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Dewatering methods in construction pdf

In many construction works, such as building foundations and basements, you will have to deal with groundwater and surface water management. They should be controlled to ensure easy and safe accomplishment of the work on the construction site. That's when dewatering comes into play. Dewatering, as its name suggests, is the process of removing surface and subsurface water from a construction site. Whether you have to remove small amounts of water in case of shallow excavations (up to 1.5 m deep) or have to control large quantities of water in deep excavations (over 3 m deep), you will need to consider a wide range of methods to make sure adequate precautions have been taken. Why dewater? Dewatering provides dry and stable conditions for excavations, allows to increase the stability of the soil, and ensures workers' safety. If for some reason surface and sub-surface waters are not properly collected and disposed of, they can pose significant hazards during construction site preparation and, later on, during the building's life cycle. Image source: HSI Services, Inc The damage may be of different types: The conditions of the soil may undergo variations that can affect the structure of the building. It may become a reason for surface flooding. If you don't pay proper attention to the place where water is discharged, you may run the risk of witnessing erosion and other related problems. Dampness may lead to unhealthy conditions and attract termites. Flooding may damage adjacent properties. Builders, designers and other specialists involved in the construction process should make sure the site preparation is done professionally so that groundwater is removed as required and surface water always runs away without the risk of being banked up. What to consider before choosing a dewatering method? You should base your decision on a number of information sources. Refer to the geotechnical and groundwater site investigations and risk assessments accomplished in the scope of your construction project and, if needed, consult with the information provided by local authorities. In most cases, you will need specialist engineering services to take care of soil stabilisation and successful control of groundwater. The common process of dewatering involves the following phases: collection of water, pumping, filtering/removing silt, and discharge. Image source: SlideShare Methods of dewatering We have singled out four commonly used methods: sump pumping, wellpoints, deep wells, and eductor wells. These techniques can be employed singularly or in combination depending on the nature of the soil and groundwater conditions. 1. Dewatering by Open Sump Pumping. It's a reliable choice in a wide range of situations, and it's also referred to as the simplest, cheapest, and most effective dewatering method. A sump is a hole or an area in the ground (deeper than the basement floor) where water is collected and then pumped away for disposal. How it works. Drains and sumps are constructed at one or more sides or corners of the foundation pit. The drains collect the groundwater and convey it into the sump. From the sump, the water is continuously evacuated (either manually or mechanically). Image source: Gharpedia This method works well for most soil and rock conditions (can be applied in well-graded coarse soils or in hard fissured rock). Consider scenarios when you should be cautious. When using this technique, there is a risk of collapse of the sides as "the groundwater flows towards the excavation with a high head or a steep slope". In fine-grained soils, such as silts and fine sands, there is also a risk of instability which may result in ground movements and settlement. 2. Dewatering by a Well Point System. This method features easy installation, and it's relatively cheap and flexible, being practical and effective under most soil and hydrologic conditions. Wells are drilled around the construction area and pumps are placed into these wells. Image source: Gharpedia Wellpoint systems consist of a series of small-diameter wells, connected by a header pipe to a centrally located suction pump. Groundwater is abstracted via the wellpoints from a vacuum generated by the pump. The perforated pipe has a ball valve to regulate the flow of water (the ball valve also prevents the mud from entering into the pipe). Groundwater can be lowered about six metres by this method. Image source: Groundwater Engineering This method is ideal for buildings with deep basements and is effective in sands and sandy gravels. Image source: GEOQUIP3. Dewatering by Constructing Deep Wells. When a deep excavation is needed and a large quantity of groundwater is required to be removed, dewatering may be done by constructing deep wells in soils or rocks where permeability is between moderate (e.g. sands) to high (e.g. gravels). Image source: The Constructor Deep well dewatering system can drain out water up to 24m depth. The capacity of the pumps as well as the number, depth, and spacing of deep wells may vary depending on the site conditions. In cases when wellpoints and deep wells are not suitable methods for dewatering, the use of eductors can be considered. 