common reason is if the original footings were just inadequate to begin with. Maybe they weren't built to code, or maybe the soil was misjudged during the initial construction. Adding reinforcement now can correct those past mistakes and prevent future headaches.

What are the benefits, then, in a nutshell? Increased load-bearing capacity is the big one. Reinforced footings can handle significantly more weight than plain concrete footings. They also improve the overall stability of the structure, reducing the risk of settling and cracking. And, ultimately, they extend the lifespan of your building by protecting the foundation from deterioration. It's an investment in the long-term health and safety of your property. So, while it might seem like a daunting task, incorporating reinforced footings can be a really worthwhile project, especially when dealing with existing structures that need a little extra help.

*** Assessing the Suitability of Reinforced Footings for Specific Residential Properties.**

Okay, let's talk about reinforced footings and how to figure out if they're a good fit for your house, especially if we're talking about adding them to a structure that's already standing. It's not like picking out new curtains; it's a serious decision that needs careful consideration.

Basically, when you're looking at reinforcing footings, you're often trying to solve a problem. Maybe the original footings are undersized for the load they're carrying. Perhaps you're seeing cracks, settling, or other signs of foundation distress. Or, you might be planning an addition, like a second story, that's going to add significant weight to the existing structure. Reinforced footings can be a way to strengthen and stabilize things.

But here's the thing: slapping in some reinforced concrete isn't a one-size-fits-all solution. You really need to assess the specific situation of the property. That means getting a

professional structural engineer involved. They'll look at a whole bunch of things.

First, the soil. What kind of soil are we dealing with? Is it dense and stable, or loose and sandy? The soil's bearing capacity – how much weight it can support – is crucial. Soil tests are often necessary to get accurate data.

Next, the existing structure. How old is it? What's its condition? What are the original foundation plans (if they exist)? Understanding the existing load paths and how the house is currently supported is vital before adding more weight or altering the foundation.

Then there's the design itself. The engineer will calculate the loads the footings need to handle, taking into account the existing weight of the house, any new loads from additions, and even things like wind and seismic activity. They'll then design the reinforced footings to meet those requirements, specifying the size, shape, and amount of reinforcing steel needed.

Finally, there's the practical side of things. Can the work even be done? Is there enough access to the footings? Are there underground utilities that need to be relocated? What are the potential risks and disruptions to the occupants of the house during construction?

So, assessing the suitability of reinforced footings boils down to a thorough investigation and careful analysis. It's about understanding the soil, the structure, the loads, and the practical limitations of the project. Getting expert advice from a qualified structural engineer is absolutely essential to ensure a safe, effective, and long-lasting solution. You don't want to cut corners here; a properly designed and installed reinforced footing can save you a lot of headaches (and money) down the road.

*** The Reinforced Footing Installation Process: A Step-by-Step Guide.**

Okay, so you're tackling the beast that is adding reinforced footings to an existing structure? That's no small feat! Basically, you're giving the old girl some new, stronger legs. Think of it like this: the original foundation might be struggling, maybe it's showing its age, or you're planning some serious renovations that'll add a lot of weight. Reinforced footings are the answer – a way to beef up the base and prevent future headaches.

The process, in a nutshell, goes something like this. First, you've gotta do your homework. That means soil testing, understanding the existing foundation's condition, and figuring out exactly how much extra support you need. This is where you bring in the professionals – engineers and experienced contractors. You absolutely don't want to wing this!

Then comes the digging. You carefully excavate around the existing foundation where you'll be pouring the new footings. This has to be done with precision to avoid undermining the current structure. Shoring and bracing might be necessary, depending on the soil and the building's design. Safety first, always.

Next, you'll build the formwork – the molds that will hold the concrete. Inside these forms, you'll place the reinforcing steel, the rebar. This is what gives the concrete its strength and prevents cracking. It's gotta be properly spaced and tied together, following the engineer's specifications to the letter.

Finally, the concrete is poured. It's vibrated to remove air pockets and ensure it fills the forms completely. After it's cured (dried and hardened), the forms are removed, and you backfill around the new footings.

It sounds simple when you break it down like that, but each step is crucial. The key takeaway? Planning and professional expertise are non-negotiable. This isn't a DIY project for the faint of heart. Get the right people involved, follow the plans meticulously, and you'll end up with a foundation that's ready to handle whatever you throw at it. Good luck!

*** Materials and Techniques Used in Reinforced Footing Construction.**

Okay, so you're thinking about adding reinforced footings to an existing building, huh? Smart move. That foundation is the backbone, and beefing it up can be a real lifesaver. But let's talk about the nitty-gritty: what actually goes into building these reinforced footings when you're dealing with an existing structure. It's not like starting from scratch, that's for sure.

First off, the materials. Concrete is king, naturally. But not just any concrete. We're talking high-strength stuff, designed to handle serious loads. The specific mix will depend on the soil conditions, the building's weight, and all that engineering jazz. And then there's the rebar – the reinforcing steel. This isn't your garden fence wire! We're talking meticulously designed cages of steel bars, strategically placed within the concrete to provide tensile strength and resist cracking. Think of it like the bones in your body, giving the concrete structure its backbone. The grade and size of the rebar are crucial calculations, based again on the load and the soil.

