Foundation Safety

- **Project Logistics Permitting and QA QC**
  Project Logistics Permitting and QA QC   Steps to Secure a Municipal Foundation Repair Permit   Coordinating Utility Markouts Before Pier Drilling   Developing a Work Sequence to Minimize Downtime   Creating a Safety Plan That Meets OSHA Guidelines   Scheduling Third Party Inspections for Key Milestones   Preparing As Built Elevation Logs for Engineer Review   Managing Material Deliveries on Confined Job Sites   Using Checklists to Track QA QC Tasks in Real Time   Budget Control Methods for Foundation Projects   Communication Strategies With Homeowners During Repairs   Document Storage Solutions for Project Records   Closing Out a Permit After Final Inspection Approval
- **Cost Financing and Warranty Structures**
  Cost Financing and Warranty Structures   Factors That Influence Foundation Repair Pricing   Understanding Pier Installation Quotes Line by Line   Comparing Financing Options for Structural Repairs   How Transferable Warranties Protect Future Owners   Common Exclusions Found in Foundation Repair Contracts   Calculating Return on Investment for Underpinning Services   Payment Schedule Ideas to Align With Work Progress   Evaluating Insurance Coverage for Structural Damage   Estimating Long Term Savings From Preventive Upgrades   Negotiating Warranty Terms With Contractors   Impact of Material Choice on Overall Project Cost   Tracking Repair Expenses for Tax Documentation
- **About Us**

Repairs

Project Scope Definition and Permitting Requirements for Foundation Repair

Clear and consistent communication is paramount when dealing with homeowners during the repair process. This approach not only builds trust but also ensures that expectations are managed effectively, reducing potential conflicts and misunderstandings. When homeowners are undergoing repairs, whether its due to damage or renovation, theyre often in a state of disruption and stress. Those tiny hairline cracks above your doorway are basically your house's version of sending an SOS text at 2am **root cause analysis Kane County** leak. Effective communication serves as a beacon of reliability in this tumultuous time.

Firstly, clear communication sets the stage for a smooth workflow. By clearly outlining what will happen, when it will happen, and how long each phase might take, homeowners can plan their lives around the repair schedule. This reduces anxiety as they know what to expect; there are no surprises lurking around the corner. For instance, informing them about daily work hours or any necessary shutoffs (like water or electricity) ahead of time can prevent inconveniences.

Consistency in communication is equally crucial. Regular updates keep homeowners in the loop regarding progress or any unforeseen issues that might arise during the repair process. This could be through scheduled meetings, phone calls, or even digital platforms like emails or project management apps tailored for home renovations. Consistent check-ins demonstrate professionalism and commitment to transparency, fostering a positive relationship.

Moreover, clear communication helps in managing expectations about costs and timelines. Homeowners appreciate knowing if there might be additional expenses due to unexpected findings beneath surfaces or if delays are anticipated because of supply chain issues or weather conditions. By being upfront about these possibilities from the beginning and updating them as things evolve, homeowners feel respected and involved rather than sidelined.

Lastly, effective communication channels allow for feedback from the homeowner side as well. They might have concerns or preferences regarding certain aspects of the repair which can significantly affect their satisfaction with the outcome. Listening actively and responding thoughtfully not only addresses their concerns but also makes them feel valued in the decision-making process.

In conclusion, adopting strategies that prioritize clear and consistent communication with homeowners during repairs isnt just good practice; its essential for maintaining harmony, ensuring satisfaction, and ultimately achieving successful project completion. It transforms what could be a stressful experience into one where homeowners feel supported and informed every step of the way.

Pre-repair communication is a critical phase in the process of home repairs, setting the stage for a smooth and transparent relationship between contractors and homeowners. This initial interaction not only establishes the groundwork for effective communication but also manages expectations, ensuring both parties are on the same page from the outset.

Initiating this dialogue involves clearly outlining what the repair work entails. Homeowners need to understand the scope of the project, including what will be repaired, how long it might take, and any disruptions they can expect. Its important to convey this information in laymans terms, avoiding industry jargon that could confuse or intimidate them. For instance, instead of saying "Well be retrofitting your HVAC system," one might explain, "Were going to update your heating and cooling system to make it more efficient and reliable."

Setting realistic expectations about timelines is equally crucial. While its tempting to promise a swift completion to please the homeowner, unforeseen issues often arise during repairs. Communicating potential delays due to weather, material availability, or unexpected damage helps prevent frustration later on. Transparency about these possibilities fosters trust; homeowners appreciate honesty over overly optimistic forecasts that dont pan out.

Discussing costs upfront is another vital aspect of pre-repair communication. Providing a detailed estimate with a breakdown of expenses ensures there are no surprises when it comes time for payment. If additional costs might occur due to unforeseen circumstances, explaining this possibility beforehand allows homeowners to budget accordingly or decide if they want to proceed with optional upgrades.

Moreover, establishing how communication will continue throughout the project is key. Agreeing on regular updates via phone calls, emails, or even scheduled site visits can keep homeowners informed without overwhelming them with too much information at once. This continuous loop of communication reassures them that their home is in good hands and that any concerns they might have will be addressed promptly.

Lastly, encouraging homeowners to voice their preferences or concerns early on helps tailor the repair process to their comfort level. Whether its scheduling work around their daily routine or discussing privacy measures during interior renovations, considering their input shows respect for their living space and lifestyle.

In essence, pre-repair communication is about building a rapport based on clarity and mutual understanding. By setting expectations effectively at this stage, contractors pave the way for fewer misunderstandings, greater satisfaction from homeowners, and ultimately a smoother execution of repairs. This foundational dialogue not only enhances project efficiency but also strengthens professional relationships built on trust and respect.

Material Procurement and Quality Control Procedures

Communication during active repair work is a critical aspect of maintaining a positive relationship with homeowners. When repairs are underway, homeowners are often anxious about the disruption to their daily lives and the outcome of the work being done. Effective communication can alleviate these concerns, foster trust, and ensure that both parties are on the same page regarding expectations and progress.

One key strategy is to establish regular updates. This could be in the form of daily or weekly briefings where the homeowner is informed about what has been accomplished, what is planned next, and any unforeseen issues that have arisen. These updates should be delivered in person when possible, as it adds a personal touch and allows for immediate feedback or questions from the homeowner. If in-person isnt feasible, phone calls or video updates can serve as good alternatives.

Transparency is also paramount. If theres a delay or an issue like unexpected damage or additional costs, its important to communicate this promptly and clearly. Explaining why something has happened not only keeps the homeowner informed but also demonstrates professionalism and respect for their time and investment. For instance, if a repair reveals further structural problems, explaining this with visual aids or diagrams can help homeowners understand the necessity of extra work.

Another effective method is to involve homeowners in decision-making where appropriate. For example, if theres an option between two types of materials or methods for repair, presenting these choices allows them to feel involved and respected in the process. Its crucial here to provide clear pros and cons so they can make informed decisions.

Lastly, setting up a simple yet effective communication channel can streamline interactions during the repair period. This might be through a group chat on messaging apps where updates are posted, or an email thread dedicated solely to project communications. This ensures that all parties have access to information at any time, reducing confusion and miscommunication.

In conclusion, communication during active repair work should be frequent, transparent, inclusive, and well-organized. By adopting these strategies, contractors not only ensure smoother project execution but also build lasting trust with homeowners, potentially turning one-time clients into repeat customers through positive experiences during stressful times like home repairs.


