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Detailed Study on Subsurface Soil Water Drainage System

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***Abstract*:-** Subsrface soil water drainage system(S.S.W.D.) is a soil water drainage system which is required to reduce the uplift pressure to become zero.A subsurface drain is a perforated drain conduit, such as 'Geotextile,Metals and Perforated Pipe' is use to installed the system below the ground surface to intercept,collect and convey drainage water. Subsurface drain are designed to remove excesse water from soil. Currently is study o this technique in Kanakia Sevens site on Saugbaug,Andheri.On particular site we designed a system for water table 18meter below the ground level.

Key words: *Subsoil, Drainage, Water table, Subsoil water content.*

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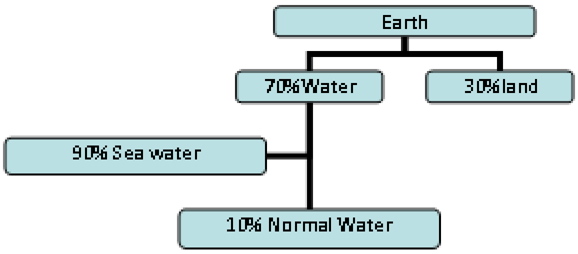
I. INTRODUCTION

Subsoil is the layer of soil under the topsoil on the surface of the ground. Like topsoil it is made out of a variable blend of little particles, for example, sand, residue and/or dirt, yet it does not have the natural matter and humus substance of topsoil. Underneath the subsoil is the substratum, which can be leftover bedrock, dregs, or aeolian stores. As it is inadequate in dim humus, subsoil is generally paler in shading than the overlying topsoil. It might contain the more profound bases of some plants, for example, trees, yet a lion's share of plant roots exist in the surface topsoil.[1]On the earth surface there is 70%of water and 30%of soil is available. Out of 70%of water 90%is ocean water which is salted and staying 10%is ordinary water. In that 10% of water 5%of water is on earth ans 5% is underneath the earth.



Subsurface drain are effective,although expensive,means of controlling stromwater or reduce the uplift pressure.In addition,the ground water table may be depleted due to the installation of subsurface drain.Subsurface drain provides internal damage behind bulkhead,seawalls,retaining walls and other slope/shoreline stabilization structure.they also provide drainage for dry strom water management structure and infiltration.[2]

Speed is an administering variable in this system. The least speed that ought to be utilized as a part of all surface channel is 0.2 feet for each sec. Lower speed will permit sedimentation to gather in the drain. Maximum reasonable speeds are recorded in Table-1., in view of soil composition. Size of subsurface channel ought to be intended to convey the required limit without weight flow.it is critical to consider changes in upland land uses, particularly in urbanized area. Changes in area uses could bring about expanded flows, which may fundamentally modify the planned of the drain. The least distance across for a subsurface channel is 4 inches.

Subsurface drain are used when it ie necessary to remove excess water from soil, or to improve infiltration or percolation characteristic of soil in storm water management facilities. Sometime it is also necessary to use subsurface drains because the topography is not suitable to direct water to design location. subsurface drains will also be used when the topography would required a very deep "cut" through a hill or rigde in order to direct stromwater to desirable outlet. Apply in area where it is necessary to intercept groundwater so slopes can be stabilized; where it is necessary to relieve hydrostatic pressure behind retaining wall and other similar structure; to provide a stable base for construction; or where lowering the water table justifies the installation of such a system. [3]

SOIL TEXTURE	MAX.ALLOWABLE VELOCITY.(FPS)
Sand & sandy loam.	2.5
Silt loam.	3
Sandy clay loam.	3.5
Clay loam.	4
Stiff clay.	5
Graded silt to cobbles.	5.5
Shale and coarse gravel.	6

The target in the configuration of the subsurface seepage framework is to control dampness content variance in the subsurface inside the breaking points accepted in outline. In the territories with a background marked by saltiness problems,surface waste might be endorsed to keep the groundwater table lower in the strata to maintain a strategic distance from dynamic decay of the soundness of subsoil and upper surface because of saltiness levels expanded by rising or fluctuating groundwater tables. Subsoil channel are planned for the waste of ground water or leakage from the subsoil in cutting and filling ares.

Lessen the water content in soil, Increase soil quality, Structural Importance e.g. Soundness, Strenght, etc.Reduce

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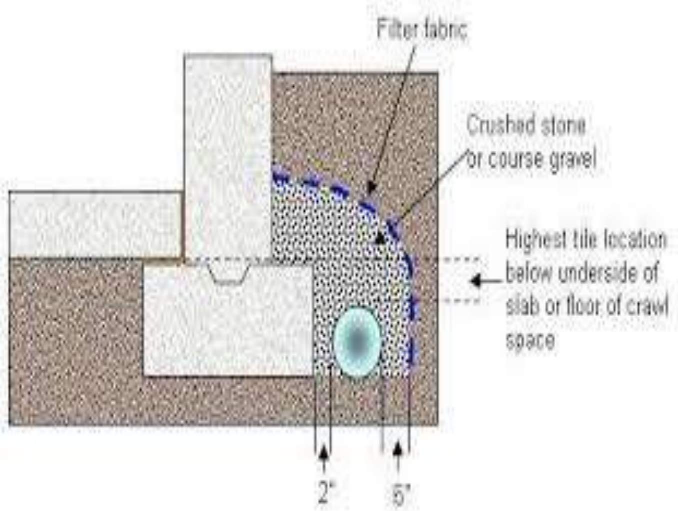
the versatility of soil. Utilized the water which is available subsoil, Reduce the Uplift Pressure, Decreases the Raft size, Reduce the general cost work, The fundamental important is diminish the 'inspire water weight' to end up zero,Collection the subsoil water which utilized for different working reason development site, This strategy is lessen the water prerequisite at site, Cost control by bringing about less thickness of flatboat chunk, this procedure spare the season of fruition of work in different way, for example, E.g..