Now, the techniques. This is where things get interesting, especially when you're working around an existing building. You can't just bulldoze everything! Underpinning is the name of the game in many cases. This means systematically excavating sections of the existing footing, pouring new reinforced concrete sections, and then repeating the process until the entire footing is reinforced. It's like performing surgery on the building's foundation, bit by bit. There are different underpinning methods, like mass concrete underpinning, beam and base underpinning, and even pile underpinning for really tricky situations. The choice depends on the soil conditions, the load, and access constraints.

Another technique you might see is soil nailing. This involves drilling into the soil around the existing footing and inserting steel bars (the "nails") that are then grouted in place. This helps stabilize the soil and prevent collapse during excavation. Think of it like giving the soil a firm hug to keep it from crumbling.

And let's not forget the importance of proper excavation and shoring. You don't want the

building to collapse while you're working on the foundation! Shoring uses temporary supports to hold up the existing structure while the new footings are being constructed. It's all about safety first.

So, to recap: high-strength concrete and carefully designed rebar are the key materials. Underpinning, soil nailing, and careful excavation with shoring are crucial techniques. It's a complex process, requiring experienced engineers and contractors. But if done right, reinforcing those footings can give an existing building a whole new lease on life. It's a worthwhile investment in the long run.

*** Potential Challenges and Solutions During Installation.**

Incorporating reinforced footings into existing structures, while often necessary for stability or expansion projects, isn't always a walk in the park. You're essentially performing structural surgery on a building that's already breathing, and that comes with its own set of potential headaches.

One major challenge? Access. Digging around existing foundations can be incredibly cramped and awkward. Think tight spaces, existing utilities snaking around unpredictably, and the ever-present risk of disturbing the surrounding soil. The solution here is careful planning and often, specialized equipment. Mini-excavators and hand tools become your best friends. Ground penetrating radar can help locate those pesky unseen utilities before you accidentally sever a crucial gas line.

Another potential issue is the existing structure itself. Is it structurally sound enough to handle the excavation and the new load distribution? You might uncover unforeseen damage like crumbling concrete or corroded rebar. A thorough structural assessment is crucial before you even break ground. If weaknesses are found, temporary shoring and reinforcement might be needed to prevent collapse during the construction phase. This adds to the cost and complexity, but it's far preferable to a catastrophic failure.

Then there's the challenge of tying the new footings into the old. A strong, durable connection is vital for the long-term integrity of the structure. This often involves techniques like epoxy-anchored dowels or carefully engineered concrete overlays. The key here is to ensure proper surface preparation and adherence to strict bonding procedures. Skipping steps or cutting corners can lead to delamination and ultimately, structural weakness.

Finally, let's not forget about the neighbors. Construction noise, dust, and vibrations can be a major source of complaint, especially in densely populated areas. Open communication is key. Keeping neighbors informed about the project timeline, noise mitigation measures, and dust control protocols can go a long way in preventing friction. Sometimes, even simple gestures like offering to clean up any dust that settles on their property can make a big difference.

In short, incorporating reinforced footings into existing structures is a complex undertaking.

But by anticipating potential challenges, investing in thorough planning, and employing appropriate solutions, you can ensure a successful and structurally sound outcome. It's all about respecting the existing structure and the surrounding environment, and remembering that careful preparation is always the best foundation for success.

*** Cost Considerations and Return on Investment for Homeowners.**

Let's talk money, shall we? Specifically, how much it's going to cost you to beef up those footings under your house, and whether it's actually worth it in the long run. Incorporating reinforced footings into an existing structure isn't exactly a weekend DIY project, and it definitely comes with a price tag. You're looking at costs for engineering assessments (gotta know what you're dealing with!), excavation, materials like concrete and rebar (lots of rebar!), labor, and potential landscaping repairs afterward. Think of it like this: you're essentially giving your house a stronger foundation, literally.

Now, the upfront cost can feel daunting. But let's consider the return on investment. Are you doing this because your house is showing signs of foundation trouble – cracks in the walls, doors and windows sticking, uneven floors? In that case, this isn't just an improvement, it's preventative medicine. Ignoring foundation issues is like ignoring a leaky faucet; it just gets worse and more expensive over time. Reinforced footings can stabilize your home, prevent further damage, and avoid potentially catastrophic and incredibly costly repairs down the line. Think of it as an investment in the structural integrity and longevity of your biggest asset.

Furthermore, a properly reinforced foundation can increase your property value. Potential buyers are increasingly savvy, and they're looking for homes that are structurally sound. A history of proactive foundation work can be a major selling point, giving them peace of mind and potentially fetching you a higher price when you decide to sell.

Finally, let's not forget the intangible benefits. Peace of mind is worth something, right? Knowing your home is stable and secure, protected from the elements and the slow creep of time, is a valuable feeling. So, while the initial cost of incorporating reinforced footings might sting a bit, consider it a long-term investment in your home's health, your property value, and ultimately, your peace of mind. Do your research, get multiple quotes, and weigh the costs against the potential benefits. It might just be the smartest money you ever spend on your house.

*** Maintaining Reinforced Footings for Long-Term Stability.**

So, you've gone and added reinforced footings to an existing structure, smart move. It's like giving the old house a new pair of really sturdy boots. But, you can't just slap them on and forget about it. Maintaining those footings is absolutely crucial for long-term stability. Think of it less like a one-time fix and more like a commitment to the building's future health.

