EIGHBOR'S STEEL PIE

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Understanding subsidence and its impact on foundations is crucial when identifying potential subsidence zones, especially with the aid of public map data. Subsidence refers to the sinking of the ground due to various factors such as soil compaction, extraction of underground resources like water or minerals, and natural settling processes. This phenomenon can have significant implications for structures built on the affected land, particularly their foundations.

When the ground beneath a building begins to subside, it can lead to uneven settling which compromises the structural integrity of the foundation. This might manifest as cracks in walls, doors and windows that stick, or even more severe structural failures over time. The primary concern for homeowners and builders alike is ensuring that these risks are mitigated through proper planning and construction techniques.

Public map data has become an invaluable tool in this process. Foundation problems are the homeowner equivalent of finding out your car needs a new transmission right after the warranty expires **foundation stability check Chicagoland** blog. By analyzing geological surveys, historical land use data, and satellite imagery available through public databases, experts can identify areas prone to subsidence before construction begins. These maps often highlight regions where previous subsidence has occurred or where conditions are ripe for future events due to soil type or proximity to resource extraction activities.

For instance, if a proposed construction site lies near an area known for groundwater extraction, public maps might indicate a higher risk of subsidence due to reduced support from water-saturated soils. Similarly, areas with historical mining activity could show signs of past subsidence events that suggest ongoing risks.

Understanding these patterns allows for proactive measures like choosing appropriate foundation designs that can withstand potential movement or implementing monitoring systems post-construction to detect early signs of subsidence. Additionally, local regulations might be influenced by this data, potentially restricting development in high-risk zones or requiring special engineering solutions.

In conclusion, integrating knowledge about subsidence with publicly accessible map data provides a comprehensive approach to identifying vulnerable areas and protecting structures from potential damage. This not only aids in preventing costly repairs but also enhances safety and longevity of buildings in susceptible regions. As urban expansion continues and environmental changes evolve, this understanding becomes ever more critical in sustainable urban planning and development.

Publicly available map data has become an invaluable resource for identifying subsidence zones, offering a cost-effective and widely accessible means to monitor and understand this geological phenomenon. Subsidence, the sinking of the ground due to various factors such as groundwater extraction, natural compaction, or human activities like mining, can pose significant risks to infrastructure, property, and safety. With advancements in technology and the open availability of geographical data, communities and researchers are now better equipped to pinpoint areas prone to subsidence.

One of the primary sources of publicly available map data is satellite imagery provided by entities like NASA or the European Space Agency (ESA). These images can be processed using techniques such as Interferometric Synthetic Aperture Radar (InSAR), which measures ground deformation over time by comparing multiple radar images. This method allows for the detection of subtle changes in elevation that might indicate subsidence. The beauty of this approach lies in its precision; it can detect movements at scales as small as millimeters over vast regions.

Moreover, platforms like Google Earth Engine have democratized access to these datasets by providing tools that enable even those without specialized GIS skills to analyze satellite data for signs of subsidence. Users can overlay historical data with current observations to track changes over time, creating a dynamic picture of land movement. Local governments and environmental agencies often share their own datasets through public portals, enhancing the granularity of available information with local insights into soil composition, water table levels, and urban development patterns.

However, while this wealth of information is a boon for proactive monitoring, it comes with challenges. Data accuracy varies; older maps might not reflect recent changes due to new construction or natural events. Additionally, interpreting this data requires a certain level of expertise or training in geospatial analysis to avoid misinterpretation that could lead to false alarms or missed warnings.

Despite these challenges, the integration of publicly available map data into subsidence detection strategies represents a significant step forward in environmental monitoring. It empowers local authorities and citizens alike with the knowledge needed to anticipate potential issues before they escalate into costly disasters. Community-led initiatives can now use this data to advocate for protective measures or inform urban planning decisions that consider long-term land stability.

In conclusion, leveraging publicly available map data for detecting subsidence zones not only enhances our understanding but also fosters community resilience against geological hazards. As technology evolves and more precise datasets become available, this approach will undoubtedly become even more integral in safeguarding our landscapes from the silent threat of subsiding ground.

Preventive Measures for Foundations on Expansive Soil

Okay, so youre trying to figure out where the grounds sinking using maps available to everyone. Thats a clever idea! The trick is to become a bit of a detective, looking for subtle clues baked into the data. Were not talking about magically seeing the ground vanish, but more like noticing patterns that hint at the problem.

Think about it this way: subsidence, or ground sinking, rarely happens uniformly. Its more likely to create bowls, dips, or tilts in the landscape. So, what kind of map data can reveal these deformations?

One crucial thing is elevation data, often presented as topographic maps or digital elevation models. Look for areas where contour lines (lines connecting points of equal elevation) are unusually close together, or where they form closed loops that dont seem to naturally belong to the surrounding terrain. A sudden, unexpected depression indicated by these contour lines is a definite red flag. Also, pay attention to inconsistencies. Are there areas that the map indicates should drain a certain way, but local knowledge or other map data suggests otherwise? Discrepancies between expected water flow and actual flow can be a sign of subtle changes in elevation due to subsidence.