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Inspection and Testing Protocols During Foundation Repair

Okay, so were talking communication with homeowners during repairs, right? And specifically, how photos and videos can be our best friends. Honestly, in this business, trust is everything. People are letting you into their homes, often when somethings already gone wrong. Theyre stressed. Theyre worried about costs. Transparency is key, and thats where visuals shine.

Think about it. Trying to explain a hidden plumbing issue you found with words alone? Good luck! You might as well be speaking a different language. But show them a picture, or better yet, a short video walk-through of the corroded pipe, and suddenly it clicks. They *see* the problem. They understand the need for the repair. Its not just you saying it; it's right there in front of them.

Its not just about pointing out problems, though. Use visuals to show progress too. A quick snapshot of a freshly installed beam or a video of the new tiles being laid can be incredibly reassuring. It lets them know things are moving along, that their investment is actually turning into something tangible. Its a powerful way to keep them engaged and confident in your work.

Plus, let's be real, everyone has a smartphone these days. Its quick, its easy, and it creates a visual record. Before and after photos are gold. They document the initial condition, the work performed, and the final result. This can be invaluable if any questions or concerns arise down the line.

Ultimately, using photos and videos isnt just about being tech-savvy; its about being a better communicator. Its about building trust, managing expectations, and making the whole repair process less stressful for the homeowner. And happy homeowners? Well, thats good for everyone.

Documentation and Reporting for Permitting Compliance and QA/QC

Addressing Homeowner Concerns and Questions: Its all about listening, really.

Let's be honest, having your home under repair is stressful. It's your safe space, maybe your biggest investment, and suddenly it's filled with unfamiliar faces, noise, and the potential for things to go wrong. So, its no surprise homeowners have questions and, yeah, sometimes, concerns. The key to navigating this tricky territory? Good, old-fashioned, human communication.

Forget the jargon. Nobody wants to hear about "substrate adhesion coefficient" when theyre worried about a leaky roof. Speak plainly. Explain whats happening, why its happening, and what the expected outcome is, in words they actually understand. Pictures, diagrams, even a quick sketch on a notepad can be incredibly helpful.

More importantly, listen. Really listen. Don't just wait for them to stop talking so you can launch into your pre-prepared explanation. Hear what their underlying worry is. Are they concerned about the cost? The timeline? The impact on their family? Acknowledge their feelings. Saying something like, "I understand this is disruptive, Mrs. Smith, and were doing our best to minimize the inconvenience" goes a long way.

Be proactive. Dont wait for them to come to you with questions. Provide regular updates, even if its just to say, "Everything is progressing as planned." A little communication prevents a lot of anxiety. And when they *do* have questions, answer them honestly and promptly. If you dont know the answer, say so, but promise to find out.

Ultimately, its about building trust. Homeowners are putting a lot of faith in you to take care of their property. By addressing their concerns and questions with empathy, clarity, and responsiveness, you not only alleviate their stress, but you also build a stronger, more positive relationship, and thats good for everyone involved. Its not just about fixing the house; its about fixing the experience.

Risk Management and Mitigation Strategies in Project Logistics

Okay, lets talk about keeping homeowners in the loop *after* the dust settles from a repair. We all know communication during a repair is crucial, right? Updates on delays, explanations of unexpected costs, the whole shebang. But what about *after* youve fixed the leaky roof, unclogged the drain, or whatever the crisis was? Thats where post-repair communication and follow-up come in, and honestly, its just as important.

Think about it from the homeowners perspective. Theyve just gone through the stress and inconvenience of a repair. They're probably still a little anxious. Did everything *really* get fixed? Are they going to have another problem next week? A simple, friendly follow-up can do wonders to ease those anxieties.

It doesnt have to be complicated. A quick phone call a few days later – "Hi Mrs. Johnson, just wanted to check in and see how that new water heater is working out. Any issues at all?" – thats all it takes. Or maybe a short email: "Following up on the recent plumbing repair. We hope youre happy with the service. Please let us know if you have any questions or concerns."

The key is to make it personal and genuine. No one wants to feel like theyre just a number on a spreadsheet. Show them you actually care about their satisfaction. Ask specific questions about the repair. This also gives you valuable feedback! Maybe theres a tiny adjustment needed that you can address before it becomes a bigger problem.

Beyond the immediate "hows it going?" theres also the opportunity to reinforce your brand and build a long-term relationship. You could send a thank-you note with a small discount on future services. Or share helpful tips on maintaining the repaired item – "Here are some things you can do to extend the life of your new garbage disposal."

Ultimately, post-repair communication and follow-up is about building trust and demonstrating that youre not just in it for the quick fix. Youre in it to be their go-to resource for all things home repair. And that kind of reputation? Thats worth its weight in gold. Its about being human, being helpful, and building a relationship that lasts.

Post-Repair Verification and Long-Term Monitoring for QA/QC

Communication is key when youre knee-deep in home repairs, right? Especially when youre dealing with homeowners. But its not just about *what* you say, its about how you say it, and even more importantly, how you *record* what you say. Think of "Documenting Communication for Future Reference" as your safety net, your "get out of jail free" card, and frankly, just plain good business sense all rolled into one.

Lets be real, memories fade. Homeowners might remember a conversation differently than you do, especially when emotions are running high because their kitchen is ripped apart. Having a clear record of discussions, decisions, and agreements protects everyone. Did Mrs. Johnson agree to the premium tile? Document it. Did you explain the potential for delays due to lumber shortages? Get it in writing (or a detailed email).

This isnt about being distrustful; its about being professional and proactive. Its about setting expectations and managing them effectively. Think of it as creating a shared understanding, a living document that both you and the homeowner can refer back to.

What does this look like in practice? Well, it could be anything from a simple email recap after a phone call ("Just to confirm, we agreed...") to detailed meeting minutes. Photos documenting the "before" state, progress updates, and any unexpected issues are invaluable. Even a quick text message can be helpful ("FYI, rain is delaying the roofing crew.").

The key is consistency and clarity. Use plain language, avoid jargon, and make sure the homeowner understands whats being communicated. Organize your documentation in a way thats easily accessible. A well-organized project folder (physical or digital) is your best friend.

In the long run, documenting communication saves time, reduces misunderstandings, and builds trust with homeowners. It shows them youre organized, responsible, and committed to delivering a quality service. And lets face it, happy homeowners are more likely to give referrals, which is the best advertising money cant buy. So, document those conversations. Your future self (and your business) will thank you.

About waterproofing

Waterproofing is the procedure of making a things, person or structure water-proof or water-resistant so that it stays reasonably untouched by water or withstands the access of water under specified conditions. Such products may be utilized in wet atmospheres or undersea to specified midsts. Waterproof and water resistant commonly refer to resistance to infiltration of water in its fluid state and potentially under stress, whereas wet evidence refers to resistance to moisture or wetness. Permeation of water vapour with a material or framework is reported as a wetness vapor transmission rate (MVTR). The hulls of boats and ships were as soon as waterproofed by using tar or pitch. Modern things may be waterproofed by applying water-repellent layers or by sealing joints with gaskets or o-rings. Waterproofing is utilized in reference to building frameworks (such as basements, decks, or wet areas), boat, canvas, clothes (raincoats or waders), digital tools and paper product packaging (such as containers for liquids).
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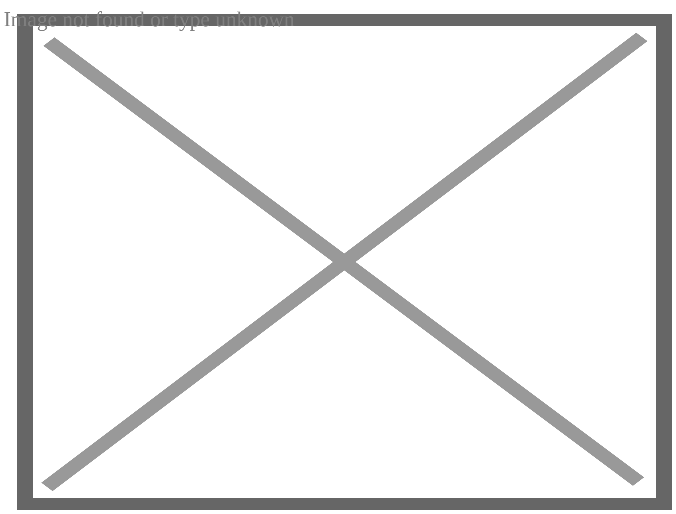
About Pile driver

This article is about the mechanical device used in construction. For other uses, see Pile driver (disambiguation).