4. Dewatering Using the Eductor System The eductor system (also known as the ejector system) is a specialist technique used in low permeability soils such as very silty sands, silts, or clays. Eductors are typically used to help stabilise the side slopes and soil in the excavation area. Unlike the wellpoint dewatering system, it uses high-pressure water in the riser units. The eductor system works in the following way: "Ejector supply pumps located at ground level feed high-pressure water to the ejector nozzle and venturi located at the base of the wells. The flow of water through the nozzle generates a vacuum in the well and draws in groundwater". Image source: WJ Middle East Wrapping up! To survive and thrive in an environment where more and more buildings are designed and built, construction specialists have to be knowledgeable in the industry laws and regulations and competent to accomplish construction projects - from demolition to excavation, from glazing to maintenance. More than ever before, Australia needs highly skilled professionals to meet the ever-increasing workforce demand in the construction industry. That's when the need for a recognized training provider arises. Back to Basics is here to help you receive high-quality training at an affordable price and in the shortest time frame possible. Sounds promising? That's only the beginning. You enjoy the flexibility and efficiency of learning online. You gain access to training materials written by builders for builders. You receive one-on-one training from industry experts. If you would like more information on the courses Back to Basics offers or are interested in upgrading your resume with one of our qualifications, Call us on 1300 855 713 or email enquiries@backtobasics.edu.au to find out more. Dewatering is the removal of water from solid material or soil by wet classification, centrifugation, filtration, or similar solid-liquid separation processes, such as removal of residual liquid from a filter cake by a filter press as part of various industrial processes. The term dewatering is used to control groundwater through pumping at construction sites known as construction dewatering and also used at mine sites known as mine dewatering. Here we will learn about dewatering, types of dewatering & much more. Introduction to dewatering: The process of dewatering is used for the foundation trenches ground of the high water table, water-logging area. The excavations are carried out by dewatering the sub-soil water and water must be pumped into an area filled with water for which the foundation is to be excavated. In a waterlogged area, at the time of excavation timber and strutting are very difficult because the soil is in contact with water. Therefore the remedy to overcome this problem is to let the area come into contact with water, offering a better solution for the foundation excavation. Purpose for dewatering: Dewatering provides a dry digging and allows the construction to proceed efficiently. It reduces lateral load on sheeting and bracing in the excavation. Also, it improves the supporting characteristics of foundation materials. This excavation increases the stability of slopes and side-hill fills. It cuts off the capillary rise and prevents piping and frosting in the pavement. It reduces air pressure in the operation of tunnels. Methods of dewatering: Ditches and Sumps: This is a simple method, which is adopted on a large scale if the soil is shallow, coarse-grained. The pits called the sumps are dug and water is collected from the side current under gravity. This water is then pumped out. Deep Well System: This method is adopted when the depth of excavation exceeds 16 m below the water table. In this method, boring of 15 cm to 70 cm diameter is done with a casing, which has a long screen and a submersible pump to lift the water up. A separate pump is provided to each well. Vacuum dewatering system: A well point system is followed in a well for fine-grained soils. For better dewatering results, a suction head is applied in the case of fine, non-adhesive clay. Dewatering is done both ways and a vacuum is maintained in the well using the airtight seal for all points. Well point system: This method is based on gravity flow, it consists of a perforated pipe which is about 0.5 to 1 meter long and 5 to 8 cm in diameter. This perforated pipe is covered by a cylindrical wire gauge screen, the suction pump has the ability to bring water to the surface from a maximum depth of about 6 meters. If there is more than 6 meters of dewatering excavation below the water table, a multistage well system is preferably adopted. Electro osmosis dewatering: It is the most suitable method for cohesive soils or soils in which the soil is drained or stabilized by electric current. The electro-osmosis method is best suited for fine-grained cohesive soils. In this case, the soil water can be traveled from the positive electrode i.e. the anode to the negative electrode i.e. cathode, only when the current is passed between two electrodes to the saturated soil mass. The cathode is made with a metal hose or well for the purpose of pumping out the seeping water. A pipe or sheet piling of an excavation or steel rod acts as an anode in this method. In order to increase the shear strength and slope stability of the soil, the natural flow direction of the water is overcome by digging the suitable arrangement of electrodes. Importance of Dewatering: Ground Excavation: It plays an important role in the excavation of the ground, subsurface excavation can be endangered due to the level of the water table. Allows excavation and construction in a relatively dry environment. Stable Foundation: It controls the hydrostatic pressure and seepage thus increasing the stability of excavated slopes to make them suitable for supporting structures. It can be used to increase the effective weight of soil and strengthen soil layers and reduces lateral load on sheeting and bracing. Irrigation: The excess water extracted from construction sites can be used for irrigation. Also read: Waterproofing, Rainwater Harvesting & Grouting Conclusion: The process of dewatering is pumping from wells or sumps to temporarily lower groundwater levels, permitting excavation under natural groundwater levels to occur in dry and stable situations. dewatering methods in construction pdf. methods of dewatering in construction site. dewatering methods in basement construction. what are the methods of dewatering, what is dewatering in construction. what is the purpose of dewatering in construction

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