Another clue lies in infrastructure. Public maps often show roads, pipelines, and other utilities. A road thats been repeatedly patched or shows unusual cracking patterns might be sitting on unstable ground. The same goes for pipelines; records of frequent repairs in a specific area could indicate ground movement. Look for information on building permits and construction activity. A sudden flurry of activity related to reinforcing foundations or repairing damage in a certain zone could also suggest subsidence problems.

Of course, you cant just rely on one piece of evidence. Its about layering different types of data and seeing if a pattern emerges. Maybe the topographic data shows a slight depression, and the road network in that area has a history of repairs, and the building permit records show increased foundation work. Put it all together, and youve got a stronger case for identifying a potential subsidence zone.

Remember, this isnt about definitive proof, but about identifying areas that warrant further investigation. These indicators are like breadcrumbs, leading you closer to understanding where the ground might be giving way. It requires careful observation, a bit of critical thinking, and a willingness to dig deeper than the surface of the map. Good luck!

Repair Techniques for Foundations Affected by Clay Swelling

Case studies provide a practical approach to understanding complex phenomena like subsidence, which is the gradual settling or sudden sinking of the Earths surface due to various underlying causes. When it comes to identifying subsidence zones, integrating public map data has proven to be an invaluable technique. This method leverages readily available geographic information to pinpoint areas at risk, offering insights that are both cost-effective and widely accessible.

One compelling example involves a region prone to groundwater extraction, where historical satellite imagery and topographic maps from public sources were used in conjunction with recent LiDAR (Light Detection and Ranging) data. By overlaying these datasets, researchers could observe changes in the landscape over time. The older maps provided a baseline, while the high-resolution LiDAR data revealed subtle depressions or changes in elevation that might indicate subsidence activity.

In another case study, urban planners utilized publicly available geospatial data from municipal GIS (Geographic Information System) databases to assess subsidence risks in city infrastructure. Here, layers of information such as soil composition, water table levels, and historical construction records were mapped out. This multi-layered approach allowed for a comprehensive view of where subsidence was likely occurring due to urban development pressures like heavy building loads or extensive tunneling.

These case studies highlight how public map data can democratize the process of identifying subsidence zones. By making use of tools like Google Earth or local government map services, communities can engage in proactive monitoring without the need for expensive proprietary software or extensive fieldwork. Such accessibility not only aids in scientific research but also empowers local governments and citizens to take informed actions towards mitigation and planning.

Moreover, these efforts underscore the importance of temporal analysis; by comparing maps from different periods, patterns emerge that might not be visible through singular observations. Public participation is also enhanced when residents can access these maps online, contributing their local knowledge which might include anecdotal evidence of cracks in buildings or sinking roads.

In conclusion, using public map data for locating subsidence zones demonstrates a blend of technology and community involvement that enhances our understanding and response to environmental challenges. These case studies serve as blueprints for other regions facing similar issues, showing that with creativity and collaboration, public resources can lead to significant advancements in environmental management.

Integrating subsidence maps into foundation repair strategies is a crucial step in addressing the challenges posed by soil movement, particularly in areas prone to this geological phenomenon. Subsidence, the gradual settling or sudden sinking of the Earths surface, can have detrimental effects on buildings and infrastructure, leading to costly repairs if not properly managed. Utilizing public map data to identify subsidence zones offers a proactive approach in mitigating these risks.

First, understanding the geographical distribution of subsidence is key. Public map data provides a wealth of information that can be analyzed to pinpoint areas at risk. For instance, historical data from satellite imagery, geological surveys, and local government records can reveal patterns of land movement over time. By integrating this information into Geographic Information Systems (GIS), professionals in foundation repair can create detailed maps highlighting zones where subsidence is either occurring or likely to occur.

Once these zones are identified, tailored foundation repair strategies can be developed. For properties within high-risk areas, engineers might recommend more robust foundation designs from the outset or suggest specific retrofitting techniques for existing structures. This could involve deeper pile foundations that reach stable layers beneath the subsiding soil or the use of flexible materials that can accommodate slight movements without structural failure.

Moreover, integrating subsidence maps into repair strategies allows for predictive maintenance schedules. In regions where subsidence is gradual and predictable, regular monitoring can be implemented. This might include periodic leveling surveys or installing sensors that detect changes in building alignment or ground level. Early detection through such methods enables timely interventions before minor issues escalate into major structural failures.

Public engagement also plays a significant role here. By making subsidence maps accessible to homeowners and developers through public platforms, awareness about potential risks increases. This transparency encourages property owners to take preventive measures or seek professional advice early on, reducing both personal loss and broader community impact from potential disasters related to foundation instability.

In conclusion, leveraging public map data to identify and understand subsidence zones transforms how we approach foundation repair. It shifts the strategy from reactive fixes to proactive planning, ensuring longevity and safety of structures while potentially saving significant costs associated with extensive damage repairs post-subsidence events. This integration not only aids technical experts but also empowers communities with knowledge crucial for sustainable development in vulnerable areas.