Tracked vehicle configured as a dedicated pile driver

A **pile driver** is a heavy-duty tool used to drive piles into soil to build piers, bridges, cofferdams, and other "pole" supported structures, and patterns of pilings as part of permanent deep foundations for buildings or other structures. Pilings may be made of wood, solid steel, or tubular steel (often later filled with concrete), and may be driven entirely underwater/underground, or remain partially aboveground as elements of a finished structure.

The term "pile driver" is also used to describe members of the construction crew associated with the task,[1] also colloquially known as "pile bucks".[2]

The most common form of pile driver uses a heavy weight situated between vertical guides placed above a pile. The weight is raised by some motive power (which may include hydraulics, steam, diesel, electrical motor, or manual labor). At its apex the weight is released, impacting the pile and driving it into the ground.[1][3]

History

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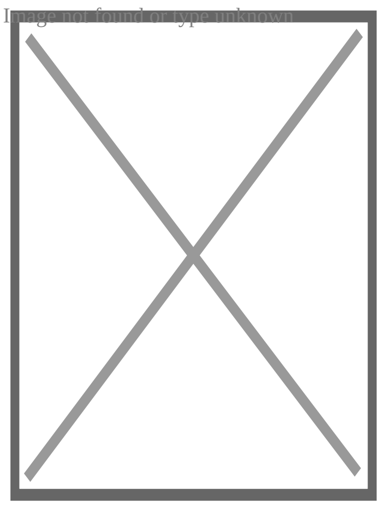
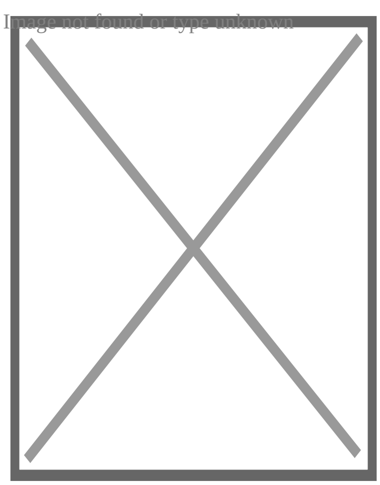


Replica of Ancient Roman pile driver used at the construction of Caesar's Rhine bridges (55 BC)

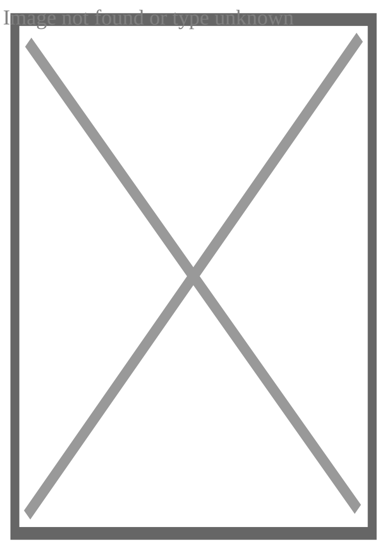


18th-century Pile driver, from *Abhandlung vom Wasserbau an Strömen*, 1769

There are a number of claims to the invention of the pile driver. A mechanically sound drawing of a pile driver appeared as early as 1475 in Francesco di Giorgio Martini's treatise *Trattato di Architectura*.[4] Also, several other prominent inventors—James Nasmyth (son of Alexander Nasmyth), who invented a steam-powered pile driver in 1845,[5] watchmaker James Valoué,[6] Count Giovan Battista Gazzola,[7] and Leonardo da Vinci[8]—have all been credited with inventing the device. However, there is evidence that a comparable device was used in the construction of Crannogs at Oakbank and Loch Tay in Scotland as early as 5000 years ago.[9] In 1801 John Rennie came up with a steam pile driver in Britain.[10] Otis Tufts is credited with inventing the steam pile driver in the United States.[11]

Types

[edit]



Pile driver, 1917

Ancient pile driving equipment used human or animal labor to lift weights, usually by means of pulleys, then dropping the weight onto the upper end of the pile. Modern piledriving equipment variously uses hydraulics, steam, diesel, or electric power to raise the weight and guide the pile.

Diesel hammer

[edit]

Concrete spun pile driving using diesel hammer in Patimban Deep Sea Port, Indonesia

A modern diesel pile hammer is a large two-stroke diesel engine. The weight is the piston, and the apparatus which connects to the top of the pile is the cylinder. Piledriving is started by raising the weight; usually a cable from the crane holding the pile driver — This draws air into the cylinder. Diesel fuel is injected into the cylinder. The weight is dropped, using a quick-release. The weight of the piston compresses the air/fuel mixture, heating it to the ignition point of diesel fuel. The mixture ignites, transferring the energy of the falling weight to the pile head, and driving the weight up. The rising weight draws in fresh air, and the cycle continues until the fuel is depleted or is halted by the crew.[12]

From an army manual on pile driving hammers: The initial start-up of the hammer requires that the piston (ram) be raised to a point where the trip automatically releases the piston, allowing it to fall. As the piston falls, it activates the fuel pump, which discharges a metered amount of fuel into the ball pan of the impact block. The falling piston blocks the exhaust ports, and compression of fuel trapped in the cylinder begins. The compressed air exerts a pre-load force to hold the impact block firmly against the drive cap and pile. At the bottom of the compression stroke, the piston strikes the impact block, atomizing the fuel and starting the pile on its downward movement. In the instant after the piston strikes, the atomized fuel ignites, and the resulting explosion exerts a greater force on the already moving pile, driving it further into the ground. The reaction of the explosion rebounding from the resistance of the pile drives the piston upward. As the piston rises, the exhaust ports open, releasing the exhaust gases to the atmosphere. After the piston stops its upward movement, it again falls by gravity to start another cycle.

