

Services Guide

Water Well Drilling & Service

**NOTE 1: This information is pulled from credible sources. This information is a guide. Any information used from this guide must be re-contextualized (no copying and pasting). Re-contextualize information incorporating SEO and business specifics.*

**NOTE 2: For MCP websites, stick to general information and avoid specifics.*

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1. WELL DRILLING OVERVIEW

1.1 GENERAL INFORMATION

https://en.wikipedia.org/wiki/Well_drilling

<http://drillwell.com/>

<http://www.andersonwater.ca>

<http://www.blackdogdrilling.com>

<http://www.ahwelldrilling.ca/>

- Well drilling is the process of drilling a hole in the ground for the extraction of a natural resource such as ground water, brine, natural gas, or petroleum, for the injection of a fluid from surface to a subsurface reservoir or for subsurface formations evaluation or monitoring.
- Drilling for the exploration of the nature of the material underground (for instance in search of metallic ore) is best described as borehole drilling.
- Well drilling can be done either manually or mechanically and the nature of required equipment varies from extremely simple and cheap to very sophisticated.
- The earliest wells were water wells, shallow pits dug by hand in regions where the water table approached the surface, usually with masonry or wooden walls lining the interior to prevent collapse.
 - Modern drilling techniques utilize long drill shafts, producing holes much narrower and deeper than could be produced by digging.

1.2 SEO

Keywords (First Row – BEST, Last Row – LEAST)

<input type="radio"/> Water well	<input type="radio"/> Well drillers	<input type="radio"/> Well pumps	<input type="radio"/> Well repair
<input type="radio"/> Well service	<input type="radio"/> Drilling rig	<input type="radio"/> Drilling company	<input type="radio"/> Well water systems
<input type="radio"/> Water treatment	<input type="radio"/> Pump installation	<input type="radio"/> Well chlorination	<input type="radio"/> Well testing
<input type="radio"/> Core drilling	<input type="radio"/> Hydrofracturing	<input type="radio"/> Geotechnical drilling	<input type="radio"/> Borehole drilling

1.3 TYPES OF WELL DRILLING

Types of Well Drilling:

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Type	Description
Water Wells	<ul style="list-style-type: none">○ A water well is an excavation or structure created in the ground by digging, driving, boring, or drilling to access groundwater in underground aquifers.○ The well water is drawn by a pump, or using containers, such as buckets, that are raised mechanically or by hand.
Geotechnical	<ul style="list-style-type: none">○ Geotechnical drilling is drilling which is often related to the construction of a structure such as a building or an oil rig.○ It can be part of the construction process as well as part of the investigation process conducted on site before the structure is built.
Exploration/Coring	<ul style="list-style-type: none">○ Exploration drilling is a procedure in which several test holes are drilled for the purpose of evaluating the contents of the ground in a particular area.
Geothermal	<ul style="list-style-type: none">○ A well drilled in the service of a geothermal heat pump or ground source heat pump as a central heating and/or cooling system that transfers heat to or from the ground.
Environmental	<ul style="list-style-type: none">○ Wells used to determine the existence of contamination in soil or groundwater.○ These are equipped with special features to facilitate the development and sampling of environmental monitoring.
Municipal	<ul style="list-style-type: none">○ Any drilling or well design completed for cities or other municipal organizations.○ Subject to conditions outlined by municipal bylaws and regulations based on area.
Artesian	<ul style="list-style-type: none">○ If water reaches the ground surface under the natural pressure of the aquifer, the well is called a flowing artesian well.○ An aquifer is a geologic layer of porous and permeable material such as sand and gravel, limestone, or sandstone, through which water flows and is stored.