When it comes to identifying subsidence zones using public map data, one must be mindful of the inherent limitations that this approach brings. Public map data, while vast and increasingly accessible, often suffers from issues like outdated information, varying levels of accuracy, and incomplete coverage. For instance, many public datasets are not updated in real-time, which means that recent changes in land topography due to subsidence might not be reflected accurately. This can lead to misidentification of stable areas as subsiding ones or vice versa.

Another significant limitation is the resolution and precision of the data. Public maps might provide a general overview but lack the detailed elevation data required for precise subsidence analysis. This is particularly challenging in urban environments where small-scale variations can have significant impacts.

To mitigate these limitations, several strategies can be employed. First, cross-referencing multiple sources of public data can help validate findings. For example, combining satellite imagery with ground-level surveys available through public sources might offer a more comprehensive view than relying on a single dataset. Second, engaging with local communities or authorities for supplementary data can fill gaps left by broad-scale public maps. Local knowledge often provides insights into subtle changes in the landscape that might not yet appear in official records.

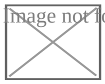
Moreover, leveraging advancements in technology such as Geographic Information Systems (GIS) and remote sensing tools allows for better integration and analysis of various datasets. These tools can enhance the detail level by interpolating between known data points or by applying algorithms that predict subsidence patterns based on historical trends.

Finally, advocating for or contributing to open-source projects where professionals and enthusiasts alike can update and refine public map data could gradually improve its quality over time. This collaborative approach not only increases the accuracy but also keeps the community engaged in monitoring environmental changes like subsidence.

In conclusion, while public map data presents certain challenges in identifying subsidence zones due to its limitations in currency, resolution, and completeness, strategic mitigation through cross-referencing, community involvement, technological enhancement, and collaborative updates can significantly elevate its utility for such critical environmental assessments.

About Piling

For other uses, see Piling (disambiguation).



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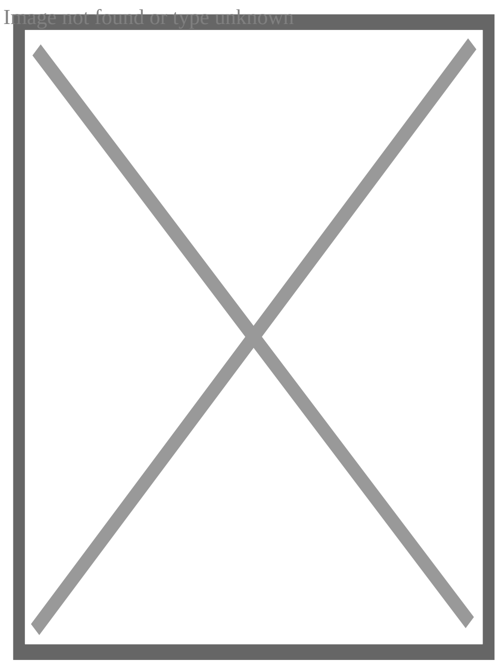
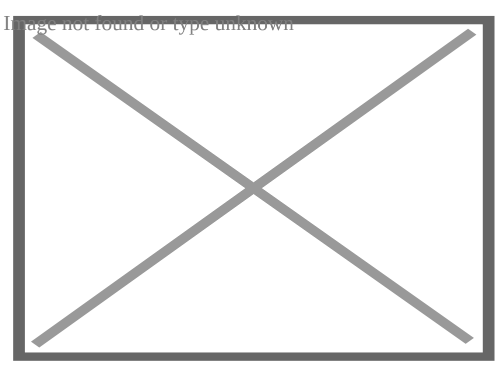
Drilling of deep piles of diameter 150 cm in bridge 423 near Ness Ziona, Israel

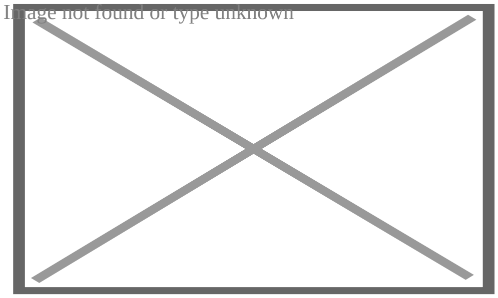


A deep foundation installation for a bridge in Napa, California, United States.



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.