Vertical travel lead systems

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Berminghammer vertical travel leads in use

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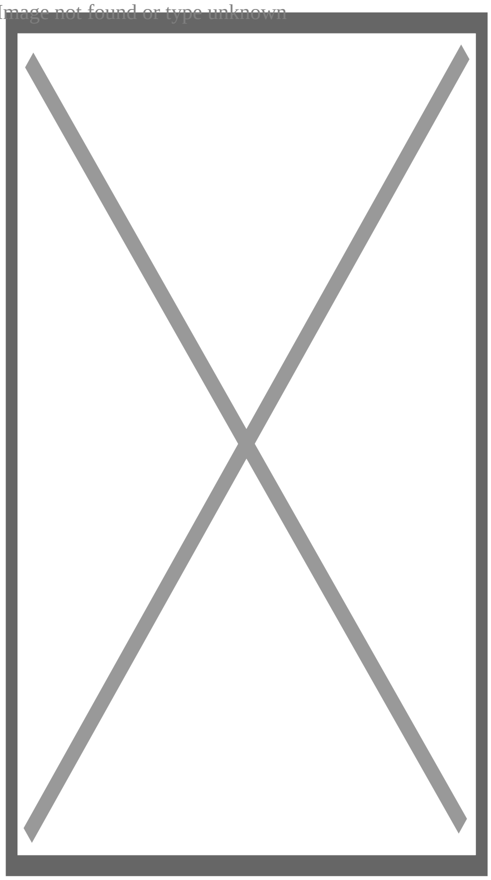

Military building mobile unit on "Army-2021" exhibition

Vertical travel leads come in two main forms: spud and box lead types. Box leads are very common in the Southern United States and spud leads are common in the Northern United States, Canada and Europe.

Hydraulic hammer

[edit]

A hydraulic hammer is a modern type of piling hammer used instead of diesel and air hammers for driving steel pipe, precast concrete, and timber piles. Hydraulic hammers are more environmentally acceptable than older, less efficient hammers as they generate less noise and pollutants. In many cases the dominant noise is caused by the impact of the hammer on the pile, or the impacts between components of the hammer, so that the resulting noise level can be similar to diesel hammers.[12]

Hydraulic press-in

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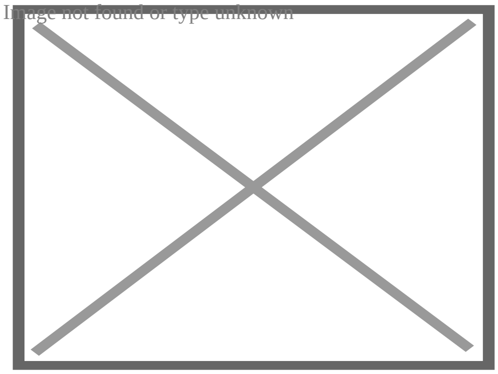

A steel sheet pile being hydraulically pressed

Hydraulic press-in equipment installs piles using hydraulic rams to press piles into the ground. This system is preferred where vibration is a concern. There are press attachments that can adapt to conventional pile driving rigs to press 2 pairs of sheet piles simultaneously. Other types of press equipment sit atop existing sheet piles and grip previously driven piles. This system allows for greater press-in and extraction force to be used since more reaction force is developed.[12] The reaction-based machines operate at only 69 dB at 23 ft allowing for installation and extraction of piles in close proximity to sensitive areas where traditional methods may threaten the stability of existing structures.

Such equipment and methods are specified in portions of the internal drainage system in the New Orleans area after Hurricane Katrina, as well as projects where noise, vibration and access are a concern.

Vibratory pile driver/extractor

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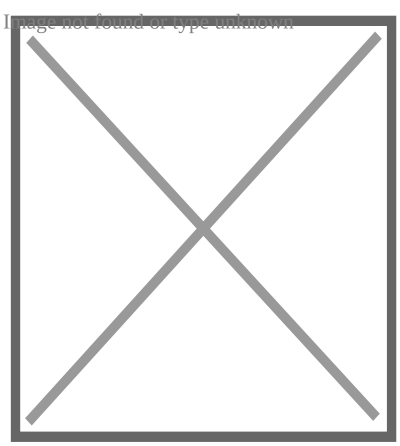
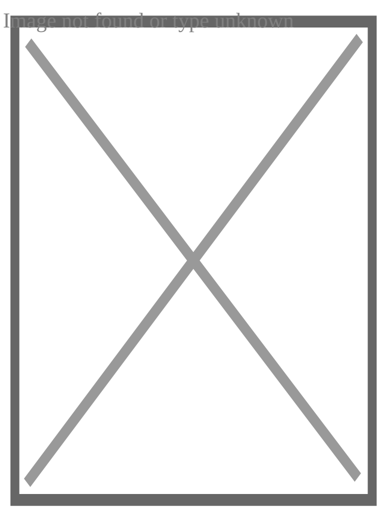


A diesel-powered vibratory pile driver on a steel I-beam

Vibratory pile hammers contain a system of counter-rotating eccentric weights, powered by hydraulic motors, and designed so that horizontal vibrations cancel out, while vertical vibrations are transmitted into the pile. The pile driving machine positioned over the pile with an excavator or crane, and is fastened to the pile by a clamp and/or bolts. Vibratory hammers can drive or extract a pile. Extraction is commonly used to recover steel I-beams used in temporary foundation shoring. Hydraulic fluid is supplied to the driver by a diesel engine-powered pump mounted in a trailer or van, and connected to the driver head via hoses. When the pile driver is connected to a dragline excavator, it is powered by the excavator's diesel engine. Vibratory pile drivers are often chosen to mitigate noise, as when the construction is near residences or office buildings, or when there is insufficient vertical clearance to permit use of a conventional pile hammer (for example when retrofitting additional piles to a bridge column or abutment footing). Hammers are available with several different vibration rates, ranging from 1200 vibrations per minute to 2400 VPM. The vibration rate chosen is influenced by soil conditions and other factors, such as power requirements and equipment cost.

Piling rig

[edit]



A Junttan purpose-built piledriving rig in Jyväskylä, Finland

A piling rig is a large track-mounted drill used in foundation projects which require drilling into sandy soil, clay, silty clay, and similar environments. Such rigs are similar in function to oil drilling rigs, and can be equipped with a short screw (for dry soil), rotary bucket (for wet soil) or core drill (for rock), along with other options. Expressways, bridges, industrial and civil buildings, diaphragm walls, water conservancy projects, slope protection, and seismic retrofitting are all projects which may require piling rigs.

Environmental effects

[edit]

The underwater sound pressure caused by pile-driving may be deleterious to nearby fish.[13][14] State and local regulatory agencies manage environment issues associated with pile-driving.[15] Mitigation methods include bubble curtains, balloons, internal combustion water hammers.[16]

See also

[edit]

- Auger (drill)
- Deep foundation
- Post pounder
- Drilling rig

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[edit]

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External links

[edit]
Image not found or type unknown
Wikimedia Commons has media related to ***Pile drivers***.

- Website about Vulcan Iron Works, which produced pile drivers from the 1870s through the 1990s

About Piling

For other uses, see Piling (disambiguation).

