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WATER MANAGEMENT OF CONSTRUCTION SITE

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ABSTRACT

At prior stage water management is not considered to be vital point of planning and supervision as well, as the time passes all the possible chances of water entry in the structured is observed. As a result it seems very worst stage of existing building. Here entry of water may be from underground source, due to wrong workmanship or entryofwaterfromsurfacesource.Finalresultwillbeintheformofstructurallyweakbuilding.Forunderground water entry there are number of chances of corrosion of steel in footing portion.

KEYWORDS: sustainable water management in buildings , an affordable approach

INTRODUCTION

Water management for construction site is very important issue from the point of view of environmental impact as well as structural stability of the building. A well-managed site reduces environmental impacts on the structure.

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Underground water is polluted with toxic contents which corrode the steel from foundation and as a result whole structure will be weakening in upcoming few years. So water management using BMP (best management practice) and SWPPP (storm water pollution prevention plan) can be carried out as explained in this report,

NEED

With industry consuming a high percentage of water, conservation efforts can also be the solution to the ongoing water pollution challenges that we frequently experience .So often ,industrial waste products such as heavy metals, solvents, toxic sludge and others pollute our fresh water systems .Sustainable water management practices could offer solutions to such challenges

There is an increasing need for us to adopt processes that best serve the interests of the environment. It all starts with a conscious decision to work towards water conservation and then thoroughly scrutinizing all processes for opportunities. Aspects such as awareness building, efficiency measurement systems , monitoring and reporting are a good start. As we build on this knowledge, we can always adjust solutions to incorporate new learning in order to achieve maximum efficiency.

Environmental issues arise through a construction project. People working on construction site should be aware of their environmental obligations & the benefits that good practice will bring at every stage from initial feasibility. As a result, Water management will reduce damage the aquatic environment.

LITERATUREREVIEW

A sustainable water management in buildings , an affordable approach:

In this case study, a hotel with 41 rooms & 2400sq .mt. is planned and its water supply scheme is pre planned and predesigned to get minimum waste water and cost comparison for ordinary water supply and waste water production is carried out to check the economy as well. This paper encourage the hydraulic designs for controlling waste water production and water management after the construction of structure.

Ground water engineering construction dewatering

In this case study, various types of ground water dewatering are given which enhance the enthusiasm of managing the site for which highly permeable stratais observed. Constructing low permeability cut-off wall is best suitable way of dewatering. In this method pumps are allowed to install in cut off walls.

Principles of storm water management : city of Corpus Christi

In this guidance document, the rules regarding the water management scheme are given. If the area more than 5 acres of construction activity or excavation is disturbing due to water source the nitis considered to be unlawful, So proper precaution should be taken.

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

In this document, various ways of controlling the underground water are given i.e. stacking of sandbags, constructing cofferdams. These are the best suited practices can be used for managing the water on site during excavation.

Thesecondworldconstruction2013-socioeconomicactivitiesinconstruction:

In this case study, BMP and SWPPP method are introduced with water management rating system. It shows that India is still very undeveloped country in water management for construction as well as all the possible water management incidents.

STAGE1-PRE-CONSTRUCTION

Proper planning is more than just ensuring that the building envelope is weather tight before allowing interior trades to begin work.

- In the design stage, it involves locating mechanical and electrical equipment away from areas where water may collect, such as basements. Building plans should locate water lines in heated areas, away from crawl spaces or closets to avoid frozen water lines
- Site development or grading plans should divert water accumulations from the construction area. Connections to permanent sewer and storm water systems should be made before building construction begins.
- Waterusuallyenterstheexteriorskinofabuildingattransitionpointssuchaswindows.Thedesignand installation of moisture and air infiltration barriers or retarders should allow water to exit the exterior wall systems and ensure that external walls have appropriate drainage planes behind them. Appropriate vapor barriers are critical.
- Building plans should include water proofing designs to all roofs, foundations, windows, doors, gutters, anddrainagesystemsandspecifythetypesofflashing,waterproofingcomponents,moisturebarriersand retarders to be used

Construction Dewatering:

Construction projects that extend below groundwater level present particular challenges. If groundwater is not adequately controlled then excavations may flood or become unstable, and the efficiency of construction operations will be reduced, wasting time and money.

