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Controlling the Flow of Water on a Construction Site

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Abstract

Water management was not previously considered to be a critical point of planning and supervision; however, as time passes, all possible points of water entry into the structure are observed. As a result, it appears to be the worst stage of the existing building. Water may enter from an underground source due to poor workmanship, or it may enter from a surface source. The end result will be a structurally deficient building. There are numerous possibilities for corrosion of steel in the footing portion due to underground water entry.

Keywords: *Water management, Construction site, Underground water, Construction project*

INTRODUCTION

Water management on construction sites is a critical issue in terms of both environmental impact and structural stability of the building. A well-managed site reduces the structure's environmental impact.

Water management was not previously considered to be a critical point of planning and supervision; however, as time passes, all possible points of water entry into the structure are observed. As a result, it appears to be the worst stage of the existing building. Water may enter from an underground source due to poor workmanship, or it may enter from a surface source. The end result will be a structurally deficient building. There are numerous possibilities for corrosion of steel in the footing portion due to underground water entry.

Underground water is contaminated with toxic substances that corrode the steel from the foundation, causing the entire structure to weaken in the coming years. So, as explained in this report, water management can be carried out using BMPs (best management practises) and SWPPPs (storm water pollution prevention plans).

Need

With industry consuming a large portion of the water, conservation efforts can also help to solve the ongoing water pollution problems that we face. So often, industrial waste products such as heavy metals, solvents, toxic sludge and others pollute our fresh water systems. Sustainable water management practises may be able to provide solutions to such problems.

There is a growing need for us to adopt processes that are most beneficial to the environment. It all begins with a conscious decision to work toward water conservation, followed by a thorough examination of all processes for opportunities. A good place to start is with aspects like awareness raising, efficiency measurement systems, monitoring, and reporting. We can always adjust solutions to incorporate new learning as we build on this knowledge to achieve maximum efficiency.

A construction project raises environmental concerns. Workers on construction sites should be aware of their environmental responsibilities and the benefits that good practise will bring at every stage, beginning with initial feasibility. As a result, water management will reduce the amount of damage done to the aquatic environment.

LITERATURE REVIEW

A cost-effective approach to sustainable water management in buildings:

In this case study, a hotel with 41 rooms and 2400sq.mt. is planned, and its water supply scheme is preplanned and predesigned to get the least amount of waste water. A cost comparison for ordinary water supply and waste water production is also performed to check the economy. This paper promotes hydraulic designs for controlling waste water production and water management following structure construction.

Dewatering of ground water engineering construction

Various types of ground water dewatering are discussed in this case study, which increases interest in managing the site with

highly permeable strata. The best method of dewatering is to build a low permeability cut-off wall. Pumps can be installed in cut-off walls using this method. Principles of storm water management: city of Corpus Christi

The rules for the water management scheme are outlined in this guidance document. If a construction activity or excavation disturbs more than 5 acres of land due to a water source, it is considered illegal, so proper precautions should be taken.

Temporary Construction Methods in the Water Environment: Good Practice Guide –

This document describes various methods of controlling underground water, such as sandbag stacking and the construction of cofferdams. These are the best practises for managing water on the job site during excavation.

Construction in the Second World 2013-construction socioeconomic activities:

BMP and SWPPP methods are introduced in this case study, along with a water management rating system. It demonstrates that India is still a developing country in terms of water management for construction as well as all possible water management incidents.

Stage1- Pre-Construction

Proper planning entails more than simply ensuring that the building envelope is weather tight before permitting interior trades to begin work.

- It entails locating mechanical and electrical equipment away from areas where water may collect, such as basements, during the design stage. To avoid frozen water lines, building plans should place water lines in heated areas, away from crawl spaces or closets.

- Plans for site development or grading should divert water accumulations away from the construction area. Before building construction begins, connections to permanent sewer and storm water systems should be made.

- Water usually enters a building's exterior skin through transition points such as windows. Moisture and air infiltration barriers or retarders should be designed and installed in such a way that water can exit the exterior wall systems while also ensuring that external walls have adequate drainage

planes behind them. Proper vapour barriers are essential.

- Waterproofing designs for all roofs, foundations, windows, doors, gutters, and drainage systems should be included in building plans, as should the types of flashing, waterproofing components, moisture barriers, and retarders to be used.

Construction Dewatering

Construction projects that extend below groundwater pose unique challenges. If groundwater is not adequately controlled, excavations may flood or become unstable, reducing construction efficiency and wasting time and money.

Construction dewatering refers to the techniques used to control groundwater so that excavations, shafts, tunnels, and other structures can be built below groundwater level in workably dry, stable, and safe conditions. A construction project will typically see several benefits if a construction dewatering programme is implemented, including:

- Improved geotechnical stability and safety, including allowing steeper side slopes and preventing the • Increased geotechnical stability and safety, including the ability to allow steeper side slopes and prevent softening or disruption of the excavation formation level due to rising groundwater pressures or uncontrolled seepage.

- More efficient excavation and construction conditions, such as firmer excavation conditions that are less prone to rutting or clogging of plant and machinery. Dewatering creates drier working conditions, which improves the efficiency of construction operations such as excavation, concreting, and pipe laying.