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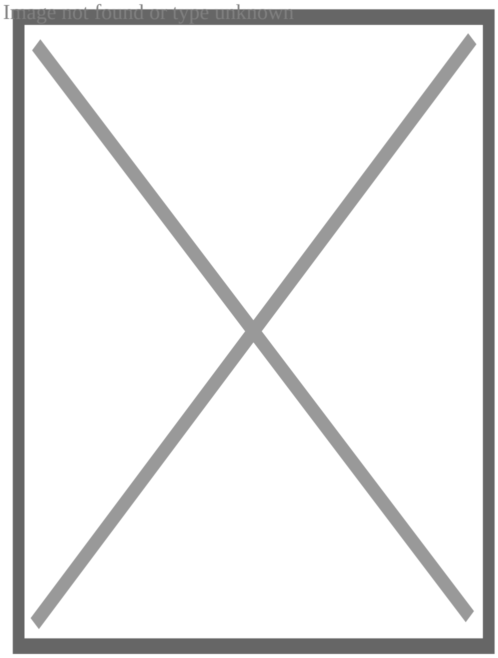
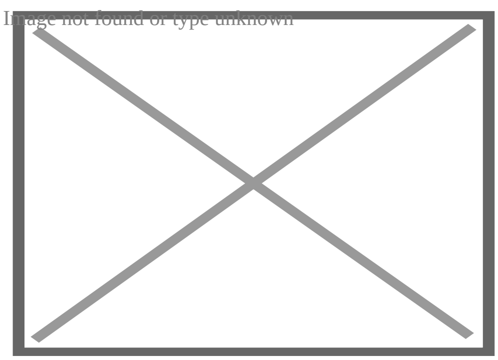
Drilling of deep piles of diameter 150 cm in bridge 423 near Ness Ziona, Israel

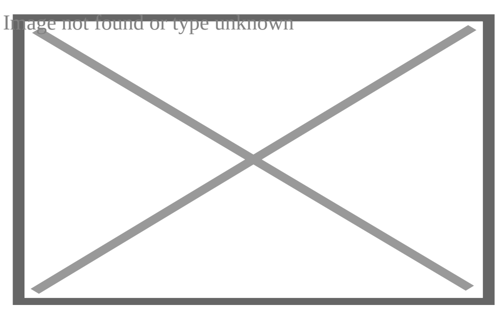


A deep foundation installation for a bridge in Napa, California, United States.



Pile driving operations in the Port of Tampa, Florida.

A **pile** or **piling** is a vertical structural element of a deep foundation, driven or drilled deep into the ground at the building site. A deep foundation is a type of foundation that transfers building loads to the earth farther down from the surface than a shallow foundation does to a subsurface layer or a range of depths.



Deep foundations of The Marina Torch, a skyscraper in Dubai

There are many reasons that a geotechnical engineer would recommend a deep foundation over a shallow foundation, such as for a skyscraper. Some of the common reasons are very large design loads, a poor soil at shallow depth, or site constraints like property lines. There are different terms used to describe different types of deep foundations including the pile (which is analogous to a pole), the pier (which is analogous to a column), drilled shafts, and caissons. Piles are generally driven into the ground *in situ*; other deep foundations are typically put in place using excavation and drilling. The naming conventions may vary between engineering disciplines and firms. Deep foundations can be made out of timber, steel, reinforced concrete or prestressed concrete.

Driven foundations

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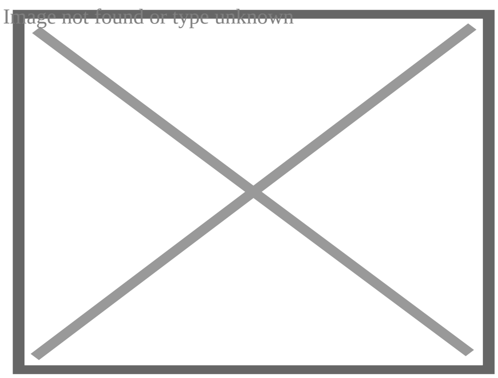


Pipe piles being driven into the ground

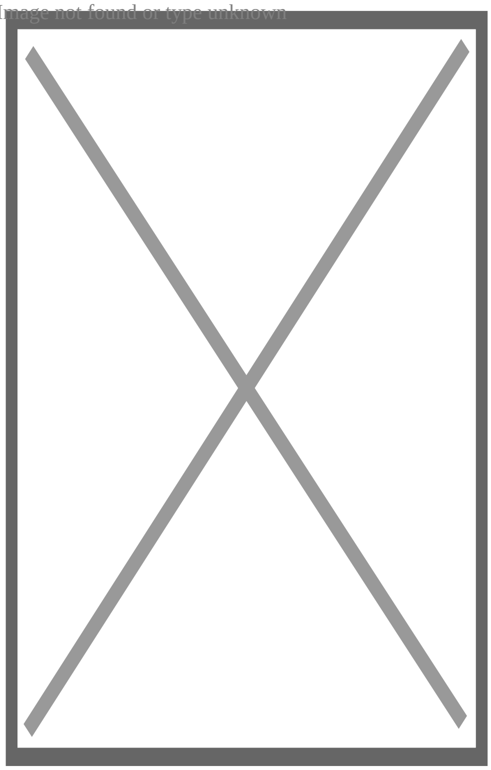


Illustration of a hand-operated pile driver in Germany after 1480

Prefabricated piles are driven into the ground using a pile driver. Driven piles are constructed of wood, reinforced concrete, or steel. Wooden piles are made from the trunks of tall trees. Concrete piles are available in square, octagonal, and round cross-sections (like Franki piles). They are reinforced with rebar and are often prestressed. Steel piles are either pipe piles or some sort of beam section (like an H-pile). Historically, wood piles used splices to join multiple segments end-to-end when the driven depth required was too long for a single pile; today, splicing is common with steel piles, though concrete piles can be spliced with mechanical and other means. Driving piles, as opposed to drilling shafts, is advantageous because the soil displaced by driving the piles compresses the surrounding soil, causing greater friction against the sides of the piles, thus increasing their load-bearing capacity. Driven piles are also considered to be "tested" for weight-bearing ability because of their method of installation.[*citation needed*]

Pile foundation systems

[edit]

Foundations relying on driven piles often have groups of piles connected by a pile cap (a large concrete block into which the heads of the piles are embedded) to distribute loads that are greater than one pile can bear. Pile caps and isolated piles are typically connected with grade beams to tie the foundation elements together; lighter structural elements bear on the grade beams, while heavier elements bear directly on the pile cap.[*citation needed*]

Monopile foundation

[edit]

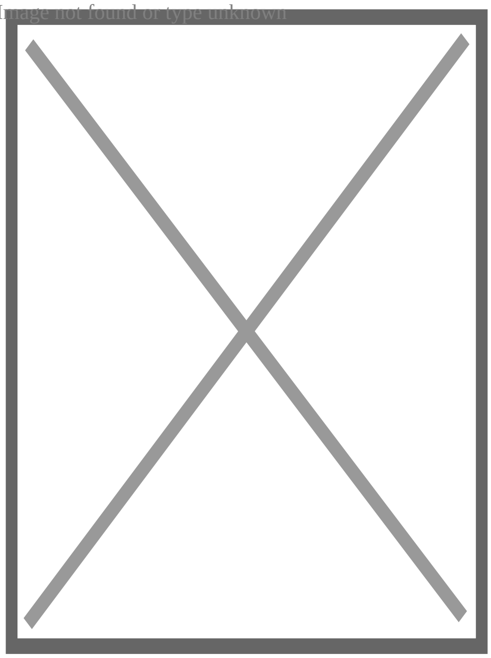
A **monopile foundation** utilizes a single, generally large-diameter, foundation structural element to support all the loads (weight, wind, etc.) of a large above-surface structure.

A large number of monopile foundations[1] have been utilized in recent years for economically constructing fixed-bottom offshore wind farms in shallow-water subsea locations.[2] For example, the Horns Rev wind farm in the North Sea west of Denmark utilizes 80 large monopiles of 4 metres diameter sunk 25 meters deep into the seabed,[3] while the Lynn and Inner Dowsing Wind Farm off the coast of England went online in 2008 with over 100 turbines, each mounted on a 4.7-metre-diameter monopile foundation in ocean depths up to 18 metres.[4]

The typical construction process for a wind turbine subsea monopile foundation in sand includes driving a large hollow steel pile, of some 4 m in diameter with approximately 50mm thick walls, some 25 m deep into the seabed, through a 0.5 m layer of larger stone and gravel to minimize erosion around the pile. A transition piece (complete with pre-installed features such as boat-landing arrangement, cathodic protection, cable ducts for sub-marine cables, turbine tower flange, etc.) is attached to the driven pile, and the sand and water are removed from the centre of the pile and replaced with concrete. An additional layer of even larger stone, up to 0.5 m diameter, is applied to the surface of the seabed for longer-term erosion protection.[2]

Drilled piles

[edit]



A pile machine in Amsterdam.