What does that commitment look like? Well, first off, regular inspections. We're talking about checking for cracks, settlement, or any signs of water damage. Water is the enemy, always seeping in and causing havoc. If you spot something, don't ignore it! A small crack today can become a major problem down the road. Think of it like a cavity; you get it filled early, you avoid a root canal later.

Then there's the surrounding soil. Make sure drainage is working properly. Water pooling around the footings can weaken the soil and compromise the whole system. And keep an eye on vegetation. Tree roots, while seemingly innocent, can burrow under the footings and cause significant issues over time.

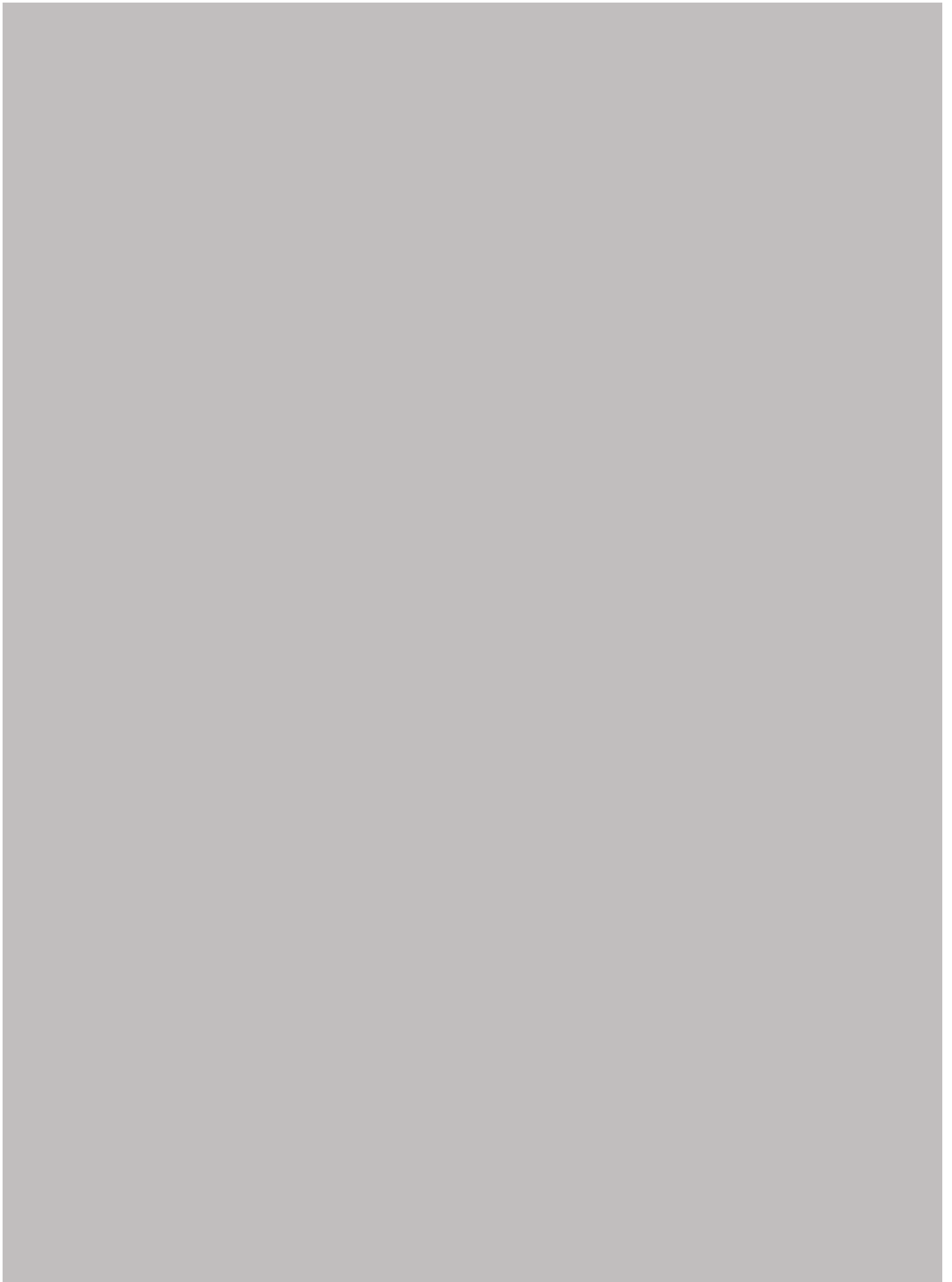
Finally, remember that any modifications to the structure above can impact the footings below. A new addition, a change in load-bearing walls – these things can add stress. Consult with an engineer to ensure the footings can handle the added burden. Basically, maintaining reinforced footings is about being proactive and paying attention. It's about safeguarding your investment and ensuring the building stands strong for years to come. It's not glamorous, maybe, but it's essential.