2. WATER WELLS

<http://www.wellowner.org/basics/types-of-wells/what-exactly-is-a-drilled-well/>

General:

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- A drilled well consists of a hole bored into the ground, with the upper part being lined with casing.
 - The casing prevents the collapse of the borehole walls and (with a drive shoe or grout seal) prevents surface or subsurface contaminants from entering the water supply.
 - The casing also provides a housing for a pumping mechanism and for the pipe that moves water from the pump to the surface.
- The quality of materials used in well construction is an important factor.
 - Casing must meet certain specifications, since substandard pipe does not have sufficient strength to withstand driving without potential damage to the joints.
 - Such damage may allow shallow or surface water to enter the well.
- Once the well is completed, it is bailed or pumped to develop the well and determine the yield.
 - Many areas need further work after drilling to remove fine material remaining from the drilling process so that water can more readily enter the well.
- Possible development methods include compressed air (blowing), bailing, jetting, surging, or pumping.

Types of Water Wells:

<http://www.wellowner.org/basics/types-of-wells/>

Type	Description	Benefits
Drilled well	<ul style="list-style-type: none">◦ Constructed by either cable tool (percussion) or rotary-drilling machines.◦ Drilled wells that penetrate unconsolidated material require installation of casing and a screen to prevent inflow of sediment and collapse.	<ul style="list-style-type: none">◦ Can be drilled more than 1,000 feet deep.
Driven well	<ul style="list-style-type: none">◦ Constructed by driving a small-diameter pipe into shallow water-bearing sand or gravel.◦ Can tap only shallow water and are easily contaminated from nearby surface sources because they are not sealed with grouting material.	<ul style="list-style-type: none">◦ Relatively simple and economical to construct.◦ Machine-driven wells can be 50 feet deep or more.
Dug well	<ul style="list-style-type: none">◦ Excavated to below the water table until incoming water exceeds the bailing rate.	<ul style="list-style-type: none">◦ Able to obtain water from less-permeable materials such as very fine sand, silt, or clay.

	<ul style="list-style-type: none">○ Because of the type of construction, bored wells can go deeper beneath the water table than can hand-dug wells. Dug and bored wells have a large diameter and expose a large area to the aquifer.○ Lack continuous grouting, making them subject to contamination from nearby surface sources, and they go dry during periods of drought if the water table drops below the well bottom.
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3. GEOTECHNICAL DRILLING

General:

- Geotechnical drilling involves exploratory drilling combined with testing and instrumentation installation to determine sub-surface ground characteristics for infrastructure development purposes including, but not limited to:
 - tailings storage feasibility or upgrades
 - pipeline alignment investigations
 - hydro-electric dam feasibility investigations or upgrades
 - road network evaluation
 - LNG facilities and construction/foundation design for buildings
- Work together on site with an engineer or technologist to achieve a greater understanding of the stratigraphy or hydrogeological conditions present by collecting soil or water samples, performing various types of probe or in-situ tests, or by setting various types of installations for either geotechnical or environmental monitoring.

Types of Geotechnical Wells:

<http://www.geotechdrilling.com/services/geotechnical/>
<http://drillwell.com/services/geotechnicalenvironmental/>
<http://www.rodrendrilling.com/geo-technical-bedrock-sample>

Type	Description	Benefits
Geotechnical drilling	<ul style="list-style-type: none">○ Geotechnical projects focus on the characteristics and structure of the subsurface material, rather than the value of the mineral composition.○ One common reason for geotechnical drilling is site	<ul style="list-style-type: none">○ For the purpose of gathering site characterization information and data.

	<p>investigation. Site investigation is conducted to determine whether or not a site will be suitable for construction.</p> <ul style="list-style-type: none">○ It includes drilling to remove rock and soil samples, along with drilling to evaluate soil stability and other topics of interest.	
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4. EXPLORATION/CORING WELLS

<http://www.rodrendrilling.com/exploration-ice-land-barge-drilling>

General:

- Exploration drilling is a procedure in which several test holes are drilled for the purpose of evaluating the contents of the ground in a particular area.
- It is conducted to find out whether or not materials of value are present, and to assess the quality of those materials.
- A common reason for exploration drilling to be done is in mineral exploration. Once a potential site is identified, exploration drilling can be used to determine whether or not the site has materials of interest, ranging from metal ores to diamonds, and to assess the quality and quantity of those materials.
- This is done by sinking a drill bit which takes a core sample into the ground; the core sample is extracted and analyzed.

