SLOPE STABILIZATION AND DESIGN OF FOUR STOREYED RESIDENTIAL BUILDING

A

PROJECT REPORT

Submitted in the partial fulfilment for the requirement of the degree

of

BACHELOR OF TECHNOLOGY

IN

CIVIL ENGINEERING

Under the supervision

of

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by

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to

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY

WAKNAGHAT, SOLAN – 173234

HIMACHAL PRADESH, INDIA

June, 2020

STUDENT'S DECLARATION

I hereby declare that the work presented in the project report entitled **"Slope Stabilization and Design of four Storeyed Residential Building"** submitted for partial fulfilment of the requirement for the degree of Bachelor of Technology in Civil Engineering at **Jaypee University of Information Technology, Waknaghat** is an authentic record of our work carried out under the supervision of **Mr. Chandra Pal Gautam**. This work has not been submitted elsewhere for the reward of any other degree/diploma. We are fully responsible for the contents of our project report.

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CERTIFICATE

This is to certify that the work which is being presented in the project report titled **"Slope Stabilization and Design of four Storeyed Residential building"** in partial fulfilment of the requirements for the award of the degree of Bachelor of Technology in Civil Engineering submitted to the Department of Civil Engineering, **Jaypee University of Information Technology, Waknaghat** is an authentic record of work carried out by **Sangay Zangmo (161628) and Ngawang Dorji (161698)** under the supervision of **Mr Chandra Pal Gautam,** Department of Civil Engineering, Jaypee University of Information Technology, Waknaghat.

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ABSTRACT

Landslide occurs in the sloppy regions especially in the rainy seasons affecting the stability of the soil thus in turn affecting the lives of many people residing in and around the vicinity.

This study is conducted in a place called Kumarihatti, nahan road under Solan district in Himachal Pradesh, India and aims to stabilize the soil. The soil profile of place is reddish in colour and after conducting the various tests the optimum moisture content of the soil came to be 12% which is quite low.

This study aims to stabilize the soil by constructing the stepping reinforced cement concrete retaining wall at the slope of vertical height of 19m in total and construct a 4 storey residential building over it which will be safe during the land slide. This retaining wall is checked for stability with respect to overturning and sliding.

Keywords: landslide, slope stability, retaining wall, overturning, sliding, design of building.

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W	water content or moisture content of the soil
G	Specific gravity of soil
OMC	Optimum moisture content
MDD	Maximum dry density
Cc	Centimetre cube (cm^3)
Ht	Height
HI	Height of instrument
Q	Safe bearing capacity
ϒ	Density
Θ	Angle of internal friction/angle of failure plane
Σ	Shear strength
ξ	Strain
Ka	Coefficient of Active earth pressure
Kp	Coefficient of Passive earth pressure
µ	Coefficient of friction
Fy	Tensile stress of steel
h_{min}	Minimum depth of foundation
c/c	Center to center distance

g	Grams
D60	Diameter at 60% finer
D30	Diameter at 30% finer
D10	Diameter at 10% finer
Cu	Coefficient of uniformity
Ct	Coefficient of curvature
IS sieve	Indian standard sieve
Fck	Compressive strength of concrete
Ast	Area of steel

CHAPTER 1

INTRODUCTON

1.1 General

In this chapter we will basically see the types of slope and its failure. It also talks about what is slope stabilization and different techniques used in the stabilization of the slope. From the various methods, using of retaining wall in the slope stabilization is discussed in detail here.

1.2 Slope

Slope can be natural or man-made.

Various kinds of slopes are;

a. Natural slope
b. Cut slope
c. Open excavation
d. Earth dams
e. Embankment over poor soil
f. Side hill fill
g. Water front structure