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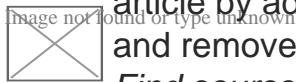
Residential Foundation Repair Services

Strong Foundations, Strong Homes



About radon mitigation

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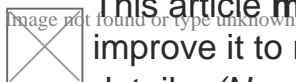


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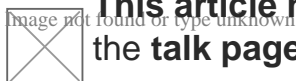
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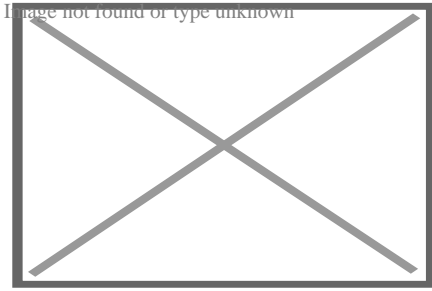
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Radon mitigation is any process used to reduce radon gas concentrations in the breathing zones of occupied buildings, or radon from water supplies. Radon is a significant contributor to environmental radioactivity and indoor air pollution. Exposure to radon can cause serious health problems such as lung cancer.^[1]

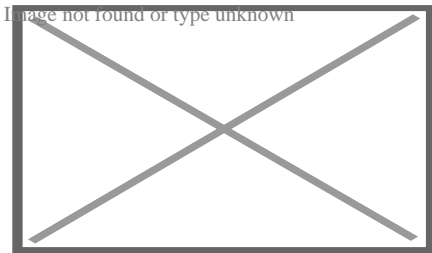
Mitigation of radon in the air by active soil depressurization is most effective. Concrete slabs, sub-floors, and/or crawlspaces are sealed, an air pathway is then created to exhaust radon above the roof-line, and a radon mitigation fan is installed to run permanently. In particularly troublesome dwellings, air exchangers can be used to reduce indoor radon concentrations. Treatment systems using aeration or activated charcoal are available to remove radon from domestic water supplies. There is no proven link between radon in water and gastrointestinal cancers; however, extremely high radon concentrations in water can be aerosolized by faucets and shower heads and contribute to high indoor radon levels in the air.

Testing

[edit]



A typical radon test kit



Fluctuation of ambient air radon concentration over one week, measured in a laboratory

The first step in mitigation is testing. No level of radiation is considered completely safe, but as it cannot be eliminated, governments around the world have set various *action levels* to provide guidance on when radon concentrations should be reduced. The World Health Organization's International Radon Project has recommended an action level of 100 Bq/m^3 (2.7 pCi/L) for radon in the air.^[2] Radon in the air is considered to be a larger health threat than radon in domestic water. The US Environmental Protection Agency recommendation is to not test for radon in water unless a radon in air test shows concentrations above the action level. However, in some U.S. states such as Maine where radon levels are higher than the national average, it is recommended that all well water should be tested for radon. The U.S. government has not set an action level for radon in water.

Air-radon levels fluctuate naturally on a daily and seasonal basis. A short term test (90 days or less) might not be an accurate assessment of a home's average radon level, but is recommended for initial testing to quickly determine unhealthy conditions. Transient weather such as wind and changes in barometric pressure can affect short-term concentrations as well as ventilation, such as open windows and the operation of exhaust fans.

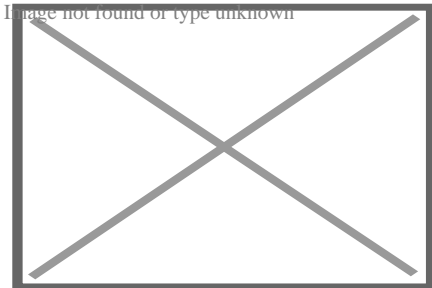
Testing for radon in the air is accomplished using passive or active devices placed in the building. Some devices are promptly sent to a laboratory for analysis, others calculate the results on-site including digital Radon detectors. Radon-in-water testing requires a water sample being sent to a laboratory.

Retesting is recommended in several situations, for example, before spending money on the installation of a mitigation system. Test results which exceed accuracy tolerances also require re-testing. When a mitigation system installation is warranted, a retest after the system is functional is advised to be sure the system is effectively reducing the radon concentration

below the action level, and after any mitigation system repairs such as replacing a fan unit. The US EPA recommends retesting homes with radon problems every two years to ensure proper system function. Due to the vast fluctuation in indoor radon levels, the EPA recommends all homes be tested at least once every five years.^[3]

Testing in the United States

[edit]



Radon map of the United States

ASTM E-2121 is a US standard for reducing airborne radon in homes as far as practicable below the action level of 4 picocuries per liter (pCi/L) (148 Bq/m³).^{[4][5]} Some states recommend achieving 2.0 pCi/L or less.

Radon test kits are commercially available^[6] and can be used by homeowners and tenants and in limited cases by landlords, except when a property is for sale.

Commercially available test kits include a passive collector that the user places in the lowest livable floor of the house for 2 to 7 days. The user then sends the collector to a laboratory for analysis. Long-term kits, taking collections from 91 days to one year, are also available. Open land test kits can test radon emissions from the land before construction begins, but are not recommended by the EPA because they do not accurately predict the final indoor radon level. The EPA and the National Environmental Health Association have identified 15 types of radon test devices.^[7] A Lucas cell is one type of device.

Retesting is specifically recommended in several situations. Measurements between 4 and 10 pCi/L (148 and 370 Bq/m³) warrant a follow-up short-term or long-term radon test before mitigation. Measurements over 10 pCi/L (370 Bq/m³) warrant only another short-term test (not a long-term test) so that abatement measures are not unduly delayed.

