

# A Strong Foundation

A successful dewatering project has many stages. Make sure you always take these steps.

By David Giles

In the construction industry, the expression that “a building is only as good as its foundation” carries a great deal of validity.

Many factors are taken into consideration when a building foundation is laid, and one of the most important procedures deals with the effective control of the ground water prior to its placement. This process is known in the construction industry as “dewatering.”

The process of dewatering a proposed foundation excavation is no simple task. A dewatering contractor, or drilling contractor offering dewatering services, must understand a well-orchestrated process of detailed analysis and planning, and implementation must be followed in order for the project to be successful. If any of a number of potential hazards, such as misinterpretation of the subsurface soils, is allowed to impede the process, severe problems can occur during construction, translating into significant cost overruns and delays. Therefore, it becomes imperative that an organization taking responsibility for dewatering maintain a high level of expertise and skilled personnel to troubleshoot all potential hazards in the effort to keep a project both on schedule and within budget.

## Why Do Many Dewatering Projects Fail?

The lack of professionalism and competency of a dewatering contractor, or drilling contractor offering dewatering services, often leads to project cost overruns and delays. They include:

- **Improper expectation setting** — All too often, the dewatering/drilling contractor becomes overly eager to obtain a contract for a project. In an effort to win the bid, a less wise contractor will frequently set project expectations at a very high level and make a variety of promises of the results to be achieved, and work to be accomplished, without taking into consideration all of the possible factors and outcomes that can take place at an excavation site requiring dewatering. Given the complex nature of soil and ground water, it is always prudent to conduct as much upfront research and analysis as possible to avoid unforeseen challenges that often take place. Less prudent contractors who do not conduct or insist on this type of upfront analysis are therefore unable to set an appropriate level of expectations with a project owner before the installation begins.
- **Poor communications** — Effective and frequent communications between all of the parties involved (contractor, subcontractor, and project owner) is essential in avoiding an atmosphere of



An overview of a deep well system installation in the Rio Grande riverbed in Albuquerque, New Mexico, shows off the great size of the project.

conflict and distrust, especially when unforeseen situations occur. Unfortunately, communications are frequently an afterthought with many of those involved and are not treated as an essential component of an ongoing working relationship.

- **Poor documentation** — Documentation also plays an important role in a project’s success among the various parties involved on the site when the work is ready to begin. When documentation is missing or inaccurate, misunderstandings between the parties can ensue, leading to disagreements and conflicts during the construction. Therefore, accurate documentation becomes a working confirmation of site conditions and work to be performed for all parties involved to share. This ensures that everyone agrees on the extent of work to be completed and that the project will proceed according to the specified plan.
- **Inadequate planning** — The complexities involved with a dewatering system require an extensive amount of planning. When less wise dewatering/drilling contractors do not insist that a customer take the time to plan properly and conduct a thorough subsurface investigation, or conduct their own investigation, they address project problems when they take place. Addressing problems at the last minute often adds valuable time to the back end of the project, resulting in project delays and costs to the project.
- **Inferior installation procedures** — When the priority of a shortsighted dewatering/drilling contractor is focused on winning a bid by the lowest cost possible, every facet of the work phase conducted thereafter often becomes compromised. This becomes very apparent when the installation takes place. A contractor who is focused on cutting corners to reduce costs will often take shortcuts that compromise construction quality and worker safety. These circumstances often lead to delays and injuries that can significantly increase the cost of the project.
- **Limited adherence to safety standards** — When the less-competent dewatering/drilling contractor reduces operating costs to their bare minimum, it leaves little room for the additional expense of safety training for the personnel who are involved in a project. Without a strict adherence to safety standards, the opportunity for higher costs and possible injury litigation becomes increasingly possible.

Due to the complexities of the soil characteristics and ground water, being a successful dewatering/drilling contractor requires a level of professionalism unmatched in any other specialty trade. Seven key phases can be identified in every successful dewatering project.