Types of Exploration/Coring Wells:

http://en.openei.org/wiki/Exploration_Drilling

<http://www.walkerdrilling.com/barges.php>

Type	Description	Benefits
Ice Drilling	<ul style="list-style-type: none">○ Ice cores are typically drilled by means of either a mechanical or thermal drill. Both types of drills incise an annulus, or circle, around a central, vertical core.	<ul style="list-style-type: none">○ At sites where the ice is well below freezing, such as the interiors of the polar ice sheets, mechanical drills must be used.○ Thermal drills are particularly effective at coring through warmer ice (e.g., ice

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		approximately above -10°C) and are frequently used on mid- or low-latitude glaciers.
Land Drilling	<ul style="list-style-type: none">○ Land drilling is essential for obtaining actual temperature measurements, rock samples, and retrieving fluid samples for chemical analysis.	<ul style="list-style-type: none">○ Geophysical methods can give valuable and useful information about the subsurface, which is very important when determining the best locations for drilling.
Barge Drilling	<ul style="list-style-type: none">○ For sampling formations that are under a body of water, the use of a barge as a work platform can make that work possible.	<ul style="list-style-type: none">○ Small barges are useful on small bodies of water, tailings ponds, dam reservoirs and other places where the water conditions are relatively calm.○ Large barges allow us to precision positioning of rigs, and safe work on large, potentially choppy bodies of water with minimal impact from weather and water conditions that would otherwise hamper or delay drilling operations.

5. GEOTHERMAL WELLS

https://en.wikipedia.org/wiki/Geothermal_heat_pump

<http://geothermalprosandcons.net/introduction-to-geothermal-drilling/>

<http://www.geotechdrilling.com/services/geothermal/>

<http://www.wellowner.org/geothermal-heat-pumps/>

General:

- A geothermal well is used in the development of a geothermal heat pump or ground source heat pump, a central heating and/or cooling system that transfers heat to or from the ground.
- It uses the earth as a heat source (in the winter) or a heat sink (in the summer).
 - This design takes advantage of the moderate temperatures in the ground to boost efficiency and reduce the operational costs of heating and cooling systems,
- Water or other liquids are put through continuous loops that are buried vertically or horizontally next to the building.

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- Geothermal heat pumps use little electricity and are environmentally friendly. They can save up to 70% energy as opposed to natural gas, electric, propane or oil.
 - Heat pumps are efficient and low in maintenance, having fewer mechanical components.
- The geothermal unit itself has a 30 year lifespan compared to the 15 year life span of a typical furnace.
 - The use of geothermal heating also eliminates six tonnes of CO₂ emissions from a typical home.

Types of Geothermal Wells:

Type	Description	Benefits
Geothermal Well	<ul style="list-style-type: none">◦ Geothermal drilling is the process of creating boreholes in the earth to extract the earth's heat.◦ Geothermal heat pumps (GHPs) are among the most efficient and comfortable heating and cooling technologies available.◦ GHP systems are commonly used to provide heating and cooling to homes, schools, hospitals, as well as commercial and government buildings.	<ul style="list-style-type: none">◦ A hole (typically in the 6" diameter range, more on this later) must be drilled into the earth for quite some depth.◦ Even though the installation price of a geothermal system is more than that of conventional heating and cooling systems of the same capacity, the energy savings are significantly lower and therefore will offset the higher installation costs over time.

6. ENVIRONMENTAL WELLS

<http://www.greggdrilling.com/services/FqmlJ/environmental-services>

General:

- Used to determine the existence of contamination in soil or groundwater.
- This form of testing requires the use of clean, non-contaminated above and below ground equipment, in order to provide accurate sample integrity and eliminate the possibility of cross contamination between sampling locations.