Progress has been made regarding radon in the home. A total of 37 states have now^[when?] passed legislation requiring home-sellers to disclose known radon levels before completing the transaction (although only a handful have introduced criminal penalties for misrepresentation).^[8] And over half the legislatures have written radon into their state's

building code.^[9] Purchasers of real estate may delay or decline a purchase if the seller has not successfully abated radon to less than 4 pCi/L.

The accuracy of the residential radon test depends upon whether closed house conditions are maintained. Thus the occupants will be instructed not to open windows, etc., for ventilation during the pendency of test, usually two days or more. However, the occupants, if the present owners, will be motivated to pass the test and insure the sale, so they might be tempted to open a window to get a lower radon score. Moreover, there may be children or immature teens or young adults in the house who will open a window for ventilation notwithstanding instructions not to do so, particularly in uncomfortably hot weather. Accordingly, whether the potential purchaser should trust the result of such a test is problematic.

Management of radon service provider certification has evolved since being introduced by the EPA in 1986. In the 1990s this service was "privatized" and the National Environmental Health Association (NEHA) helped transition the voluntary National Radon Proficiency Program (NRPP) to be administered by private firms. As of 2012, the NRPP is administered by the American Association of Radon Scientists and Technologists (AARST).^[10]

Some states, such as Maine, require landlords to test their rental properties and turn the results in to the state. In limited cases the landlord or tenants may do the testing themselves. The rules in each state vary. In many cases there are private contractors that will inspect hired by the city.

Testing in Canada

[edit]

Health Canada recommends regular annual testing, either by hiring a qualified tester or by using a home-testing kit that should be checked quarterly.^[11]

Canadian Government, in conjunction with the territories and provinces, developed the guideline^[12] to indicate when remedial action should be taken was originally set at 800 Bq/m³ (becquerels per cubic meter) and since reduced to 200 Bq/m³. This new guideline was approved by the Federal Provincial Territorial Radiation Protection Committee in October 2006.^[13]

Testing in the UK

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Radon testing in the UK is managed by UKradon and the UKHSA.^[14]

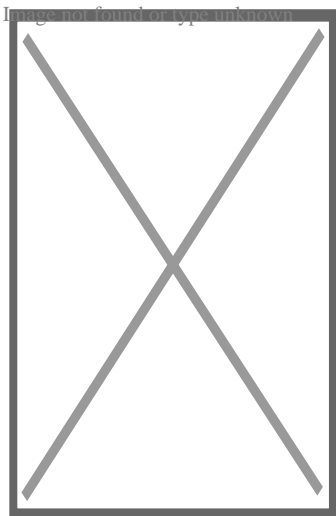
Testing in Norway

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The Norwegian Radiation and Nuclear Safety Authority (DSA) developed the protocol^[15] for radon measurements in residential dwellings^[16] with respect to rental accommodation, which is governed by The Radiation Protection Regulations.^[17]

Methods of radon gas mitigation

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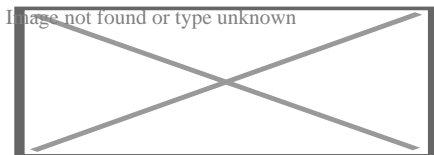
Part of a radon mitigation system including the fan and vent pipe is visible near the gutter downspout.

Because high levels of radon have been found in every state of the United States,^[18] testing for radon and installing radon mitigation systems has become a specialized industry since the 1980s. Many states have implemented programs that affect home buying and awareness in the real estate community; however, radon testing and mitigation systems are not generally mandatory unless specified by the local jurisdiction.^[19]

Anticipated high radon levels can be mitigated during building design and construction by a combination of ensuring a perfectly sealed foundation, allowing sufficient passive dispersal of under-slab gas around rather than through the building, and proper building ventilation. In many instances, such approaches may achieve a sufficient reduction of radon levels

compared to other buildings where such approaches were not taken. However, quality of implementation is crucial and testing after construction is necessary. For instance, even a small gap in the sealing of the slab may be sufficient for excessive quantities of radon to enter, given pressure differentials.

Where such approaches were not taken during construction or have proven insufficiently effective, remediation is needed. According to the EPA's "A Citizen's Guide to Radon",^[20] the method to reduce radon "primarily used is a vent pipe system and fan, which pulls radon from beneath the house and vents it to the outside", which is also called sub-slab depressurization, soil suction, or active soil depressurization (ASD). Generally indoor radon can be mitigated by sub-slab depressurization and exhausting such radon-laden air to the outdoors, away from windows and other building openings.^[21] "EPA generally recommends methods which prevent the entry of radon. Soil suction, for example, prevents radon from entering your home by drawing the radon from below the home and venting it through a pipe, or pipes, to the air above the home where it is quickly diluted" and "EPA does not recommend the use of sealing alone to reduce radon because, by itself, sealing has not been shown to lower radon levels significantly or consistently" according to the EPA's "Consumer's Guide to Radon Reduction: How to Fix Your Home".^[22] Ventilation systems can utilize a heat exchanger or energy recovery ventilator to recover part of the energy otherwise lost in the process of exchanging air with the outside. For crawlspaces, the EPA states,^[22] "An effective method to reduce radon levels in crawlspace homes involves covering the earth floor with a high-density plastic sheet. A vent pipe and fan are used to draw the radon from under the sheet and vent it to the outdoors. This form of soil suction is called submembrane suction, and when properly applied is the most effective way to reduce radon levels in crawlspace homes."