Also called **caissons**, **drilled shafts**, **drilled piers**, **cast-in-drilled-hole piles (CIDH piles)** or **cast-in-situ** piles, a borehole is drilled into the ground, then concrete (and often some sort of reinforcing) is placed into the borehole to form the pile. Rotary boring techniques allow larger diameter piles than any other piling method and permit pile construction through particularly dense or hard strata. Construction methods depend on the geology of the site; in particular, whether boring is to be undertaken in 'dry' ground conditions or through water-saturated strata. Casing is often used when the sides of the borehole are likely to slough off before concrete is poured.

For end-bearing piles, drilling continues until the borehole has extended a sufficient depth (socketing) into a sufficiently strong layer. Depending on site geology, this can be a rock layer, or hardpan, or other dense, strong layers. Both the diameter of the pile and the depth of the pile are highly specific to the ground conditions, loading conditions, and nature of the project. Pile depths may vary substantially across a project if the bearing layer is not level. Drilled piles can be tested using a variety of methods to verify the pile integrity during installation.

Under-reamed piles

[edit]

Under-reamed piles have mechanically formed enlarged bases that are as much as 6 m in diameter.[*citation needed*] The form is that of an inverted cone and can only be formed in stable soils or rocks. The larger base diameter allows greater bearing capacity than a straight-shaft pile.

These piles are suited for expansive soils which are often subjected to seasonal moisture variations, or for loose or soft strata. They are used in normal ground condition also where economics are favorable. [5][*full citation needed*]

Under reamed piles foundation is used for the following soils:-

1. Under reamed piles are used in black cotton soil: This type of soil expands when it comes in contact with water and contraction occurs when water is removed. So that cracks appear in the construction done on such clay. An under reamed pile is used in the base to remove this defect.

2. Under reamed piles are used in low bearing capacity Outdated soil (filled soil)

3.Under reamed piles are used in sandy soil when water table is high.

4. Under reamed piles are used, Where lifting forces appear at the base of foundation.

Augercast pile

[edit]

An augercast pile, often known as a continuous flight augering (CFA) pile, is formed by drilling into the ground with a hollow stemmed continuous flight auger to the required depth or degree of resistance. No casing is required. A cement grout mix is then pumped down the stem of the auger. While the cement grout is pumped, the auger is slowly withdrawn, conveying the soil upward along the flights. A shaft of fluid cement grout is formed to ground level. Reinforcement can be installed. Recent innovations in addition to stringent quality control allows reinforcing cages to be placed up to the full length of a pile when required.[*citation needed*]

Augercast piles cause minimal disturbance and are often used for noise-sensitive and environmentally-sensitive sites. Augercast piles are not generally suited for use in contaminated soils, because of expensive waste disposal costs. In cases such as these, a displacement pile (like Olivier piles) may provide the cost efficiency of an augercast pile and minimal environmental impact. In ground containing obstructions or cobbles and boulders, augercast piles are less suitable as refusal above the design pile tip elevation may be encountered.[*citation needed*]

Small Sectional Flight Auger piling rigs can also be used for piled raft foundations. These produce the same type of pile as a Continuous Flight Auger rig but using smaller, more lightweight equipment. This piling method is fast, cost-effective and suitable for the majority of ground types.[5][6]

Pier and grade beam foundation

[edit]

In drilled pier foundations, the piers can be connected with grade beams on which the structure sits, sometimes with heavy column loads bearing directly on the piers. In some residential construction, the piers are extended above the ground level, and wood beams bearing on the piers are used to support the structure. This type of foundation results in a crawl space underneath the building in which wiring and duct work can be laid during construction or re-modelling.[7]

Speciality piles

[edit]

Jet-piles

[edit]

In jet piling high pressure water is used to set piles.[8] High pressure water cuts through soil with a high-pressure jet flow and allows the pile to be fitted.[9] One advantage of Jet Piling: the water jet lubricates the pile and softens the ground.[10] The method is in use in Norway.[11]

Micropiles

[edit]

Micropiles are small diameter, generally less than 300mm diameter, elements that are drilled and grouted in place. They typically get their capacity from skin friction along the sides of the element, but can be end bearing in hard rock as well. Micropiles are usually heavily reinforced with steel comprising more than 40% of their cross section. They can be used as direct structural support or as ground reinforcement elements. Due to their relatively high cost and the type of equipment used to install these elements, they are often used where access restrictions and or very difficult ground conditions (cobbles and boulders, construction debris, karst, environmental sensitivity) exists or to retrofit existing structures. Occasionally, in difficult ground, they are used for new construction foundation elements. Typical applications include underpinning, bridge, transmission tower and slope stabilization projects.[6][12][13][14]

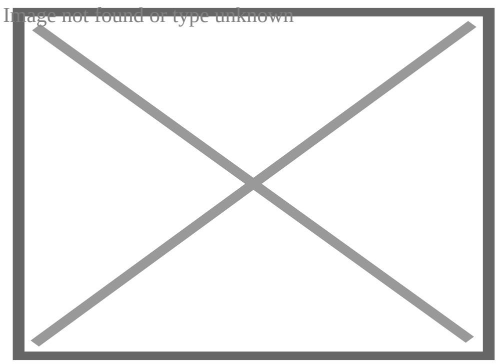
Tripod piles

[edit]

The use of a tripod rig to install piles is one of the more traditional ways of forming piles. Although unit costs are generally higher than with most other forms of piling,[*citation nee* it has several advantages which have ensured its continued use through to the present day. The tripod system is easy and inexpensive to bring to site, making it ideal for jobs with a small number of piles.[*clarification needed*]

Sheet piles

[edit]



Sheet piles are used to restrain soft soil above the bedrock in this excavation

Sheet piling is a form of driven piling using thin interlocking sheets of steel to obtain a continuous barrier in the ground. The main application of sheet piles is in retaining walls and cofferdams erected to enable permanent works to proceed. Normally, vibrating hammer, t-crane and crawle drilling are used to establish sheet piles.[*citation needed*

Soldier piles

[edit]

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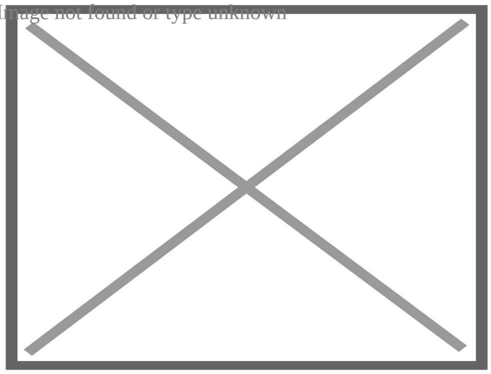


A soldier pile wall using reclaimed railway sleepers as lagging.

Soldier piles, also known as king piles or Berlin walls, are constructed of steel H sections spaced about 2 to 3 m apart and are driven or drilled prior to excavation. As the excavation proceeds, horizontal timber sheeting (lagging) is inserted behind the H pile flanges.