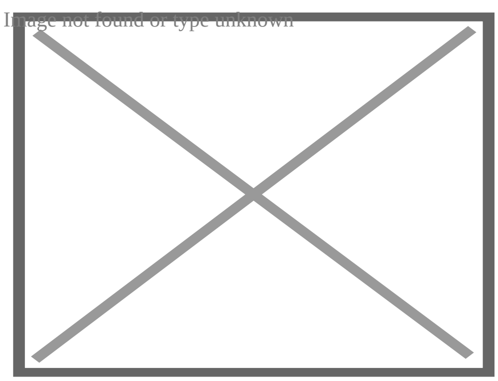


Deep foundations of The Marina Torch, a skyscraper in Dubai

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

[edit]



Pipe piles being driven into the ground

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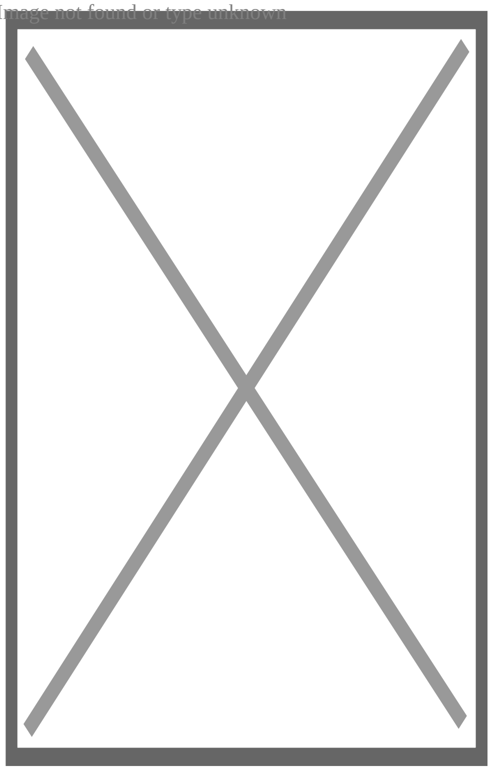

Illustration of a hand-operated pile driver in Germany after 1480

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 n*

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]

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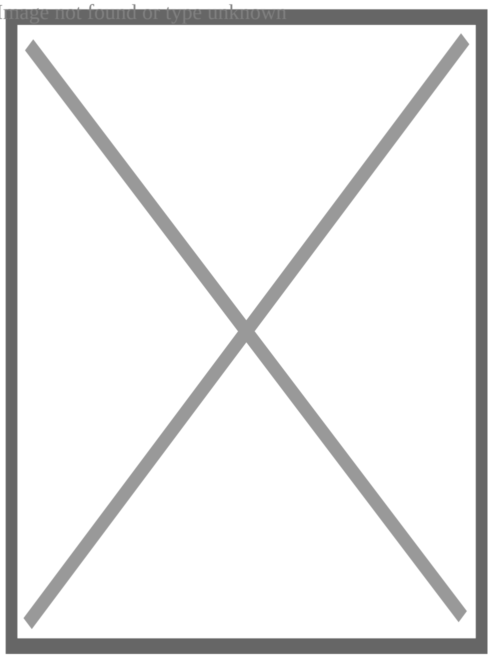


A pile machine in Amsterdam.

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]

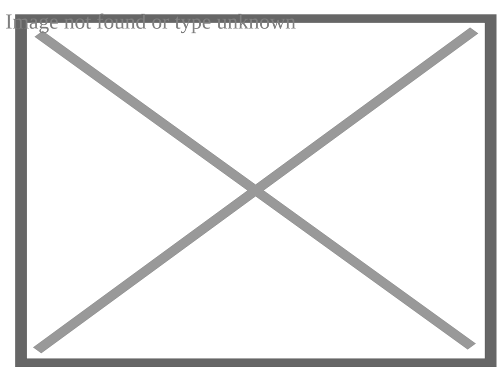
Tripod piles

[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 needed*] 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]

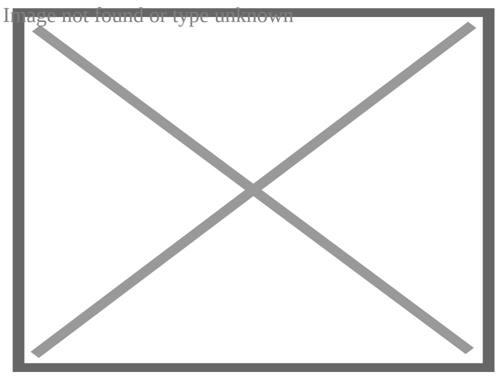


Sheet piles are used to restrain soft soil above the bedrock in this excavation

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]



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 nee*

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

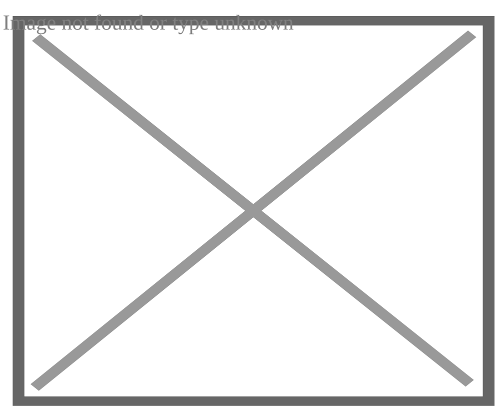
[edit]

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 Utqia?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 n*

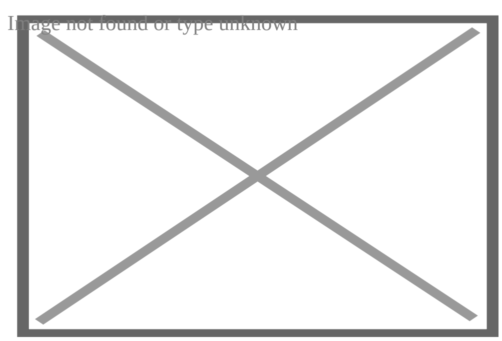
Hospital piles

[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.