High radon levels in a Minnesota (USA) basement with a passive under slab vent pipe system can be seen in the left half of the graph. After installation of a radon fan (ASD), a permanent reduction in radon levels to approximately 0.6 pCi/L can be seen in the right half of the graph.

- The most common approach is active soil depressurization (ASD). Experience has shown that ASD is applicable to most buildings since radon usually enters from the soil and rock underneath and mechanical ventilation is used when the indoor radon is emitted from the building materials. A less common approach works efficiently by reducing air pressures within cavities of exterior and demising walls where radon emitting from building materials, most often concrete blocks, collects.
- Above slab air pressure differential barrier technology (ASAPDB) requires that the interior pressure envelope, most often drywall, as well as all ductwork for air conditioning systems, be made as airtight as possible. A small blower, often no more than 15 cubic

feet per minute (0.7 L/s) may then extract the radon-laden air from these cavities and exhaust it to the out of doors. With well-sealed HVAC ducts, very small negative pressures, perhaps as little as 0.5 pascal (0.00007 psi), will prevent the entry of highly radon-laden wall cavity air from entering into the breathing zone. Such ASAPDB technology is often the best radon mitigation choice for high-rise condominiums as it does not increase indoor humidity loads in hot humid climates, and it can also work well to prevent mold growth in exterior walls in heating climates.

- In hot, humid climates, heat recovery ventilators (HRV) as well as energy recovery ventilators (ERV) have a record of increasing indoor relative humidity and dehumidification demands on air conditioning systems. Mold problems can occur in homes that have been radon mitigated with HRV and ERV installations in hot, humid climates.^[citation needed] HRVs and ERVs have an excellent record in cold dry climates.
- A recent technology is based on building science. It includes a variable rate mechanical ventilation system that prevents indoor relative humidity from rising above a preset level such as 50% which is currently suggested by the US Environmental Protection Agency and others as an upper limit for the prevention of mold. It has proven to be especially effective in hot, humid climates. It controls the air delivery rate so that the air conditioner is never overloaded with more moisture than it can effectively remove from the indoor air.
 - It is generally assumed that air conditioner operation will remove excess moisture from the air in the breathing zone, but it is important to note that just because the air conditioner cools does not mean that it is also dehumidifying. If Δt is 14 degrees or less, it may not dehumidify at all even though it is cooling.
 - Factors that are likely to aggravate indoor humidity problems from mechanical ventilation-based radon installations are as follows and an expert radon mitigator/building scientist will check for and correct any and all of the following when he or she performs radon mitigation procedures:
 - Air conditioner duct leaks located outside the breathing zone, such as in the attic.
 - Excessive exhaust fan operation
 - Oversize or over-capacity air conditioners
 - AC air handler fans that do not stop running when the air conditioner compressor stops running.
 - Delta t (Δt), which is the amount that the air is cooled as it is passed through the air conditioner's cooling coils. A good Δt performance figure for home air conditioners is about 20 °F (11 °C). In comparison, automobile air conditioners deliver Δt performance of 32 to 38 °F (18 to 21 °C). A Δt of 14 °F (8 °C) will dehumidify poorly if at all.

In South Florida, most radon mitigation is performed by use of fixed rate mechanical ventilation. Radon mitigation training in Florida does not include problems associated with mechanical ventilation systems, such as high indoor humidity, mold, moldy odors, property

damage or health consequences of human occupation in high humidity of moldy environments^[citation needed]. As a result, most Florida radon mitigators are unaware of and do not incorporate existing building science moisture management technology into mechanical ventilation radon installations. Home inspectors may not necessarily be aware of the mold risks associated with radon mitigation by mechanical ventilation.

The average cost for an ASD radon mitigation system in Minnesota is \$1500.^[23] These costs are very dependent on the type of home and age of construction.^[24]

Methods of radon-in-water mitigation

[edit]

Radon removal from water supplies may be at a treatment plant, point of entry, or point of use. Public water supplies in the United States were required to treat for radionuclides beginning in 2003 but private wells are not regulated by the federal government as of 2014. The radon can be captured by granular activated charcoal (GAR) or released into the air through aeration of the water. Radon will naturally dissipate from water over a period of days, but the quantity of storage needed to treat the water in this manner makes home systems of this type impracticably large.^[25]

Activated carbon systems capture radon from the water. The amount of radiation accumulates over time and the filter material may reach the level of requiring disposal as a radioactive waste. However, in the United States there are no regulations concerning radiation levels and disposal of radon treatment waste as of 2014.

Aeration systems move the radon from the water to the air. Radon gas discharged into the air is the release of a pollutant, and may become regulated in the United States.

References

[edit]

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- [^] US EPA, OAR (2013-08-27). "Radon". www.epa.gov. Retrieved 2023-02-04.
- [^] "Recommended Residential Radon Mitigation Standard of Practice". United States Environmental Protection Agency. Archived from the original on 2008-01-16. Retrieved 2008-02-02.
- [^] "ASTM E2121-03 Standard Practice for Installing Radon Mitigation Systems in Existing Low-Rise Residential Buildings". ASTM International. Retrieved 2008-02-02.