The horizontal earth pressures are concentrated on the soldier piles because of their relative rigidity compared to the lagging. Soil movement and subsidence is minimized by installing the lagging immediately after excavation to avoid soil loss.[*citation needed*] Lagging can be constructed by timber, precast concrete, shotcrete and steel plates depending on spacing of the soldier piles and the type of soils.

Soldier piles are most suitable in conditions where well constructed walls will not result in subsidence such as over-consolidated clays, soils above the water table if they have some cohesion, and free draining soils which can be effectively dewatered, like sands.[*citation*

Unsuitable soils include soft clays and weak running soils that allow large movements such as loose sands. It is also not possible to extend the wall beyond the bottom of the excavation, and dewatering is often required.[*citation needed*]

Screw piles

[edit]

Screw piles, also called *helical piers* and *screw foundations*, have been used as foundations since the mid 19th century in screw-pile lighthouses.[*citation needed*] Screw piles are galvanized iron pipe with helical fins that are turned into the ground by machines to the required depth. The screw distributes the load to the soil and is sized accordingly.

Suction piles

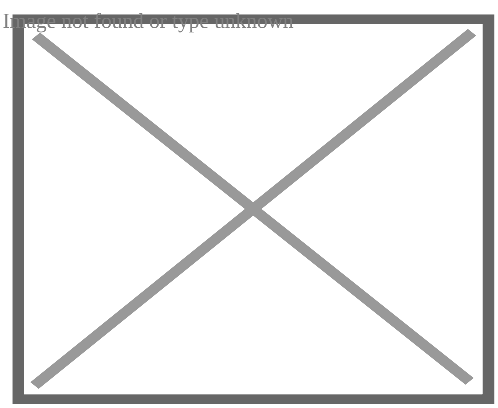
[edit]

Suction piles are used underwater to secure floating platforms. Tubular piles are driven into the seabed (or more commonly dropped a few metres into a soft seabed) and then a pump sucks water out at the top of the tubular, pulling the pile further down.

The proportions of the pile (diameter to height) are dependent upon the soil type. Sand is difficult to penetrate but provides good holding capacity, so the height may be as short as half the diameter. Clays and muds are easy to penetrate but provide poor holding capacity, so the height may be as much as eight times the diameter. The open nature of gravel means that water would flow through the ground during installation, causing 'piping' flow (where water boils up through weaker paths through the soil). Therefore, suction piles cannot be used in gravel seabeds.[*citation needed*]

Adfreeze piles

[edit]



Adfreeze piles supporting a building in UtqiaÃƒ â€žÃ‚Â¡vik, Alaska

In high latitudes where the ground is continuously frozen, adfreeze piles are used as the primary structural foundation method.

Adfreeze piles derive their strength from the bond of the frozen ground around them to the surface of the pile.[*citation needed*]

Adfreeze pile foundations are particularly sensitive in conditions which cause the permafrost to melt. If a building is constructed improperly then it can melt the ground below, resulting in a failure of the foundation system.[*citation needed*]

Vibrated stone columns

[edit]

Vibrated stone columns are a ground improvement technique where columns of coarse aggregate are placed in soils with poor drainage or bearing capacity to improve the soils.[*citation needed*]

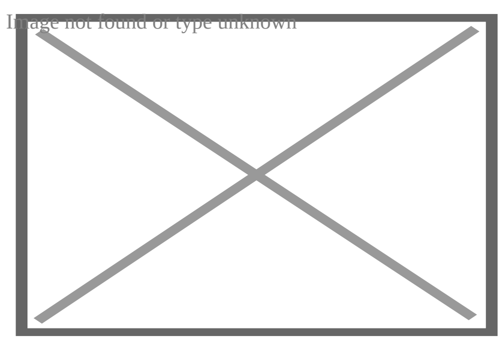
Hospital piles

[edit]

Specific to marine structures, hospital piles (also known as gallow piles) are built to provide temporary support to marine structure components during refurbishment works. For example, when removing a river pontoon, the brow will be attached to hospital pile to support it. They are normal piles, usually with a chain or hook attachment.[*citation needed*]

Piled walls

[edit]



Sheet piling, by a bridge, was used to block a canal in New Orleans after Hurricane Katrina damaged it.

Piled walls can be drivene or bored. They provide special advantages where available working space dictates and open cut excavation not feasible. Both methods offer technically effective and offer a cost efficient temporary or permanent means of retaining the sides of bulk excavations even in water bearing strata. When used in permanent works, these walls can be designed to resist vertical loads in addition lateral load from retaining soil. Construction of both methods is the same as for foundation bearing piles. Contiguous walls are constructed with small gaps between adjacent piles. The spacing of the piles can be varied to provide suitable bending stiffness.

Secant piled walls

[edit]

Secant pile walls are constructed such that space is left between alternate 'female' piles for the subsequent construction of 'male' piles.[*clarification needed*] Construction of 'male' piles involves boring through the concrete in the 'female' piles hole in order to key 'male' piles between. The male pile is the one where steel reinforcement cages are installed, though in some cases the female piles are also reinforced.[*citation needed*]

Secant piled walls can either be true hard/hard, hard/intermediate (firm), or hard/soft, depending on design requirements. Hard refers to structural concrete and firm or soft is usually a weaker grout mix containing bentonite.[*citation needed*] All types of wall can be constructed as free standing cantilevers, or may be propped if space and sub-structure design permit. Where party wall agreements allow, ground anchors can be used as tie backs.

Slurry walls

[edit]

A slurry wall is a barrier built under ground using a mix of bentonite and water to prevent the flow of groundwater. A trench that would collapse due to the hydraulic pressure in the surrounding soil does not collapse as the slurry balances the hydraulic pressure.

Deep mixing/mass stabilization techniques

[edit]

These are essentially variations of *in situ* reinforcements in the form of piles (as mentioned above), blocks or larger volumes.

Cement, lime/quick lime, flyash, sludge and/or other binders (sometimes called stabilizer) are mixed into the soil to increase bearing capacity. The result is not as solid as concrete, but should be seen as an improvement of the bearing capacity of the original soil.

The technique is most often applied on clays or organic soils like peat. The mixing can be carried out by pumping the binder into the soil whilst mixing it with a device normally mounted on an excavator or by excavating the masses, mixing them separately with the binders and refilling them in the desired area. The technique can also be used on lightly contaminated masses as a means of binding contaminants, as opposed to excavating them and transporting to landfill or processing.

Materials

[edit]

Timber

[edit]
Main article: Timber pilings

As the name implies, timber piles are made of wood.

Historically, timber has been a plentiful, locally available resource in many areas. Today, timber piles are still more affordable than concrete or steel. Compared to other types of piles (steel or concrete), and depending on the source/type of timber, timber piles may not be suitable for heavier loads.

A main consideration regarding timber piles is that they should be protected from rotting above groundwater level. Timber will last for a long time below the groundwater level. For timber to rot, two elements are needed: water and oxygen. Below the groundwater level, dissolved oxygen is lacking even though there is ample water. Hence, timber tends to last for a long time below the groundwater level. An example is Venice, which has had timber pilings since its beginning; even most of the oldest piles are still in use. In 1648, the Royal Palace of Amsterdam was constructed on 13,659 timber piles that still survive today since they were below groundwater level. Timber that is to be used above the water table can be protected from decay and insects by numerous forms of wood preservation using pressure treatment (alkaline copper quaternary (ACQ), chromated copper arsenate (CCA), creosote, etc.).