- Lower risk of negative environmental impacts because properly engineered dewatering systems produce 'clean' water with very few suspended solids, lowering the risk of water pollution.

Dewatering techniques must be appropriate for the type of excavation and hydro-geological conditions at the construction site in order to be successful. Dewatering techniques must be carefully chosen because they are not interchangeable and are only effective under certain conditions. The diagram below provides useful preliminary guidance on the selection of dewatering techniques in relation to groundwater

permeability (hydraulic conductivity) and required drawdown of groundwater levels.

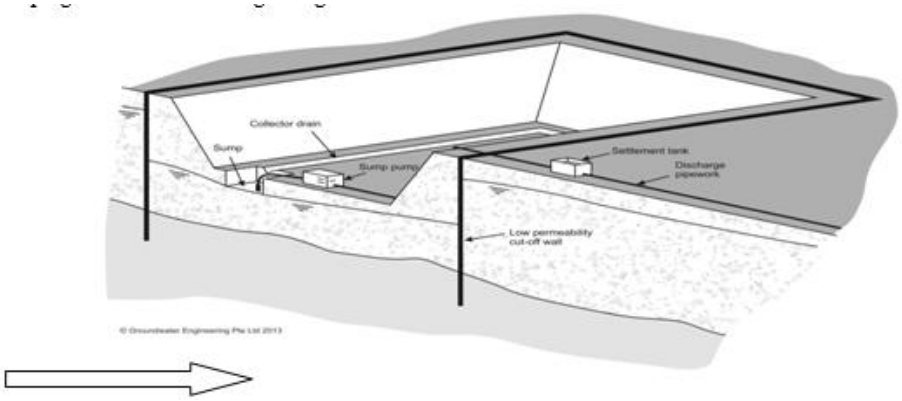
Mechanical pumping is commonly used for de-watering. It may include:

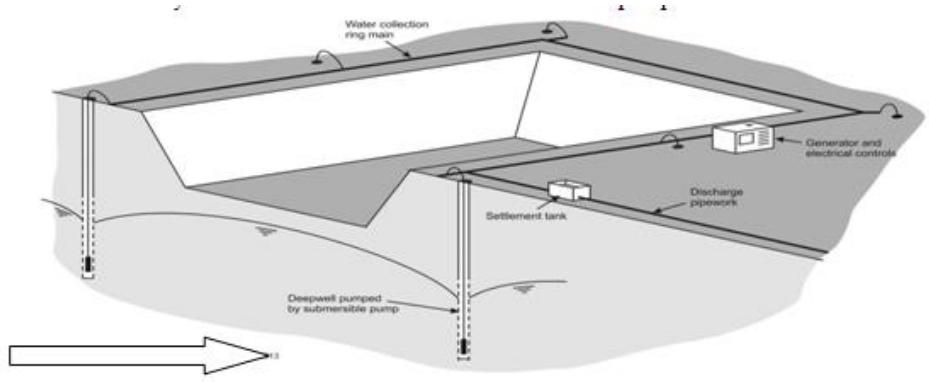
- the initial removal of water from an isolated area behind a temporary barrier; and
- The ongoing removal of water from behind cofferdams, temporary barriers, or excavations.

Groundwater control techniques are classified into two types:

- Techniques that use cut-off walls and other barriers to keep water out of the excavation (known as exclusion techniques).
- Pumping methods for dealing with groundwater.

In this method, low permeability cut off wall is constructed along the area of excavation and further pumps are installed in such a way that the water collected to cut off walls can be pumped and collected in a tank.





1. Through pumping wells and/or a connected well point system, dewatering can draw groundwater levels down to elevations not impacted by construction.

2. Developing this type of design input necessitates a thorough understanding of the underlying soils and groundwater conditions.

3. Particular care should be taken to limit the footprint of any of these operations in the adjacent areas. Caution should be used when dealing with adjacent landowners, as well as uses and environmental areas, to ensure that the project does not result in conflict (domestic water supply wells, watercourses, wetlands.). Surface water in streams and rivers can be diverted or pumped away from an active construction site, or work can resume once water containment is established.

Dewatering should be done with caution.

Make a competent person responsible for regularly monitoring over pumping where pumps are used, including:

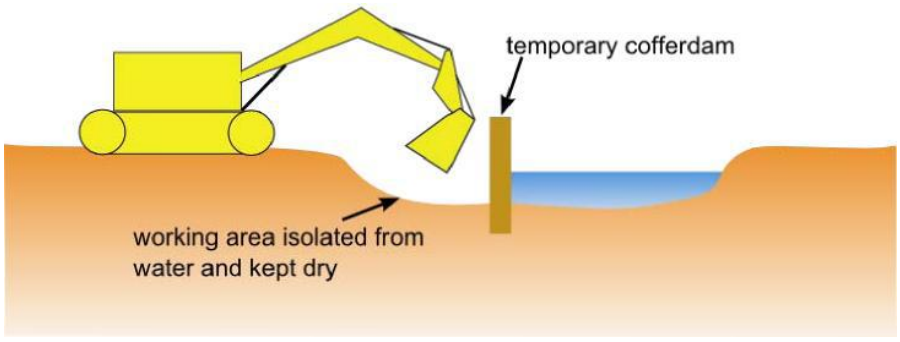
- Upstream and downstream water levels;
- Flow rate;
- pump performance;
- Inlet and outlet(s);
- Fuel level(s).