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## Investigation Phase

Before a dewatering project can begin, there are a great number of unknown factors that must be determined, such as a detailed description of the subsurface soils, the permeability of the soil to be dewatered, the water table elevation, as well as the limits of the proposed excavation (width, length, and depth) just to name a few.

All of these factors must be determined in a detailed investigation conducted prior to the start of any construction work. A competent dewatering/drilling contractor will investigate as many facets of a project prior to the work beginning, backed up by very accurate data that can create a high level of confidence for the client. Approaching a dewatering problem with this level of detail is the best way to achieve project success.

Some of the procedures that are used in the investigation phase include multiple test bores of the site, lithological logging and gathering of soil samples, conducting sieve analysis of the soil, and possibly the design and execution of pump testing to determine the physical parameters of the soil and ground water beneath the site.

During this investigation, it is helpful if the contractor can take advantage of any prior dewatering experiences. This includes using the data collected from similar projects with comparable soils to enhance the overall plan. By performing the investigation in this manner, the contractor is able to provide the client with the highest level of confidence that their desired results can be achieved.

## Design and Modeling Phase

A design and modeling phase may include both a technical evaluation and a budgetary analysis. In the technical analysis, the results from the investigation phase are used to create the “site model” representing a highly detailed report of a recommended dewatering system, its anticipated effectiveness, and its limitations. When appropriate, a pumping test should be performed and the latest ground water modeling software applied to determine if the desired design parameters can be achieved with the necessary level of confidence. A budgetary analysis includes the anticipated cost of the proposed dewatering plan.

Following these methods and procedures provides the dewatering/drilling contractor with the ability to set realistic project expectations with the client. Besides creating an accurate procedural road map and budget assessment, this information can also be used to determine if the anticipated project cannot be accomplished as specified.

For example, if the analysis of the results indicates that the water table can be depressed only so far, or that the dewatering system’s effectiveness with the existing soil conditions will be limited, the contractor can immediately communicate these issues with the client. In the event this takes place, the contractor will recommend to the client the extent and degree of the changes that will be necessary before any actual work can begin or before any final drawings are produced. In this way, the contractor establishes proper customer expectations and avoids any last-minute surprises when the installation is ready to begin.

## Preparation of the Estimate and Bid

Following the investigative and design and budgetary phases of the project, a hard bid estimate is prepared based on the project’s final design criteria that will include all of the necessary labor, equipment, and materials required to implement the dewatering plan.

Because a dewatering/drilling contractor can provide several levels of services ranging from simple installation to a complete turnkey contract/dewatering project (depending on the desires of the general contractor), a single quote may be prepared with several different options. By making use of the experiences and lessons learned within your project portfolio, the opportunity to deliver an accurate bid to the client is maximized.

While unforeseen events are always possible, always commit to communicate and accurately document any changes in the subsurface conditions or other modifications that can affect the design, no matter how small, to ensure that your organization is always able to fulfill a high level of customer satisfaction.

## Installation and Performance Phase

In the installation phase, all elements and information that have been collected beforehand are gathered and put into motion. An effective installation requires the availability of a highly trained and competent workforce that uses the latest tools and installation technologies available for site-specific situations. The successful dewatering/drilling contractor constantly evaluates the components that are used in each project, such as well casings, well screens, and filter packs, to ensure the best possible capability, durability, and performance outcome that will generate the highest satisfaction for the client.

The successful contractor should also understand that time is an important factor in any implementation plan. The level of speed, efficiency, and performance that goes into a dewatering project plays a critical role in the final cost of the dewatering service.

One key factor that will allow the successful contractor to ensure speed, accuracy, and quality involves designing a system that fully maximizes the total throughput of the ground water that is being removed. The faster a system can remove the underlying ground water, the lower the project’s operating costs will be.

For example, by using higher efficiency components such as “high volume” well screens, properly designed filter packs, appropriately sized pumps, piping systems, and well development procedures that generate a higher water throughput, a higher volume of water can be reached, resulting in a shorter amount of time for the project’s completion. This results in lower operating costs, and these savings are passed on to the client.