Construction dewatering is the range of techniques used to control groundwater to allow excavations, shafts, tunnelsandotherstructurestobeconstructedbelowgroundwaterlevelinworkablydry,stable and safe conditions. If a planned programmed of construction dewatering is implemented, a construction project will typically see several benefits, including:

- Improved geotechnical stability and safety, including allowing steeper side slopes and preventing the softening or disruption of the excavation formation level due to upward groundwater pressures or uncontrolled seepage.
- More efficient excavation and construction conditions, including firm erexcavation conditions less prone torutting or bogging down of plant and machinery. The drier working conditions created by dewatering will improve the efficiency of construction operations such as excavation, concreting or pipe laying.

- Less risk of adverse environmental impacts because correctly engineered dewatering systems produce ‘clean’ water with very little suspended solids, reducing the risk of water pollution.

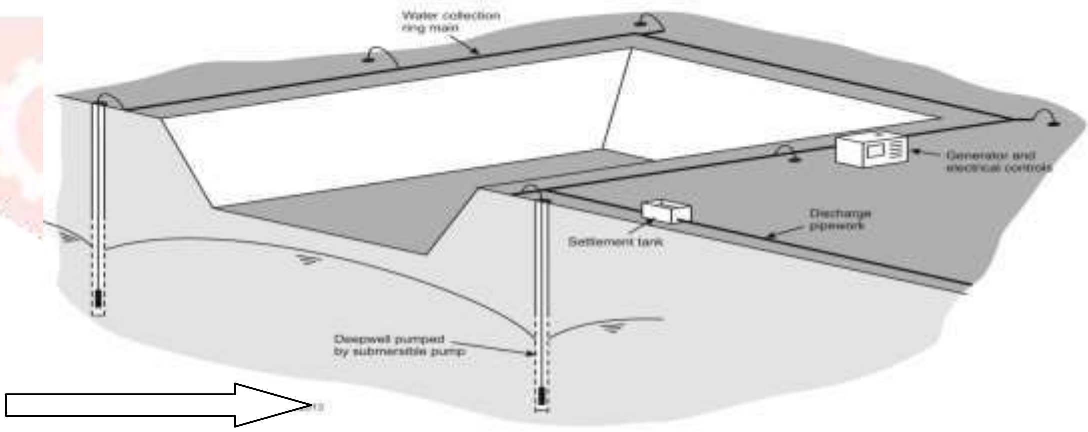
Successful dewatering requires that the techniques used are appropriate to the type of excavation and hydro-geological conditions at the construction site. Dewatering techniques must be selected carefully, as the various techniques are not interchangeable and are only effective within certain conditions. The figure below provides useful initial guidance on the selection of dewatering techniques in relation to permeability (hydraulic conductivity) of the ground and the required drawdown of groundwater levels.

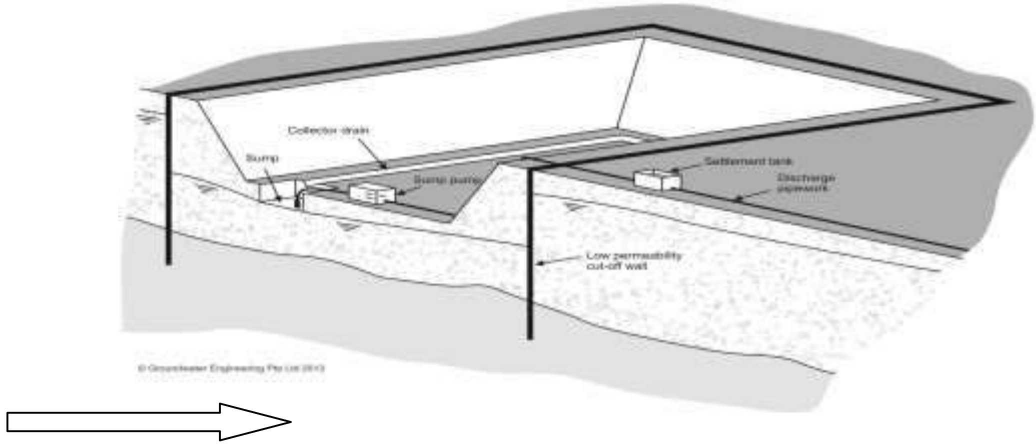
De-watering is usually be carried out by mechanical pumping. It can involve:

- The initial removal of water from the isolate dare a behind a temporary barrier;
- On going removal of water from behind cofferdams, temporary barriers or excavations

There are two main types of groundwater control techniques:

- Methods that use cut-off walls and other barriers to exclude water from the excavation(known as exclusion techniques).
- Methods that deal with groundwater by pumping.