Types of Environmental Wells:

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Type	Description	Benefits
Environmental Wells	<ul style="list-style-type: none">○ Recovers discrete undisturbed soil and groundwater samples from the subsurface enabling evaluation, monitoring and remediation of contamination impacting the environment.	<ul style="list-style-type: none">○ Produces accurate undisturbed soil and groundwater samples and constructed wells for monitoring and remediation.

7. ARTESIAN WELLS

https://en.wikipedia.org/wiki/Artesian_aquifer

General:

- An artesian aquifer is confined between impermeable rocks or clay which causes this positive pressure.
- An aquifer is a geologic layer of porous and permeable material such as sand and gravel, limestone, or sandstone, through which water flows and is stored.
- Not all the aquifers are artesian, because the water table must reach the surface (not the case for underground groundwater such as, for example, the Nubian Sandstone Aquifer System). The recharging of aquifers happens when the water table at its recharge zone is at a higher elevation than the head of the well.

Type	Description	Benefits
Artesian Well	<ul style="list-style-type: none">○ A well drilled into an artesian aquifer is called an artesian well.○ An artesian aquifer is a confined aquifer containing groundwater under positive pressure.	<ul style="list-style-type: none">○ Positive pressure causes the water level in a well to rise to a point where hydrostatic equilibrium has been reached.○ This means water can be extracted from the well without a pump system.

8. WELL RELATED SERVICES

Types of Well Related Services:

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<http://www.wellowner.org/water-treatment/>

<http://www.wellowner.org/water-quality/water-testing/>

<http://www.water-research.net/index.php/shock-well-disinfection>

http://www.flotecpump.com/ResidentialPage_resource_starthere_4inSub_Instal.aspx

Type	Description	Benefits
Water treatment	<ul style="list-style-type: none">○ There is no such thing as “pure” water. All water contains gases or minerals. Various techniques have been designed to remove unwanted substances from water, but the amount and type of substances removed depends on the treatment method.	<ul style="list-style-type: none">○ In most cases, the pollution is hardly severe and is not particularly detrimental to health. However, some substances that are health hazards do occur in water. Other substances are merely undesirable because they create bad tastes and odors, stain clothing and fixtures, or ultimately cost money.
Pump installation	<ul style="list-style-type: none">○ Whether you have a deep or shallow well, you need certain tools and knowledge to replace a submersible pump. Assuming you have already pulled the old pump out of the well, here is how to install your new submersible pump to get your household back up and running again.	<ul style="list-style-type: none">○ The job can be done quickly, and with the minimum amount of environmental damage when done by an experienced installer.○ Make sure your installer abides by local codes and regulations regarding private water systems and obtains all necessary applications, permits, and inspections.
Well chlorination	<ul style="list-style-type: none">○ If test results indicate that bacterial contamination is occurring, shock chlorination or disinfection is the most widely suggested method for initial treatment.○ Shock chlorination (disinfection) is the one-time introduction of a strong chlorine solution into the entire water distribution system (well, pump, distribution pipeline, etc.).	<ul style="list-style-type: none">○ Shock chlorination is advised: when lab results indicate a presence of bacteria, upon completion of a new well or after pump replacement or repair, when the distribution system is opened for repairs or maintenance, following contamination by flood water, to control iron and sulfur bacteria.

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Water well testing	<ul style="list-style-type: none">○ It is recommended well owners test their water at least annually for bacteria, nitrates, and any contaminants of local concern.	<ul style="list-style-type: none">○ More frequent testing should be considered if:<ul style="list-style-type: none">▪ There is a change in the taste, odor, or appearance of the well water, or if a problem occurs such as a broken well cap, inundation by floodwaters, or a new contamination source▪ The well has a history of bacterial contamination▪ The septic system has recently malfunctioned▪ Family members or house guests have recurrent incidents of gastrointestinal illness▪ To monitor the efficiency and performance of home water treatment equipment.
Pre-drill for pilings	<ul style="list-style-type: none">○ Pre-drill piling hole services by way of geotechnical (hollow or solid stem) and traditional tricone drilling with air rotary.	<ul style="list-style-type: none">○ Allows for easier driving of structural pilings in hard to drive ground materials.