Water necessity, pontoon throwing Etc.This framework is extremely powerful in regions were water sources are accessible, for example, ocean, stream, nallas, etc.[4]

II. METHODOLOGY

This framework is relying upon different variables, for example, temperature, water table, speed, and so forth. In this framework material, for example, PVC folded punctured channel of size 110mm distance across alongside adornments, for example, coupler, twists, end top, Y/T twist, metals(stones) of size 20mm is utilized as a channel media for isolating the dirt n water in subsoil and for covering,drainage and filtration layers are utilized as a part of common applications to expel dampness or fine particles from the framework. Geosynthetics give a broadly acknowledged, viable and financial other option to conventional total and sand filtration layers "polypropylene" Geosynthetics are utilized.

STEP 1-Trench to be excavate as per the drg. From the starting point of depth 300 mm and width 500 mm.
STEP 2- 2-75 mm thick CA-2 layer to be spread and leveled as per required slope.
STEP 3-Geotextile cloth is to be spread and leveled on the geo fabric cloth.
STEP 4-Perforated pipe of 110 mm dia. is to laid in the trench with the slope of 1:250.
STEP 6-Layer of CA-2 is to be laid such that the perforated pipe should be embedding properly.
STEP 7-Geofabric cloth to be cover properly with proper overlap.
STEP 8-Final layer of metal 2 of thickness 100 mm to be laid above geofabric cloth.
STEP 9-Black plastic to be spread on the CA layer ensureing 150 mm overlap on casted vertical PCC of footing.
STEP 10-PCC for Raft to be carried out.



According to this methodology subsurface drain system is prepared.[7]

Planning Considerations:
1. Conduct a site inspection to ensure that the site is suited for the proposed use(s). All potential impacts should be assessed prior to the onset of construction, with particular attention given to the potential impact of altering the water table. Where possible, do not install drain lines within 50 feet of trees to avoid tree roots that may clog the line. Use solid pipe with water-tight connections where tree roots cannot be avoided. 2. Evaluate soils to determine the appropriate method of installation. Certain soils necessitate using an envelope of granular drain material to maximize effectiveness.

2. Determine the appropriate type of subsurface drain needed. There are three types of drains:

A. Relief drains :These are used to lower the water table in large, relatively flat areas that frequently become too wet to support desirable vegetation. Although surface water may also be carried through relief drains, it is generally better to install a separate drain for this purpose. Relief drains may be installed in one of three patterns, as shown in Exhibit 1. Relief drains drain in the same direction as the slope.

B. Under drains: These are type of relief drain used to improve infiltration characteristics in storm water management facilities when permeability is restricted to soil texture or high water table conditions, or to specifically filter a portion of storm water runoff contained in detention facilities prior to discharge.

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C. Interceptor drains. These are used to remove excess groundwater from a slope, stabilize slopes, and lower the water table immediately below a slope. They also may be used to stabilize shallow foundations such as paved channels or construction Access Roads. They usually consist of a single pipe or a series of single pipes buried perpendicular to the slope on the upstream side of wet areas. Design Considerations: Subsurface drains should be designed by registered professional engineers. All materials (i.e. perforated corrugated pipe, geotextile, corrugated metal) used in the construction of subsurface drains should be strong and durable enough to meet the requirements of the site.[5]

Capacity:

A. Relief drains: must be designed to remove at least 1 inch of groundwater per hour over the area served, or 0.042 ft3/sec/acres. However, when the relief drain empties into an existing storm water system, local design standards must also be met. The design capacity must be increased accordingly to accommodate any surface water which enters the system directly.

B. Under drains: The capacity of under drains should be determined in conjunction with the corresponding storm water treatment system to achieve treatment of a minimum 0.5 inches of runoff over the entire drainage area, and insure proper operations of the facility.

C. Interceptor drains: should be designed to remove a minimum of 1.5 cfs/1000 ft. of length. As land slope increases, capacity should be increased according to the following table:

LAND SLOPE	CAPACITY
2-5%	1.65cfs/1000ft.
6-12%	1.80cfs/1000ft.
>12%	1.95cfs/1000ft.

As with relief drains, additional capacity must be included in the drain if surface or flowing spring water enters the drain.[6]

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III.CONCLUSION

This technique is important for our feature because due to this technique installation, increase the strength of soil and also the water which cannot come to use because it's present on subsoil that kind of water is also we can use and reduce the requirement of water using this techniques on various sites and use the water which is in subsoil. Also reduce the various problems which can be face after some age of completion of work.

In this technique few draw bags which can be minimize by using alternate solution of problems.

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