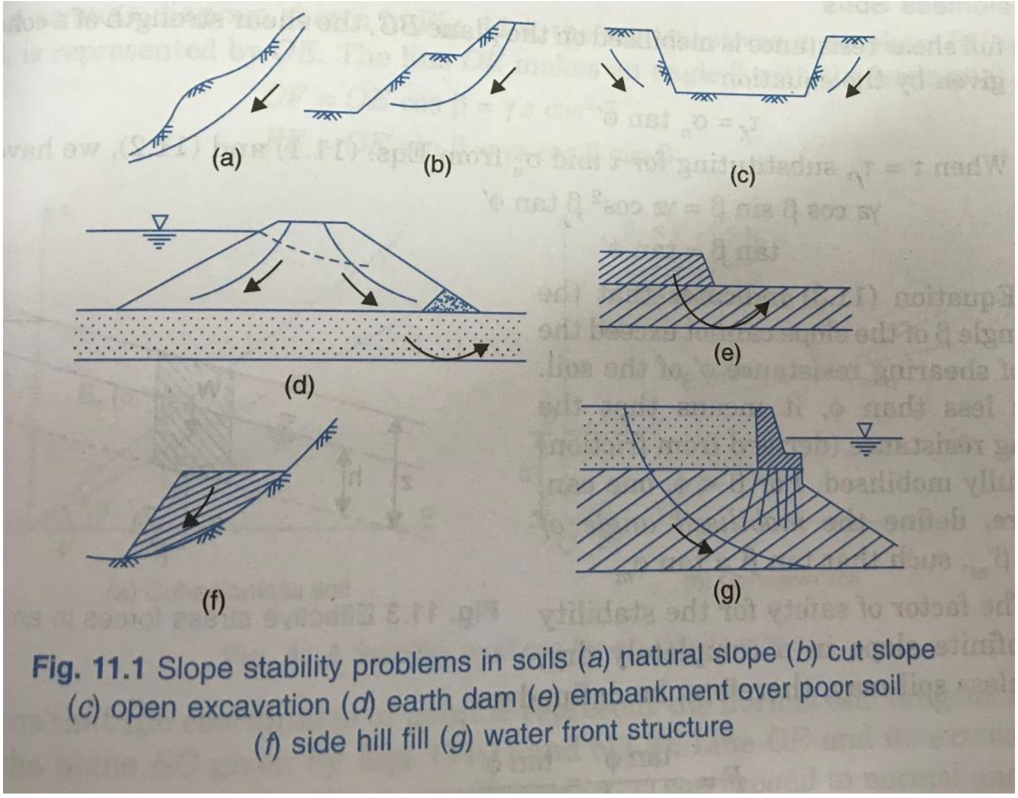


Fig. 11.1 Slope stability problems in soils (*a*) natural slope (*b*) cut slope (*c*) open excavation (*d*) earth dam (*e*) embankment over poor soil (*f*) side hill fill (*g*) water front structure

Fig 1.1: Different types of slopes (Source: Ranjan, G., and Rao,)

1.3 Slope failure

Slope failure or the landslide can be defined as the downward movement of debris or rock from an inclined slope under the effect of action of gravity.

It classified into various categories;

1. On the basis on movement of material
   a) Fall
   b) Topple
   c) Slide
   d) spread
   e) flow

2. On the basis of material
    a) Rock fall
       It is said to be rock fall when the fall mainly comprises of rocks.

    b) Debris fall
       The fall is said to be debris fall when the fall is mainly the soil masses or the debris

3. On the basis of time
    a) Extremely rapid
       The extremely rapid movement is mainly seen when the material type is rock and in the movement type is fall. It is also seen in those where there is dry moisture content

    b) Very rapid
       When the material type is soil having moisture content as moist and which undergoes the topple type of movement, it experiences very rapid rate of movement

    c) Rapid
       The rapid rate movement is experienced by the slide type of movement and the type of material is earth. The moisture content is wet.

    d) Moderate
       The flow type undergoes the moderate rate movement. Here the moisture content is very wet and the kind of material is debris.

    e) Slow
       The slow rate of movement is usually seen in flow type of movement.

    f) Very slow
    g) Extremely slow

4. On the basis of state

   a) Active state

      Active landslides are those which have advancing distribution and complex style.

   b) Reactive state

   c) The landslide is in reactive state when it has retrogressive distribution and composite style.

   d) Suspended

      It is said to be in suspended state when it has widening distribution and multiple style.

   e) Inactive

      Inactive landslides are those with enlarging distribution and with single style.

a) Fall

   Falls are the abrupt movement of debris or rock from a steep slope and it starts with a single detachment of rock or earth or both.