Splicing timber piles is still quite common and is the easiest of all the piling materials to splice. The normal method for splicing is by driving the leader pile first, driving a steel tube (normally 60–100 cm long, with an internal diameter no smaller than the minimum toe diameter) half its length onto the end of the leader pile. The follower pile is then simply slotted into the other end of the tube and driving continues. The steel tube is simply there to ensure that the two pieces follow each other during driving. If uplift capacity is required, the splice can incorporate bolts, coach screws, spikes or the like to give it the necessary capacity.

Iron

[edit]

Cast iron may be used for piling. These may be ductile.[*citation needed*]

Steel

[edit]

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Cutaway illustration. Deep inclined (battered) pipe piles support a precast segmented skyway where upper soil layers are weak muds.

Pipe piles are a type of steel driven pile foundation and are a good candidate for inclined (battered) piles.

Pipe piles can be driven either open end or closed end. When driven open end, soil is allowed to enter the bottom of the pipe or tube. If an empty pipe is required, a jet of water or an auger can be used to remove the soil inside following driving. Closed end pipe piles are constructed by covering the bottom of the pile with a steel plate or cast steel shoe.

In some cases, pipe piles are filled with concrete to provide additional moment capacity or corrosion resistance. In the United Kingdom, this is generally not done in order to reduce the cost.[*citation needed*] In these cases corrosion protection is provided by allowing for a sacrificial thickness of steel or by adopting a higher grade of steel. If a concrete filled pipe pile is corroded, most of the load carrying capacity of the pile will remain intact due to the concrete, while it will be lost in an empty pipe pile. The structural capacity of pipe piles is primarily calculated based on steel strength and concrete strength (if filled). An allowance is made for corrosion depending on the site conditions and local building codes. Steel pipe piles can either be new steel manufactured specifically for the piling industry or reclaimed steel tubular casing previously used for other purposes such as oil and gas exploration.

H-Piles are structural beams that are driven in the ground for deep foundation application. They can be easily cut off or joined by welding or mechanical drive-fit splicers. If the pile is driven into a soil with low pH value, then there is a risk of corrosion, coal-tar epoxy or cathodic protection can be applied to slow or eliminate the corrosion process. It is common to allow for an amount of corrosion in design by simply over dimensioning the cross-sectional area of the steel pile. In this way, the corrosion process can be prolonged up to 50 years.[*citation needed*]

Prestressed concrete piles

[edit]

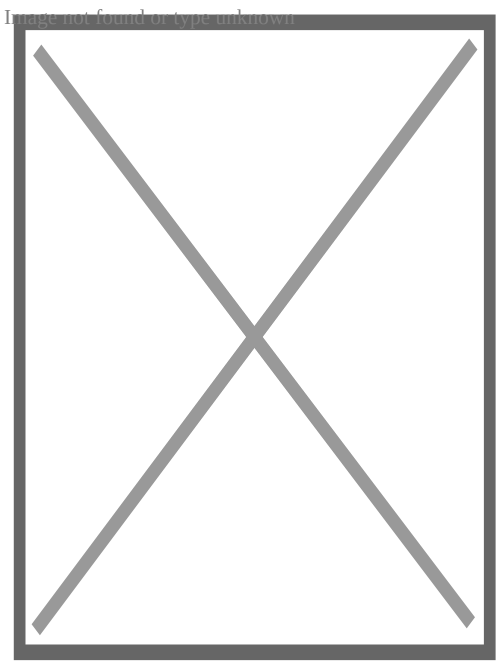
Concrete piles are typically made with steel reinforcing and prestressing tendons to obtain the tensile strength required, to survive handling and driving, and to provide sufficient bending resistance.

Long piles can be difficult to handle and transport. Pile joints can be used to join two or more short piles to form one long pile. Pile joints can be used with both precast and prestressed concrete piles.

Composite piles

[edit]

A "composite pile" is a pile made of steel and concrete members that are fastened together, end to end, to form a single pile. It is a combination of different materials or different shaped materials such as pipe and H-beams or steel and concrete.



'Pile jackets' encasing old concrete piles in a saltwater environment to prevent corrosion and consequential weakening of the piles when cracks allow saltwater to contact the internal steel reinforcement rods

Construction machinery for driving piles into the ground

[edit]

Construction machinery used to drive piles into the ground:[15]

- Pile driver is a device for placing piles in their designed position.
- Diesel pile hammer is a device for hammering piles into the ground.

- Hydraulic hammer is removable working equipment of hydraulic excavators, hydroficated machines (stationary rock breakers, loaders, manipulators, pile driving hammers) used for processing strong materials (rock, soil, metal) or pile driving elements by impact of falling parts dispersed by high-pressure fluid.
- Vibratory pile driver is a machine for driving piles into sandy and clay soils.
- Press-in pile driver is a machine for sinking piles into the ground by means of static force transmission.[16]
- Universal drilling machine.

Construction machinery for replacement piles

[edit]

Construction machinery used to construct replacement piles:[15]

- Sectional Flight Auger or Continuous Flight Auger
- Reverse circulation drilling
- Ring bit concentric drilling

See also

[edit]
- Eurocode EN 1997
- International Society for Micropiles
- Post in ground construction also called earthfast or posthole construction; a historic method of building wooden structures.
- Stilt house, also known as a lake house; an ancient, historic house type built on pilings.
- Shallow foundations
- Pile bridge
- Larssen sheet piling

Notes

[edit]

1. **^** Offshore Wind Turbine Foundations, 2009-09-09, accessed 2010-04-12.
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6. ^ ***a*** ***b*** *Siel, Barry D.; Anderson, Scott A. "Implementation of Micropiles by the Federal Highway Administration" (PDF). Federal Highway Administration (US).* cite journal: Cite journal requires |journal= (help)
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16. **^** *"General description of the press-in pile driving unit". Concrete Pumping Melbourne. 13 October 2021. Archived from the original on 25 December 2022. Retrieved 20 July 2022.*

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External links

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- Deep Foundations Institute

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Geotechnical engineering

Offshore geotechnical engineering

Investigation and instrumentation

Field (*in situ*)

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

Laboratory testing

- Soil classification
- Atterberg limits
- California bearing ratio
- Direct shear test
- Hydrometer
- Proctor compaction test
- R-value
- Sieve analysis
- Triaxial shear test
- Oedometer test
- Hydraulic conductivity tests
- Water content tests

- **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
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  - Terrain
  - Topsoil
  - Water table
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  - 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
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- Earthquake engineering
- Geomorphology
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- Biogeography
- Earth materials
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- Agricultural science
  - Agrology

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Driving Directions From 42.008657936699, -88.152725208607 to

Driving Directions From 42.007242948498, -88.153060682778 to

Driving Directions From 42.073881347839, -88.179224443136 to

https://www.google.com/maps/place//@42.050000207566,-88.075050390596,25.2z/data=!4m6!3m5!1sNone!8m2!3d42.0637725!4d-88.1396465!16s%2F

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- How Transferable Warranties Protect Future Owners
- Managing Material Deliveries on Confined Job Sites
- Impact of Material Choice on Overall Project Cost

Frequently Asked Questions

What kind of disruption should I expect during the repairs?

Expect some noise and vibration during excavation and repair work. Access to certain areas of your property may be temporarily restricted. We will minimize disruption as much as possible, protect your landscaping, and clean up the work area daily. We will also communicate any planned disruptions in advance.

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Google Business Profile

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

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