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20. ^ *"A Citizen's Guide to Radon" (PDF). EPA. Retrieved 2024-12-27.*
21. ^ *"Radon Mitigation Methods". Radon Solution. Archived from the original on 2008-12-15. Retrieved 2008-12-02.*
22. ^ **a b** *"Consumer's Guide to Radon Reduction: How to Fix Your Home" (PDF). EPA.*
23. ^ *"Radon Mitigation System - EH: Minnesota Department of Health". Health.state.mn.us. 2014-12-10. Retrieved 2019-03-26.*
24. ^ *"Featured Radon Mitigation System Archives". Radonreductioninc.com. Retrieved 2015-03-30.*
25. ^ *"Radon in Drinking Water Health Risk Reduction and Cost Analysis: Notice" (PDF). Federal Register. **64**. February 26, 1999. Retrieved 2015-03-30.*

External links

[edit]

- Radon at the United States Environmental Protection Agency
- National Radon Program Services hosted by Kansas State University
- Radon and Lung Health from the American Lung Association
- It's Your Health - Health Canada
- Radon's impact on your health – Quebec Lung Association

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Radiation protection

Main articles

- o Background radiation
- o Dosimetry
- o Health physics
- o Ionizing radiation
- o Internal dosimetry
- o Radioactive contamination
- o Radioactive sources
- o Radiobiology

Measurement quantities and units

- o Absorbed dose
- o Becquerel
- o Committed dose
- o Computed tomography dose index
- o Counts per minute
- o Effective dose
- o Equivalent dose
- o Gray
- o Mean glandular dose
- o Monitor unit
- o Rad
- o Roentgen
- o Rem
- o Sievert

Instruments and measurement techniques

- o Airborne radioactive particulate monitoring
- o Dosimeter
- o Geiger counter
- o Ion chamber
- o Scintillation counter
- o Proportional counter
- o Radiation monitoring
- o Semiconductor detector
- o Survey meter
- o Whole-body counting

- Protection techniques**
 - Lead shielding
 - Glovebox
 - Potassium iodide
 - Radon mitigation
 - Respirators

- Organisations**
 - Euratom
 - HPS (USA)
 - IAEA
 - ICRU
 - ICRP
 - IRPA
 - SRP (UK)
 - UNSCEAR

- Regulation**
 - IRR (UK)
 - NRC (USA)
 - ONR (UK)
 - Radiation Protection Convention, 1960

- Radiation effects**
 - Acute radiation syndrome
 - Radiation-induced cancer

See also the categories Medical physics, Radiation effects, Radioactivity, Radiobiology, and Radiation protection

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Heating, ventilation, and air conditioning

**Fundamental
concepts**

- Air changes per hour (ACH)
- Bake-out
- Building envelope
- Convection
- Dilution
- Domestic energy consumption
- Enthalpy
- Fluid dynamics
- Gas compressor
- Heat pump and refrigeration cycle
- Heat transfer
- Humidity
- Infiltration
- Latent heat
- Noise control
- Outgassing
- Particulates
- Psychrometrics
- Sensible heat
- Stack effect
- Thermal comfort
- Thermal destratification
- Thermal mass
- Thermodynamics
- Vapour pressure of water

- Absorption-compression heat pump
- Absorption refrigerator
- Air barrier
- Air conditioning
- Antifreeze
- Automobile air conditioning
- Autonomous building
- Building insulation materials
- Central heating
- Central solar heating
- Chilled beam
- Chilled water
- Constant air volume (CAV)
- Coolant
- Cross ventilation
- Dedicated outdoor air system (DOAS)
- Deep water source cooling
- Demand controlled ventilation (DCV)
- Displacement ventilation
- District cooling
- District heating
- Electric heating
- Energy recovery ventilation (ERV)
- Firestop
- Forced-air
- Forced-air gas
- Free cooling
- Heat recovery ventilation (HRV)
- Hybrid heat
- Hydronics
- Ice storage air conditioning
- Kitchen ventilation
- Mixed-mode ventilation
- Microgeneration
- Passive cooling
- Passive daytime radiative cooling
- Passive house
- Passive ventilation
- Radiant heating and cooling
- Radiant cooling
- Radiant heating
- Radon mitigation
- Refrigeration
- Renewable heat
- Room air distribution
- Solar air heat
- Solar combisystem

Technology

- Air conditioner inverter
- Air door
- Air filter
- Air handler
- Air ionizer
- Air-mixing plenum
- Air purifier
- Air source heat pump
- Attic fan
- Automatic balancing valve
- Back boiler
- Barrier pipe
- Blast damper
- Boiler
- Centrifugal fan
- Ceramic heater
- Chiller
- Condensate pump
- Condenser
- Condensing boiler
- Convection heater
- Compressor
- Cooling tower
- Damper
- Dehumidifier
- Duct
- Economizer
- Electrostatic precipitator
- Evaporative cooler
- Evaporator
- Exhaust hood
- Expansion tank
- Fan
- Fan coil unit
- Fan filter unit
- Fan heater
- Fire damper
- Fireplace
- Fireplace insert
- Freeze stat
- Flue
- Freon
- Fume hood
- Furnace
- Gas compressor
- Gas heater
- Gasline heater