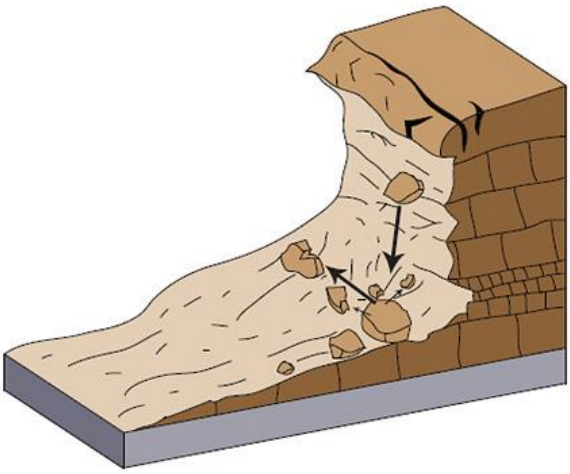


Fig1.2: Schematic of rock fall (Source: Anon [1])

b) Topple

Topple is the forward rotation of mass of earth or rock from its slope around a point or under the centre of gravity of mass of displaced mass.

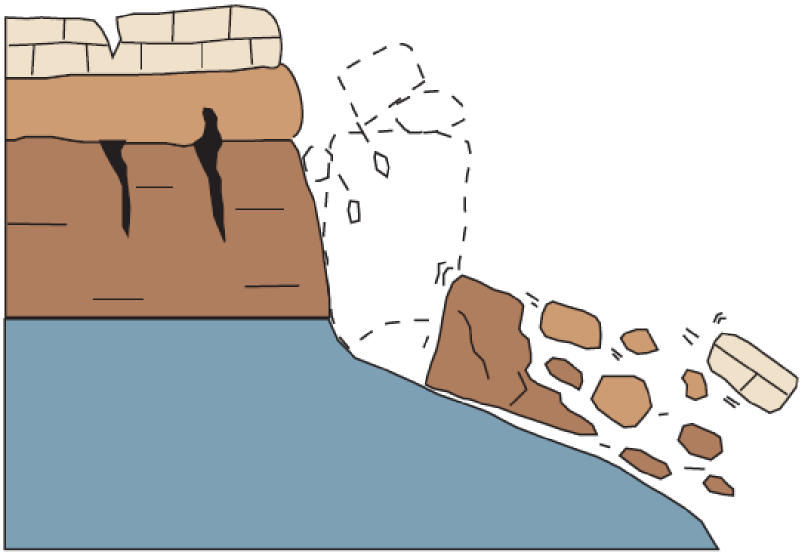


Fig1.3: Schematic of Topple (Source: Anon [1])

c) Slide

Slide is the downward movement of debris or rock and it occurs on the surface of rupture itself and it occurs in a curved manner like a spoon shape.

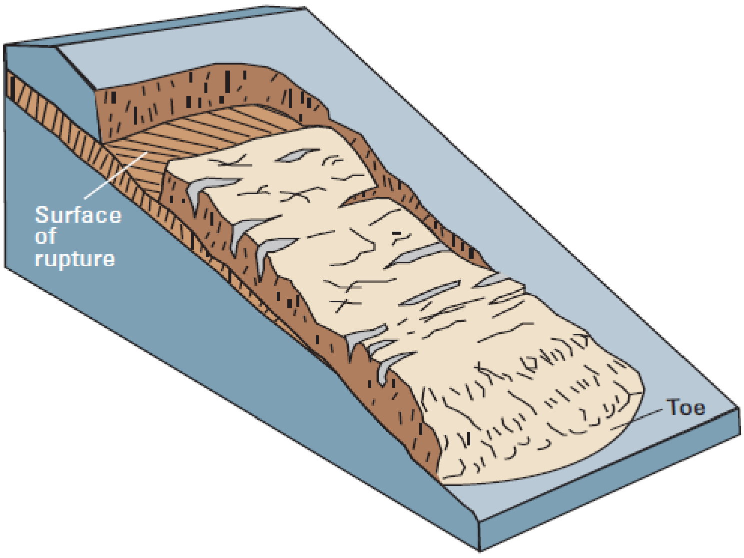


Fig1.4: Schematic of slide (Source: Anon [1])

d) Spread

This failure spread occurs due to liquefaction of soft material lying underneath and it generally on the gentle slopes. It happens when the above material is cohesive and undergoes extension.