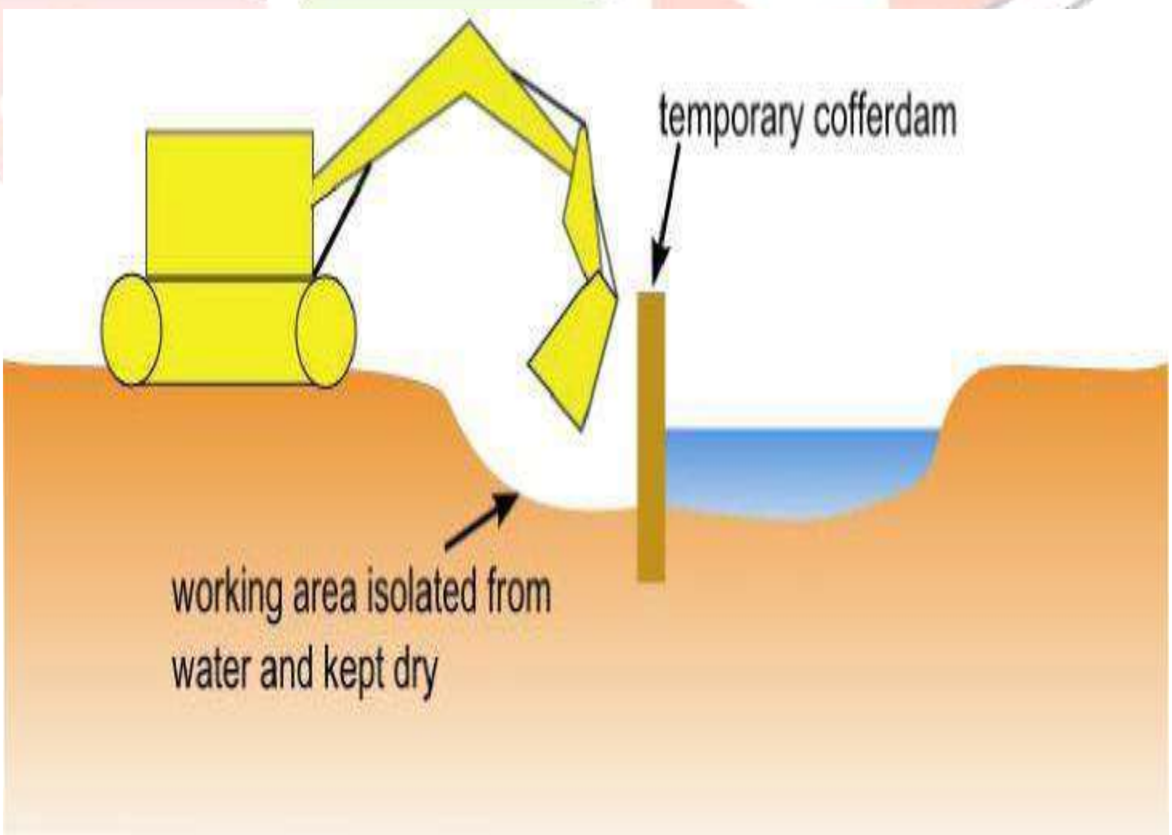
In this method, low permeability cut off wall is constructed along the area of excavation and further pumps are installed in such a way that the water collected to cut off walls can be pumped and collected in a tank.