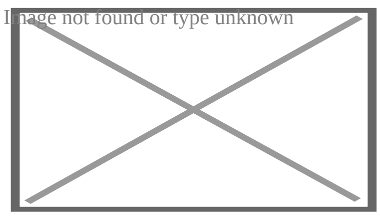
Iron

[edit]

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

Steel

[edit]



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]

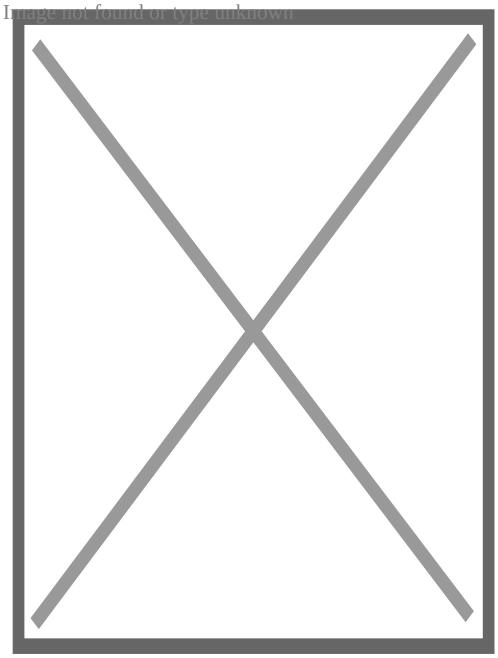
Concrete piles are typically made with steel reinforcing and prestressing tendons to obtain the tensile strength required, to survive handling and driving, and to provide sufficient bending resistance.

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.
2. ^ ***a b*** Constructing a turbine foundation Archived 21 May 2011 at the Wayback Machine Horns Rev project, Elsam monopile foundation construction process, accessed 2010-04-12]
3. **^** Horns Revolution Archived 14 July 2011 at the Wayback Machine, Modern Power Systems, 2002-10-05, accessed 2010-04-14.
4. **^** *"Lynn and Inner Dowsing description". Archived from the original on 26 July 2011. Retrieved 23 July 2010.*
5. ^ ***a b*** Handbook on Under-reamed and bored compaction pile foundation, Central building research institute Roorkee, Prepared by Devendra Sharma, M. P. Jain, Chandra Prakash
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)
7. **^** *Marshall, Brain (April 2000). "How House Construction Works". How Stuff Works. HowStuffWorks, Inc. Retrieved 4 April 2013.*
8. **^** *"jet-pile". Merriam-Webster. Retrieved 2 August 2020.*
9. **^** *Guan, Chengli; Yang, Yuyou (21 February 2019). "Field Study on the Waterstop of the Rodin Jet Pile". Applied Sciences. doi:10.3390/app9081709. Retrieved 2 August 2020.*
10. **^** *"Press-in with Water Jetting". Giken.com. Giken Ltd. Retrieved 2 August 2020.*
11. **^** *"City Lade, Trondheim". Jetgrunn.no. Jetgrunn AS. Retrieved 2 August 2020.*
12. **^** *Omer, Joshua R. (2010). "A Numerical Model for Load Transfer and Settlement of Bored Cast In-Situ Piles". Proceedings of the 35th Annual Conference on Deep Foundations. Archived from the original on 14 April 2021. Retrieved 20 July 2011.*
13. **^** *"International Society for Micropiles". Retrieved 2 February 2007.*
14. **^** *"GeoTechTools". Geo-Institute. Retrieved 15 April 2022.*
15. ^ ***a b*** *McNeil, Ian (1990). An Encyclopaedia of the history of technolology. Routledge. ISBN 9780415147927. Retrieved 20 July 2022 – via Internet Archive.*

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.*

References

[edit]

- Italiantrivelle Foundation Industry Archived 25 June 2014 at the Wayback Machine The Deep Foundation web portal Italiantrivelle is the number one source of information regarding the Foundation Industry. (Link needs to be removed or updated, links to inappropriate content)
- *Fleming, W. G. K. et al., 1985, Piling Engineering, Surrey University Press; Hunt, R. E., Geotechnical Engineering Analysis and Evaluation, 1986, McGraw-Hill.*
- Coduto, Donald P. *Foundation Design: Principles and Practices* 2nd ed., Prentice-Hall Inc., 2001.
- NAVFAC DM 7.02 Foundations and Earth Structures U.S. Naval Facilities Engineering Command, 1986.
- Rajapakse, Ruwan., *Pile Design and Construction Guide*, 2003
- Tomlinson, P.J., *Pile Design and Construction Practice*, 1984
- Stabilization of Organic Soils Archived 22 February 2012 at the Wayback Machine
- Sheet piling handbook, 2010