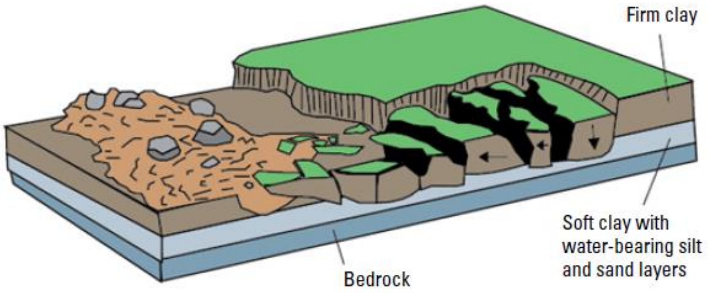


Fig1.5: Schematic of Spread type (Source: Anon [1])

e) Flow

It is the rapid downward movement of loose material like soil and rock with water in a slurry form and it is sometimes called as mudslide

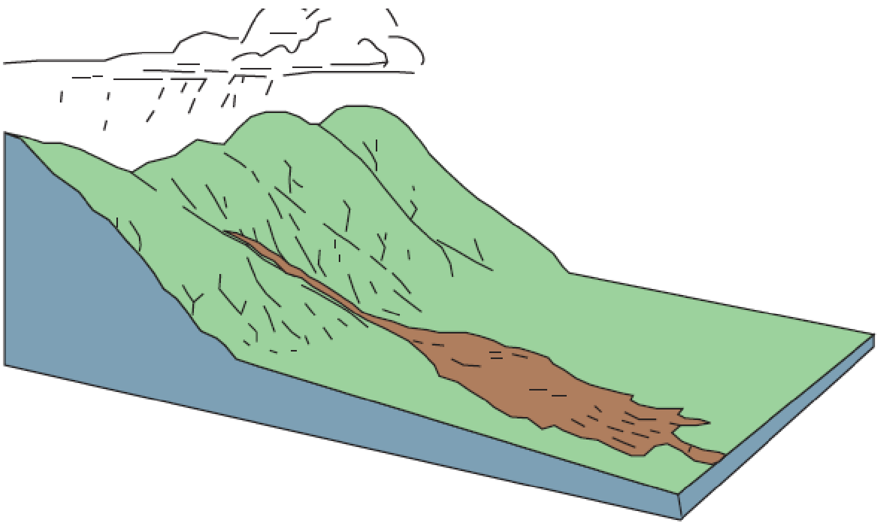


Fig1.6: Schematic of Flow type landslide (Source: Anon [1])

1.4 Causes of slope failure or landslide

There are various causes of landslide namely

1. Geological causes
    - ✓ Difference in the permeability
    - ✓ Contrast or the difference in stiffness
    - ✓ Sensitive materials
    - ✓ Weak materials
    - ✓ Weathered material

2. Morphological causes
    - ✓ Deforestation (removal of vegetation like trees by drought or forest fires)
    - ✓ Volcanic uplift or due to plate tectonic
    - ✓ Due to the erosion of toe of slope by wave
    - ✓ Due to the erosion of slope toe by glaciers

3. Physical causes
    - ✓ Heavy rainfall
    - ✓ Melting of snow rapidly
    - ✓ Rapid drawdown of tides and floods
    - ✓ Due to earthquake
    - ✓ Volcanic eruption
    - ✓ Freezing and thawing

4. Human causes
    - ✓ Due to mining
    - ✓ Deforestation
    - ✓ Excavation
    - ✓ Drawdown of reservoirs
    - ✓ Irrigation

1.5 Stabilization of slope

Every year landslides cause heavy damage in all parts of earth globally causing fatalities and death of many. Therefore, with the concept of technical mitigation, stabilization of the sloppy region is essential where the building is to be constructed.