1)Dewatering can draw groundwater levels down to elevations not impacted by construction through pumping well sand/or a connected well point system.2)A thorough understanding of the under lying soils and groundwater conditions is required to develop this type of design input.
3)Particular care should be taken to limit the foot print of the construction in the adjacent areas from Erosion and Sediment Control Guideline–December200627any of the seoperations.Caution should be exhibited when
Dealing with adjacent land owners, and uses and environmental area stoen sure that the under taking will not result in conflict(domestic water supply wells,water courses,wetlands.).Surface water in streams an drivers can either be diverted or pumped around an active construction area or work can proceed after water containment is established.

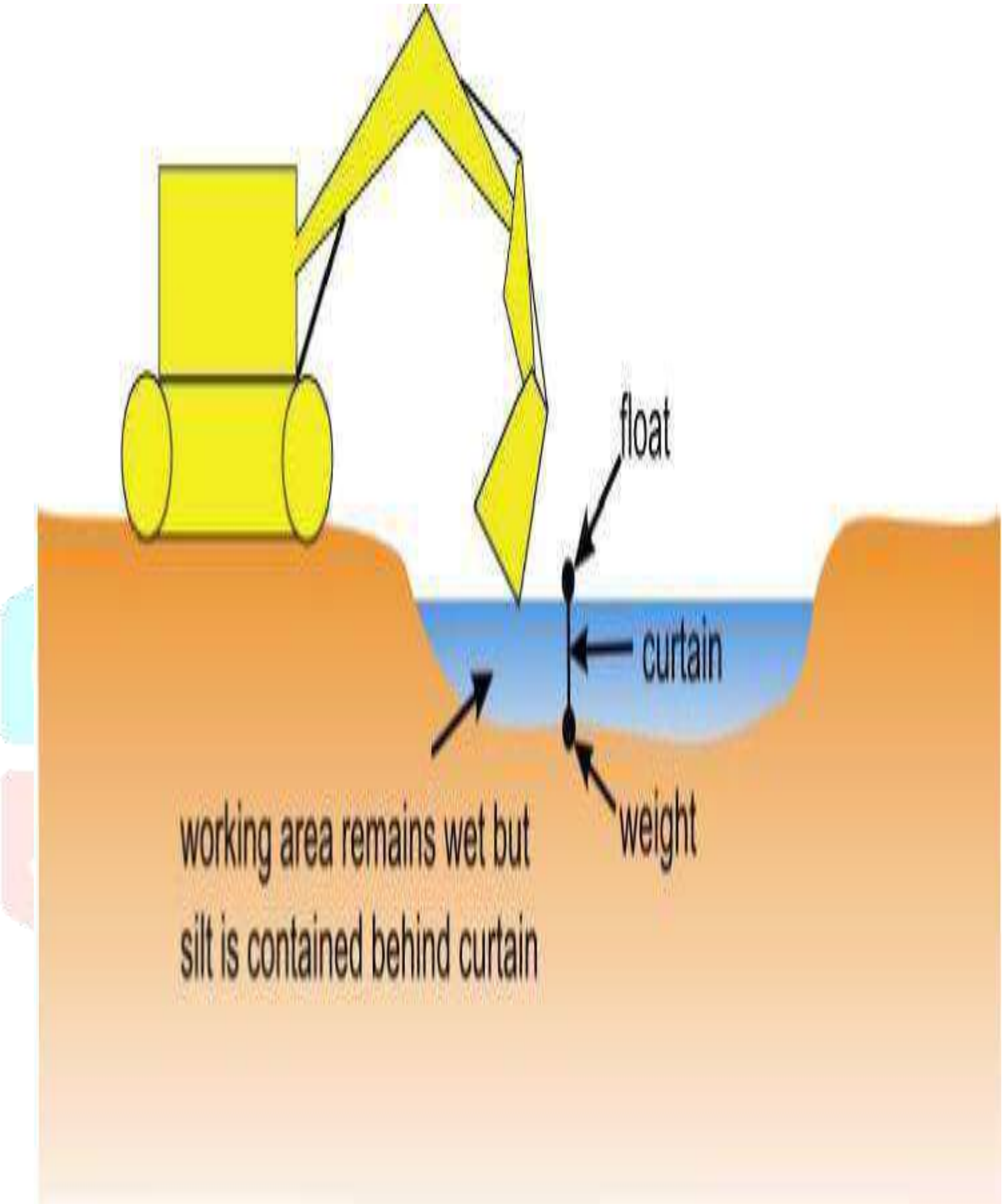
Care should be taken while dewatering
Where pumps are used,make a competent person responsible for regularly monitoring the overpumping including:

- Upstream and downstream water levels;
- Flowrate;
- Pump performance;
- In let and outlet(s);
- Fuel level(s).