**Measurement
and control**

- Air flow meter
- Aquastat
- BACnet
- Blower door
- Building automation
- Carbon dioxide sensor
- Clean air delivery rate (CADR)
- Control valve
- Gas detector
- Home energy monitor
- Humidistat
- HVAC control system
- Infrared thermometer
- Intelligent buildings
- LonWorks
- Minimum efficiency reporting value (MERV)
- Normal temperature and pressure (NTP)
- OpenTherm
- Programmable communicating thermostat
- Programmable thermostat
- Psychrometrics
- Room temperature
- Smart thermostat
- Standard temperature and pressure (STP)
- Thermographic camera
- Thermostat
- Thermostatic radiator valve

**Professions,
trades,
and services**

- Architectural acoustics
- Architectural engineering
- Architectural technologist
- Building services engineering
- Building information modeling (BIM)
- Deep energy retrofit
- Duct cleaning
- Duct leakage testing
- Environmental engineering
- Hydronic balancing
- Kitchen exhaust cleaning
- Mechanical engineering
- Mechanical, electrical, and plumbing
- Mold growth, assessment, and remediation
- Refrigerant reclamation
- Testing, adjusting, balancing

**Industry
organizations**

- AHRI
- AMCA
- ASHRAE
- ASTM International
- BRE
- BSRIA
- CIBSE
- Institute of Refrigeration
- IIR
- LEED
- SMACNA
- UMC

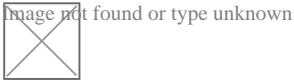
Health and safety

- Indoor air quality (IAQ)
- Passive smoking
- Sick building syndrome (SBS)
- Volatile organic compound (VOC)

See also

- ASHRAE Handbook
- Building science
- Fireproofing
- Glossary of HVAC terms
- Warm Spaces
- World Refrigeration Day
- Template:Fire protection
- Template:Home automation
- Template:Solar energy

About foundation



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

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

Common uses

[edit]

- Foundation (cosmetics), a skin-coloured makeup cream applied to the face
- Foundation (engineering), the element of a structure which connects it to the ground, and transfers loads from the structure to the ground
- Foundation (evidence), a legal term
- Foundation (nonprofit), a type of charitable organization
 - Foundation (United States law), a type of charitable organization in the U.S.
 - Private foundation, a charitable organization that might not qualify as a public charity by government standards

Arts, entertainment, and media

[edit]

Film and TV

[edit]

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

Games

[edit]

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

Literature

[edit]

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

Music

[edit]

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

Albums

[edit]

- *Foundation* (Brand Nubian album)
- *Foundation* (Breakage album)

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

Songs

[edit]

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

Other uses in arts, entertainment, and media

[edit]

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

Education

[edit]

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

Science and technology

[edit]

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

Companies

[edit]

- Foundation Medicine, a genomic profiling company

See also

[edit]

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

Disambiguation icon

Image not found or type unknown

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

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

About Cook County

Photo

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Photo

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Photo

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Photo

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Things To Do in Cook County

Photo

Sand Ridge Nature Center

4.8 (96)

Photo

Image not found or type unknown

River Trail Nature Center

4.6 (235)

Photo

Image not found or type unknown

Palmisano (Henry) Park

4.7 (1262)

Driving Directions in Cook County

Driving Directions From Palmisano (Henry) Park to

Driving Directions From Lake Katherine Nature Center and Botanic Gardens to

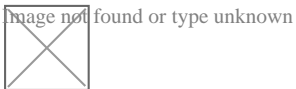
Driving Directions From Navy Pier to

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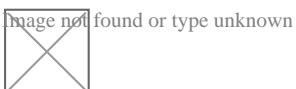
Reviews for



Jeffery James

(5)

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

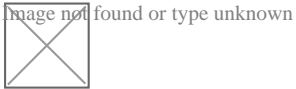


Sarah McNeily

(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

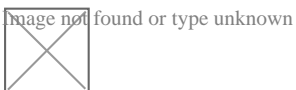
after. They kept the job site meticulously clean. The crew was on time and friendly. I'd recommend them any day!
Thanks to Jessie and crew.



Jim de Leon

(5)

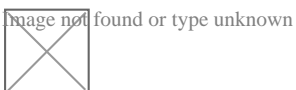
It was a pleasure to work with Rick and his crew. From the beginning, Rick listened to my concerns and what I wished to accomplish. Out of the 6 contractors that quoted the project, Rick seemed the MOST willing to accommodate my wishes. His pricing was definitely more than fair as well. I had 10 push 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.

Incorporating Reinforced Footings in Existing Structures [View GBP](#)

Check our other pages :

- [Evaluating Helical Pier Installations for Stability](#)
- [Recognizing Different Methods for Load Bearing Enhancement](#)
- [Coordinating Structural Engineer Reviews for Compliance](#)
- [Recognizing Liability Concerns in Construction Zones](#)
- [Exploring Innovative Jacking Mechanisms for Floor Leveling](#)

Frequently Asked Questions

What is the estimated cost for reinforced footings, and what factors impact that cost?

The cost of reinforced footings varies depending on factors such as the size of your home, the depth and width of the required footings, soil conditions, site accessibility, and the extent of excavation needed. Other factors may include the amount of steel reinforcement required and local building codes. We will provide a detailed estimate after a thorough inspection of your foundation and property.

United Structural Systems of Illinois, Inc

Phone : +18473822882

City : Hoffman Estates

State : IL

Zip : 60169

Address : 2124 Stonington Ave

[Google Business Profile](#)

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

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