Avoid taking shortcuts in an attempt to lower costs or using less expensive, inferior technologies that ultimately result in decreased production and additional manpower resources, all of which result in



A deep well installation takes place at the Bayport Container Facility in the Port of Houston in Texas.



Pipe is installed in the deep well system on the Rio Grande river crossing project in Albuquerque, New Mexico.

higher operating costs that must be passed along to the customer.

## System Maintenance

Once the dewatering system goes live, it must be monitored for any unforeseen complications, and accurate records must be maintained throughout this process to allow for the proper evaluation of the system’s effectiveness. Any throughput delays that result in a slower drawdown or water seepage resulting from an unanticipated stratified soil can lead to the possibility for cost overruns. Therefore, it is imperative to pay attention to the monitoring, measuring, inspection, and analysis process to ensure that these situations are minimized.

During this phase, conduct a thorough troubleshooting of the water table by measuring its depth before any pumps are turned on, and then again after the systems have been started. As part of this same process, the system’s ground water discharge rate and the water table suppression rate are measured and recorded, and any delays are evaluated.

When appropriate, the discharge water is tested for contaminants, and strict procedures are followed for their proper treatment or disposal. Follow all local, state, and federal regulations regarding the discharge of these waters. Strict adherence to all regulations is crucial in avoiding costly cleanup or expensive fines.

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Maintaining accurate documentation also plays an important role during this phase of the project by enhancing the communication process among all the parties that are involved. System maintenance includes maintaining accurate documentation for the system evaluation and including any information that identifies variations in the site conditions. In the event a problem occurs, the dewatering/drilling contractor is able to use their documentation and communicate their findings to the project owner and, if necessary, issue a detailed assessment and analysis on how to resolve the identified problem quickly. Detailed documentation during the maintenance phase is essential to a successful dewatering project.

## System Removal

The majority of ground water systems are often temporary installations. The final procedures that are undertaken after the ground water extraction has been completed and the foundation has been set include removing all dewatering systems and associated equipment from the site. Prior to system removal, water level readings should be taken and the findings reported. The system is then shut down while the water table is allowed to return to a static level.

Regulatory requirements play an important part during the system removal stage. Local, state, and, in some cases, federal regulations stipulate very strict guidelines for well abandonment. Abide by all local, state, and federal environmental standards so that all water-bearing aquifers remain protected from any future potential contamination. Continually train your personnel in the latest regulations and instructions to ensure the proper removal and abandonment of a dewatering system, eliminating the opportunity for future aquifer contamination.

## Permanent Dewatering and Relief Well Systems Maintenance

In the event a permanent dewatering system is required, design and implement a well maintenance program that will prevent any excessive deterioration of the dewatering system. Additionally, provide professional assistance in record keeping and data evaluation to assure that a proper maintenance program is in place, and recommend modifications to the maintenance program as necessary, preventing the need for costly reinstallations later on.

In the case where an existing permanent dewatering or relief well system has been neglected, design and implement a rehabilitation program in place of a costly reinstallation.

A qualified dewatering/drilling contractor is just as important to a construction project as the accuracy of the architectural plans, the quality of the materials, and the talent of the workforce. With so many factors that need to be considered when dewatering, it becomes imperative that the contractor maintain the experience, resources, and technologies necessary to overcome any challenge that may arise and provide a level of assurance that the project timeline and budgetary goals will be met.

Avoid making unrealistic promises that frequently go unfulfilled. Establish an organization that is built on the premise that what is promised will be delivered on time, on budget, and with the highest quality of workmanship possible. This, coupled with a dedication to professionalism, integrity, safety adherence, effective communication, and detailed documentation, ensures that your dewatering project will meet all of the specified plans and goals that have been established. [WWWJ](#)



The deep well system at Bayport Container Facility located in the Port of Houston in Texas was a big project that utilized dewatering.

NGWA will be hosting the two-day course titled "Construction Dewatering and Ground Water Control: Design and Application" on October 8-10 in Dublin, Ohio. Call Customer Service at (800) 551-7379 for more information.