Report on :-

SWELLING OF SOIL AND REACTION ON BUILDING STRUCTURE ACCORDING TO SWELLING AND SELF WEIGHT OF THE BUILDING .

By Engineer : Twana Ali abdulla

INTRODUCTION:

In some place of kurdistan especially in zone oasis or agriculture area have a big problem of cracking in wall and some times in slabs where ever using and executing a very good type of foundation in all direction of using material (concrete +steel) and execution .

after investigation and testing known that have a problem of soil which has a big swelling of soil especially in that area (like raparen zone) ,and some place like this area.

Case Study:

after executing some projects in raparen and bakrajo area near air port sulaimanya project like resident building (1st +2nd +3rd) floor building ,after one or two season(year) we can see small crackin different size and shape in wall of building and slabs .

after testing the soil with hammer drill soil test ,and analyze the soil to classification of soil composition granular material composition saw that the soil main component consist of (CaCo3),which is the main factor for having the soil a big amount of swelling of soil especially during the season of been natural water level raised .

definition swelling :-

are soils or soft bedrock that increase in volume as they wet and shrink as they dry out , they are also commonly known as bentonite ,expansion or montmorillinitic soils.

composition of natural ground zone raparen :-

This area is characterized by having a high amount of granular size of (CaCo3) and such as claysilty ,sand stone and siltystone. which is big factor for causing swelling having a big amount of granular (CaCo3) especially when raised water level have changing volume of soil increasing volume of soil and this changing effect on this structure which executed in this changed area .

explanation of soil swelling:-

The great gravitational force and high rate of precipitations activity also are the main factors that continuously and strongly eroded these units and making them a source area of sediments.

Affects of Swelling OF soil on building structure:

After executing of more than ten building with different level and with different weight after completing of the building and saw having cracks in the wall with different size and shape of the cracks after precise studding(comparing) on different building ,it appears depending on :-

1-weight of building .

2-type of building with foundation of building (bearing wall building ,Skelton structure building).

3-treatment of soil before executing building structure.

4-amount of existing caco3 in the soil under the building .

5-water level (season).

now try to explain each point shortly :

1-weight of building:

In that zone which have swelling of soil and executing of building which have heavy weight (second ,third) floor , have less effect than that building with one floor executed .

2-type of building with foundation of building :

this building which executed in Skelton (column ,beam),has less effects than that building which executed in bearing wall building.

3- treatment of soil before executing building structure:

in that zone which have a swelling of soil must be replace the soil under the building at least 1m in depth and put mixed soil type (B) in well compacted layer 25cm each layer until %95 MDD.

4-Amount of existing caco3 in the soil under the building.

under the building according to amount of caco3 until increase amount of caco3 cause swelling increase especially during the increasing natural water table .

5-water level :-

during changing weather may cause changing soil volume and having swelling of soil according to amount of volume water and level water table change, according changing season .

Treatment of swelling soil :

after having a swelling of soil in some part of oure building area ,before we are starting to built a building must be treatment of soil after that starting to work.

treatment of soil changing according to ratio of swelling(low ,medium , high) ratio of swelling change ,in each case soil must be treated and after that started to building a house ,for treatment of soil must be removed of swelled soil about 1.5m in depth for removing existed soil(swelled soil),and put on the replaced soil sub-base type (B) with layer each layer must not exceed 25 cm in depth and well compacted until (% 95)MDD, After that can build the foundation of the building according to your design of building structure.

Conclusion :-

after execution of many building and having some problem of been cracked on wall of executed building with different type and shape of crack I can decide to explain and divide to this type according to soil swelling :-

1-small crack thickness not more than 1mm in the wall which is this type has less swelling ratio and weight of building more than 2-floor .

2-cracked has length and thickness between (1 to 3) mm ,after comparing most building which have strong swelling ratio of soil and in most of case building executed 1-floor building but has very good foundation executed with strip footing or has a tie -beam without treatment of soil.

3- cracked has a big length extended until foundation and big thickness more than 5mm and more which is that building executed in 1-floor ,big amount of swelling exist ,and soil under the building not treatment.