Partial Cofferdam construction:
Partial area of the channel is isolated and kept dry with the use of barriers (often referred to as a cofferdam) and flow is allowed to continue in the remainder of the channel. Barriers used to isolate part of the channel can be made of a number of different materials.



Isolation with silt curtain:
In this case the works area still remains wet and a silt curtainis placed around the works are at minimize sediment being transferred downstream.



STAGE 2-DURING CONSTRUCTION

While optimum water content condition is not necessarily the lowest water cement ratio that is achieved, this is the condition of highest concrete quality is attained. Due to lowest water content, solidity will be the highest and as the result the strength of aggregate will be maximum for compacted lift of RCC.

It is common observation that segregation at all the moisture content is due to improper handling, transportation, mixing of RCC materials so lowest water content with maximum 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

After construction the water management can be carried out by following sources:

1) Micro filtration system for ground water and rain water treatment
2) Micro filtration system for gray water treatment

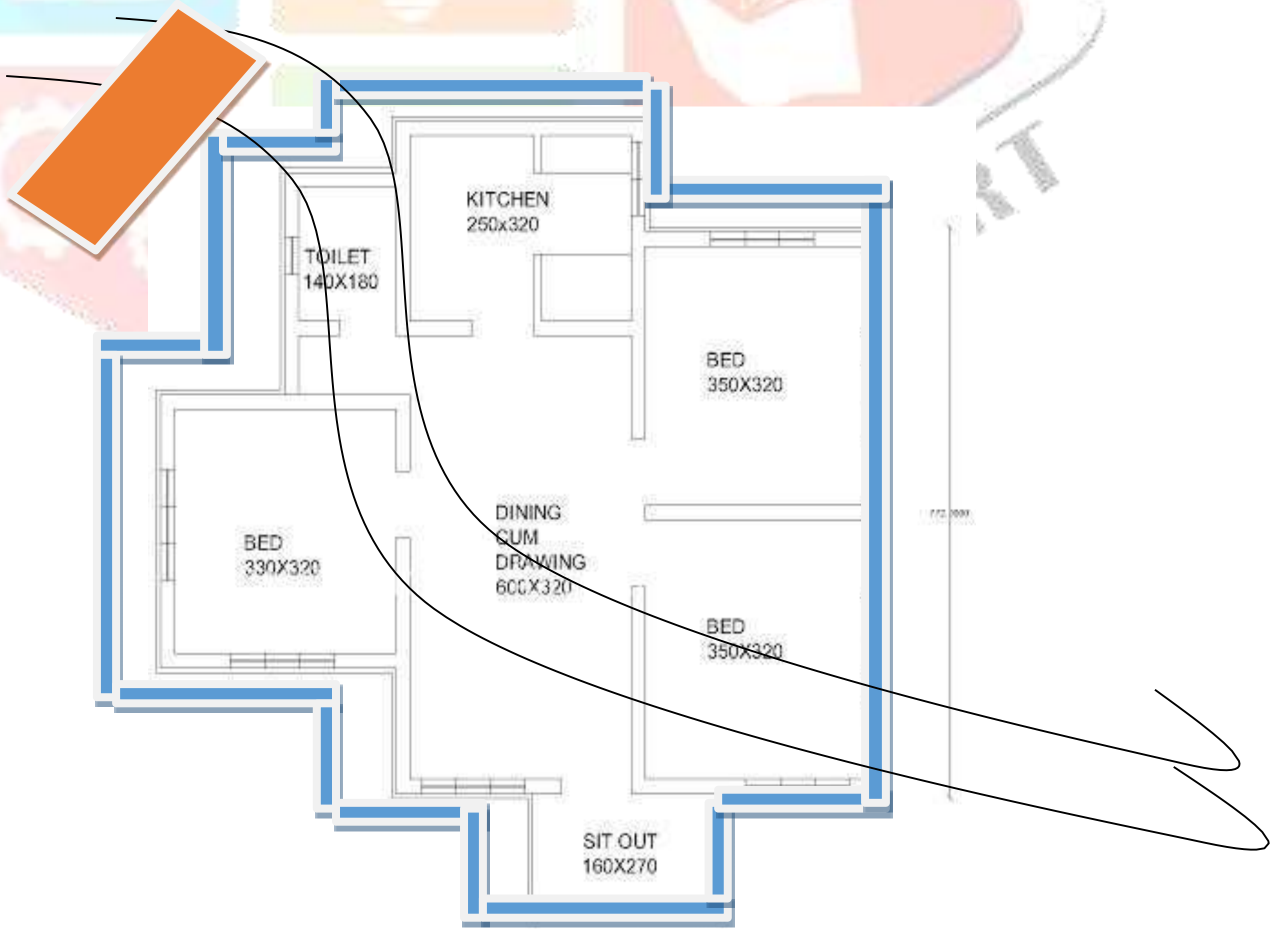
Following are the provisions–

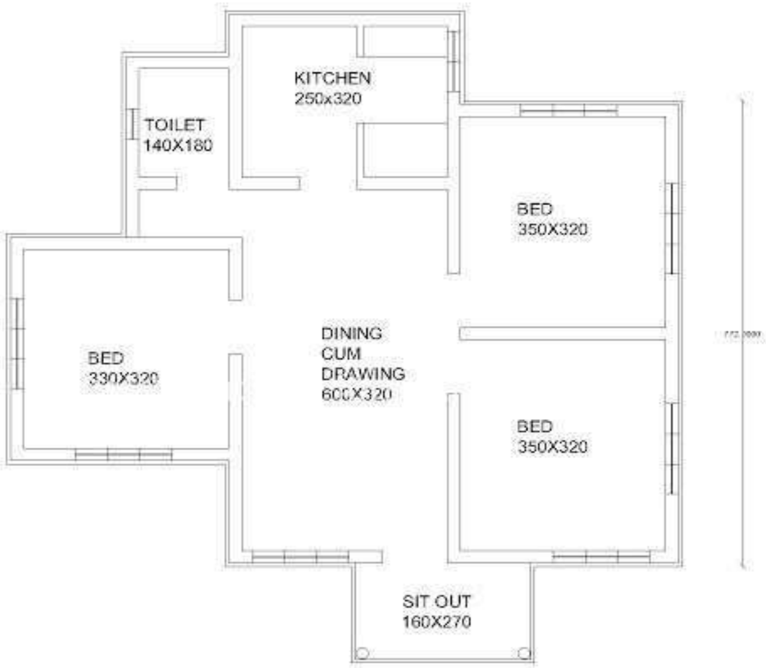
1) Rainwater and ground water filter
2) Gray water filter
3) Rain water and ground water disinfection tank
4) Gray water disinfection tank
5) Gray water clarifier
6) Control system

Thissystempromotestheuseofwaterfrombuildingasawasteproductsoastoreducetheconsumptionofwater in a proper manner so that environmental impacts can be controlled to certain extent.

PROBLEM

It is proposed to construct a building having area of 875sq.ft.but at the time of excavation water came across the work. Presently it is the task to manage the water from existing site so as to prevent entry of water during excavation and after the construction as well





METHODOLOGY

Steps involved-

1) Inspection of site
2) Finding all the sources of entry for water
3) Excavation for footing & observing the problem
4) Constructing coffer dam & excavation work simultaneously
5) Filling the extra depth excavated by stones
6) Sprinkling water and allowing for percolation
7) Constructing a cut off wall along the perimeter of proposed structure at foundation level to1.5times the depth of footing
8) Cut off walls will convey the water according to the diversion given through the walls
9) The flow will be continued……

CONCLUSION

1) Constructing cut off wall with facing side having perforations will allow the water to flow through the channel constructed
2) Cofferdam will hold the water at certain depth & further water flow will not be disturbed.
3) Water can be stored by connecting a tank to channel for future water storage plans
4) Atpriorstatetheconstructionseemstobeverycostly,butatafuturedateitwillbebeneficial

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