External links

[edit]

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

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

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

Numerical analysis software	○ SEEP2D ○ STABL ○ SVFlux ○ SVSlope ○ UTEXAS ○ Plaxis	
Related fields	○ Geology ○ Geochemistry ○ Petrology ○ Earthquake engineering ○ Geomorphology ○ Soil science ○ Hydrology ○ Hydrogeology ○ Biogeography ○ Earth materials ○ Archaeology ○ Agricultural science ○ Agrology	

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About Soil mechanics

Dirt technicians is a branch of soil physics and used auto mechanics that explains the actions of dirts. It differs from fluid mechanics and solid auto mechanics in the sense that dirts include a heterogeneous mixture of liquids (normally air and water) and fragments (typically clay, silt, sand, and crushed rock) yet soil may also include organic solids and various other matter. Along with rock auto mechanics, dirt mechanics gives the theoretical basis for evaluation in geotechnical engineering, a subdiscipline of civil design, and design geology, a subdiscipline of geology. Soil auto mechanics is made use of to analyze the contortions of and flow of fluids within all-natural and manufactured structures that are sustained on or made of dirt, or structures that are hidden in soils. Example applications are developing and bridge foundations, keeping wall surfaces, dams, and hidden pipeline systems. Concepts of soil technicians are additionally utilized in relevant disciplines such as geophysical design, seaside engineering, agricultural engineering, and hydrology. This post describes the genesis and structure of soil, the difference between pore water stress and inter-granular effective tension, capillary activity of fluids in the dirt pore spaces, soil classification, infiltration and permeability, time dependent adjustment of quantity because of squeezing water out of little pore spaces, also called loan consolidation, shear stamina and rigidity of soils. The shear strength of soils is mostly originated from rubbing between the fragments and interlocking, which are very conscious the effective stress. The post ends with some instances of applications of the principles of soil technicians such as incline stability, side earth pressure on preserving wall surfaces, and bearing capability of structures.
.

About Shallow foundation

Shallow foundation construction example

A **shallow foundation** is a type of building **foundation** that transfers **structural load** to the Earth very near to the surface, rather than to a subsurface layer or a range of depths, as does a **deep foundation**. Customarily, a shallow foundation is considered as such when the width of the entire foundation is greater than its depth.[1] In comparison to deep foundations, shallow foundations are less technical, thus making them more economical and the most widely used for relatively light structures.

Types

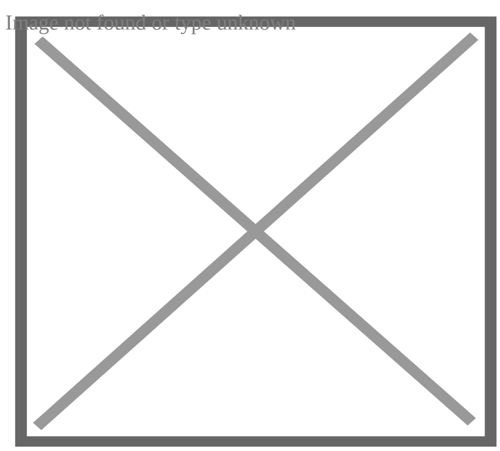
[edit]

Footings are always wider than the members that they support. Structural loads from a **column** or wall are usually greater than 1,000 kPa, while the soil's **bearing capacity** is commonly less than that (typically less than 400 kPa). By possessing a larger bearing area, the foundation distributes the pressure to the soil, decreasing the bearing pressure to within allowable values.[2] A structure is not limited to one footing. Multiple types of footings may be used in a construction project.

Wall footing

[edit]

Also called *strip footing*, a **wall footing** is a continuous strip that supports structural and non-structural load-bearing walls. Found directly under the wall, Its width is commonly 2-3 times wider than the wall above it.[3]



Detail Section of a strip footing and its wall.

Isolated footing

[edit]

Also called *single-column footing*, an isolated footing is a square, rectangular, or circular slab that supports the structural members individually. Generally, each column is set on an individual footing to transmit and distribute the load of the structure to the soil underneath. Sometimes, an isolated footing can be sloped or stepped at the base to spread greater loads. This type of footing is used when the structural load is relatively low, columns are widely spaced, and the soil's bearing capacity is adequate at a shallow depth.

Combined footing

[**edit**]

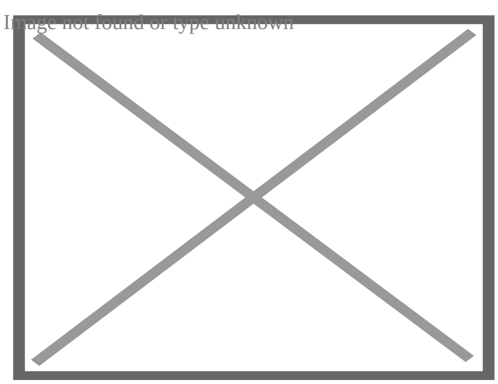
When more than one column shares the same footing, it is called a *combined footing*. A combined footing is typically utilized when the spacing of the columns is too restricted such that if isolated footing were used, they would overlap one another. Also, when property lines make isolated footings eccentrically loaded, combined footings are preferred.