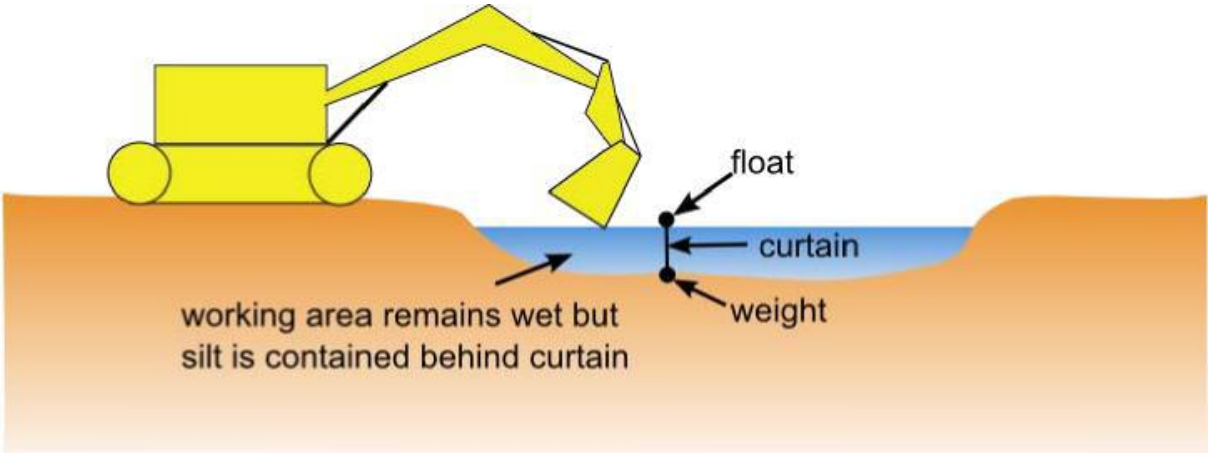
Construction of a partial cofferdam

A portion of the channel is isolated and kept dry using barriers (often referred to as a cofferdam), and flow is allowed to continue in the remainder of the channel. Barriers used to isolate a section of the channel can be made of a variety of materials.

Isolation with a silt curtain:

In this case, the work area remains wet, and a silt curtain is placed around it to reduce sediment transfer downstream.





Stage 2- During Construction

While the optimum water content condition does not always result in the lowest water cement ratio, it does result in the highest concrete quality. Because of the low water content, the solidity will be the highest, and as a result, the aggregate strength will be the greatest for compacted lift of RCC.

It is common knowledge that segregation at all moisture levels is caused by improper handling, transportation, and mixing of RCC materials, so that the lowest water content with the highest solidity increases the compressive strength of concrete.

W target = W optimum + W hydration + W evaporation

Where,

W target = lowest possible water content

W optimum = minimum water required for required mix

W hydration = minimum water required for hydration

W evaporation = minimum water required for evaporation process

Stage 2- After Construction

Following construction, the following sources can be used for water management:

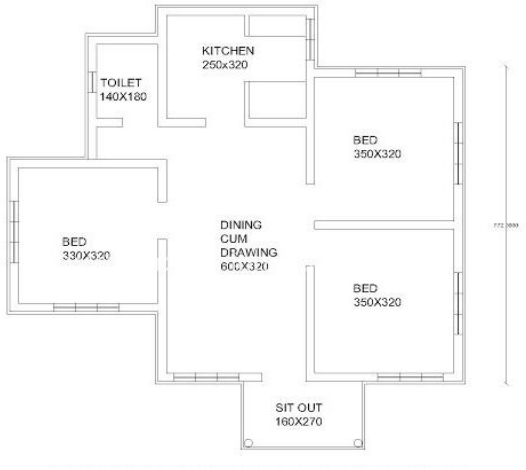
1. A microfiltration system for the treatment of ground water and rainwater.
2. Gray water treatment microfiltration system

The provisions are as follows –

1. Rainwater and groundwater filtration
2. Filter for grey water
3. Disinfection tank for rainwater and ground water
4. Disinfection tank for grey water
5. Clarifier for grey water

6. The control system

This system encourages the use of water from buildings as a waste product in order to reduce water consumption in a proper manner and thus control environmental impacts to some extent.



Problem

This system encourages the use of water from buildings as a waste product in order to reduce water consumption in a proper manner and thus control environmental impacts to some extent.

CONCLUSION

1. Building a cut-off wall with perforations on the facing side will allow water to flow through the channel.

2. Cofferdam will hold the water at certain depth & further water flow will not be disturbed.

3. Water can be stored for future use by connecting a tank to a channel.

4. At this time, the construction appears to be very expensive, but it will be beneficial in the future.

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