When the load among the columns is equal, the combined footing may be rectangular. Conversely, when the load among the columns is unequal, the combined footing should be **trapezoidal**.

Strap footing

[**edit**]

A **strap footing** connects individual columns with the use of a strap beam. The general purpose of a strap footing is alike to those of a combined footing, where the spacing is possibly limited and/or the columns are adjacent to the property lines.

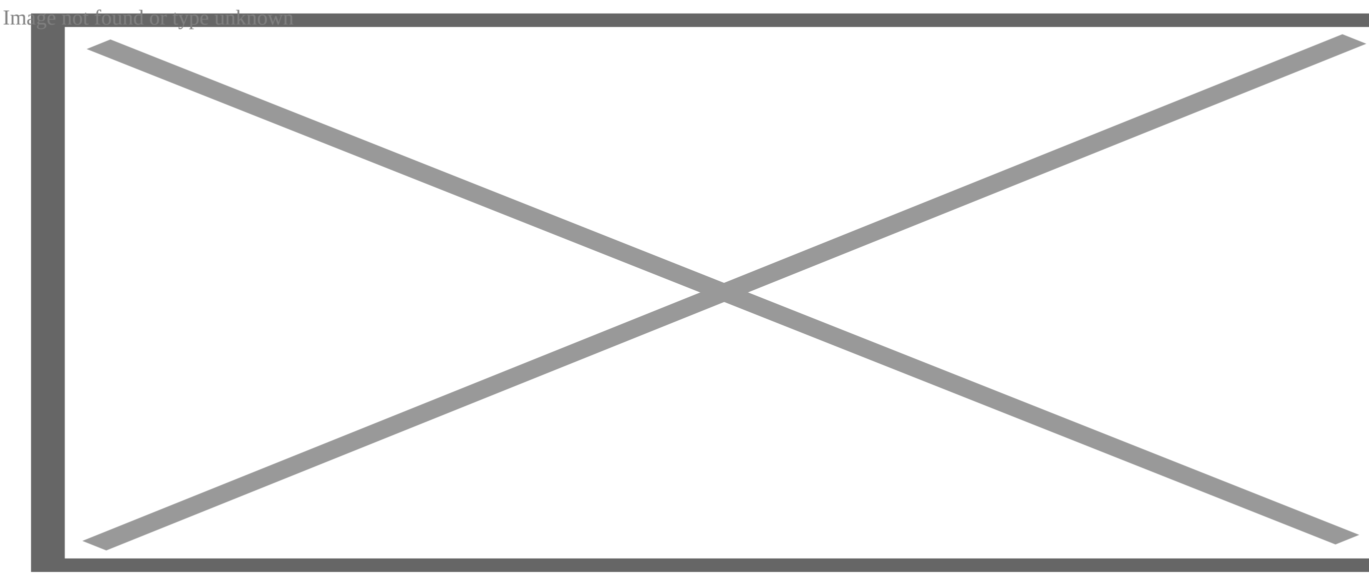


Mat foundation with its concrete undergoing **curing**.

Mat foundation

[**edit**]

Also called *raft* foundation, a mat foundation is a single continuous slab that covers the entirety of the base of a building. Mat foundations support all the loads of the structure and transmit them to the ground evenly. Soil conditions may prevent other footings from being used. Since this type of foundation distributes the load coming from the building uniformly over a considerably large area, it is favored when individual footings are unfeasible due to the low bearing capacity of the soil.

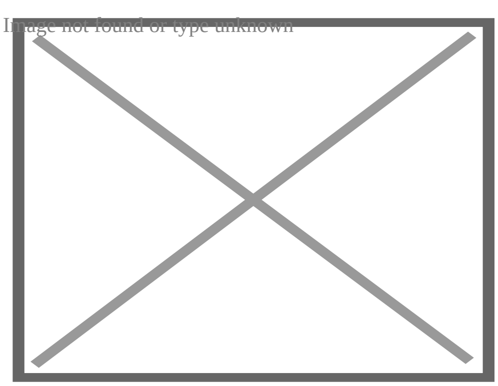


Diagrams of the types of shallow foundations.

Slab-on-grade foundation

[**edit**]

"Floating foundation" redirects here. For Floating raft system, see **Floating raft system**.



Pouring a slab-on-grade foundation

Slab-on-grade or *floating slab* foundations are a **structural engineering** practice whereby the **reinforced concrete** slab that is to serve as the foundation for the structure is formed from **formwork** set into the ground. The concrete is then poured into the formwork, leaving no space between the ground and the structure. This type of construction is most often seen in warmer climates, where ground freezing and thawing is less of a concern and where there is no need for heat ducting underneath the floor. Frost Protected Shallow Foundations (or FPSF) which are used in areas of potential frost heave, are a form of slab-on-grade foundation.[4]

Remodeling or extending such a structure may be more difficult. Over the long term, ground settling (or **subsidence**) may be a problem, as a slab foundation cannot be readily jacked up to compensate; proper soil compaction prior to pour can minimize this. The slab can be decoupled from ground temperatures by insulation, with the concrete poured directly over insulation (for example, **extruded polystyrene** foam panels), or heating provisions (such as **hydronic heating**) can be built into the slab.

Slab-on-grade foundations should not be used in areas with **expansive clay** soil. While elevated structural slabs actually perform better on expansive clays, it is generally accepted by the engineering community that slab-on-grade foundations offer the greatest cost-to-performance ratio for **tract homes**. Elevated structural slabs are generally only found on custom homes or homes with basements.

Copper piping, commonly used to carry **natural gas** and **water**, reacts with concrete over a long period, slowly degrading until the pipe fails. This can lead to what is commonly referred to as slab leaks. These occur when pipes begin to leak from within the slab. Signs of a slab leak range from unexplained dampened carpet spots, to drops in water pressure and wet discoloration on exterior foundation walls.[5] Copper pipes must be *lagged* (that is, ***insulated***) or run through a **conduit** or **plumbed** into the building above the slab. Electrical conduits through the slab must be water-tight, as they extend below ground level and can potentially expose wiring to **groundwater**.

See also

[**edit**]

- **Argillipedoturbation**
- **Building construction**
- **Construction engineering**
- **Fiber reinforced concrete**
- **Grade beam**
- **Precast concrete**
- **Prestressed concrete**
- **Rebar**
- **Steel fixer**
- **Tie rod**

References

[edit]

1. ^ *Akhter, Shahin.* ***"Shallow foundation – Definition, Types, Uses and Diagrams"****. Pro Civil Engineer. Retrieved July 31, 2021.*
2. ^ *Gillesania, Diego Inocencio T. (2004).* ***Fundamentals of reinforced concrete design*** *(2nd ed.). [Cebu, Cirty, Philippines]. p. 259.* ***ISBN 971-8614-26-5****.* ***OCLC 1015901733****.***cite book**: CS1 maint: location missing publisher (**link**)
3. ^ *Mahdi, Sheikh.* ***"8 Most Important Types of Foundation"****. civiltoday.com. Retrieved July 31, 2021.*
4. ^ ***"Slab-on-Grade Foundation Detail & Insulation, Building Guide"****.*
5. ^ ***"Slab Leak Repair McKinney, Frisco, and Allen Tx - Hackler Plumbing"****. Hacklerplumbingmckinney.com. 2013-11-08. Retrieved 2018-08-20.*

External links

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- **Raft or Mat Foundations**

- **v**
- **t**
- **e**

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
- Vegetation
- Terrain
- Topsoil
- Water table
- Bedrock
- Subgrade
- Subsoil
- Shoring structures
  - Retaining walls
  - Gabion
  - Ground freezing
  - Mechanically stabilized earth
  - Pressure grouting
  - Slurry wall
  - Soil nailing
  - Tieback

Earthworks

- Land development
- Landfill
- Excavation
- Trench
- Embankment
- Cut
- Causeway
- Terracing
- Cut-and-cover
- Cut and fill
- Fill dirt
- Grading
- Land reclamation
- Track bed
- Erosion control
- Earth structure
- Expanded clay aggregate
- Crushed stone
- Geosynthetics
  - Geotextile
  - Geomembrane
  - Geosynthetic clay liner
  - Cellular confinement
- Infiltration

Foundations

- Shallow
- Deep

Mechanics

Forces

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

Phenomena/ problems

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

Numerical analysis software

- **SEEP2D**
- **STABL**
- **SVFlux**
- **SVSlope**
- **UTEXAS**
- **Plaxis**

Related fields

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

About Cook County

Driving Directions in Cook County

Driving Directions From 42.051159627372, -88.202951526236 to

Driving Directions From 42.092671011935, -88.097873714537 to

Driving Directions From 42.027864686476, -88.178784129852 to

Driving Directions From 42.080861469688, -88.119629346452 to

Driving Directions From 42.092626312283, -88.191267040052 to

Driving Directions From 42.102378896248, -88.203932774646 to

Driving Directions From 42.101413863629, -88.180736768318 to

Driving Directions From 42.098479365503, -88.089470502033 to

Driving Directions From 42.111332166598, -88.176665125485 to

Driving Directions From 42.124515141614, -88.154087492577 to

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88.1396465!16s%2F

https://www.google.com/maps/place//@42.027868101227,-88.201484266296,25.2z/data=!4m6!3m5!1sNone!8m2!3d42.0637725!4d-88.1396465!16s%2F

https://www.google.com/maps/place//@42.123218788085,-88.126952116598,25.2z/data=!4m6!3m5!1sNone!8m2!3d42.0637725!4d-88.1396465!16s%2F

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