Fig1.7: Study site in Kumarihatti

Slope Stabilization

Slope stabilization is a system of permanent design technique whether it is to be used alone or in combination with another to minimize the downward movement soil or rock from the disturbed surfaces.

1.6 Different techniques used for the stabilization of slope are;

I. By constructing drainage system

Providing the drainage system to stabilize the slope has efficiency in terms of designing and cost of construction.

Drainage of both the surface and groundwater is one of the most popularly used and usually the most successful technique to stabilize the slope. Drainage not only reduces the weight of the mass which tend to cause the landslide but also increase the material strength in the slope

Drainage can be provided in various forms i.e.

a) Surface drainage
b) Sub surface drainage
c) Drainage Tunnels, Adits or Galleries
d) Sub horizontal Drains

II. Geotextiles and Geocomposites

The usage of geotextile is often more cheaper and effective in situations where there is the requirement of graded granular filter. Same as the graded granular filters, the geotextile filters also need to be designed to retain the soil, should have characteristics of long term filtration and the system permeability.

Geocomposites are the products which compose of geotextile filter for protection of drains and to keep them free flowing throughout its entire life span or service life.

It can be installed in slope trenches, particularly in the places or areas which are difficult to access, in the places where interception of seepage is required and also it can be installed behind the retaining structures.

III. Structural Retention system

The technique which uses the structural system or structural members to retain the earth is structural retention system.

There are various kinds of structural which can be used to retain the soil or earth safely.

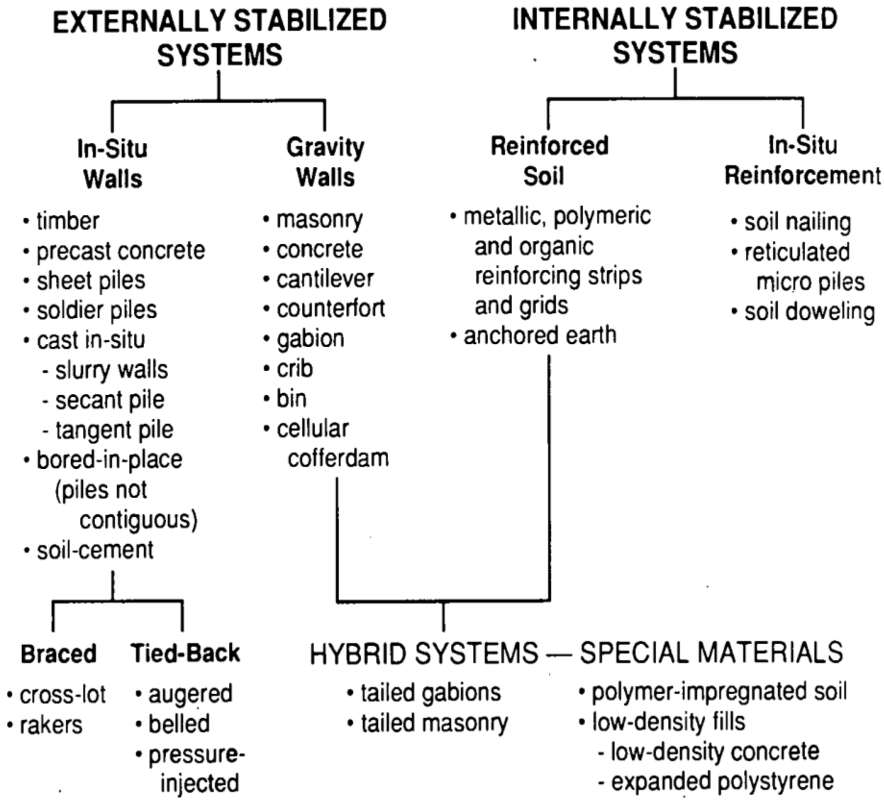


Fig1.8: Classification scheme for earth retention system.(Source: Robert D Holtz and R L Schuster [9])

1.7 Retaining wall as retaining structure

The technique of slope stabilization used and explained in this paper is by the usage of cantilever retaining wall

Retaining structures are any kind of structures that is used to retain back or hold back mass of soil are known as the retaining structures.

Some of the retaining structures are

a. Retaining wall
b. Abutment of bridge
c. Anchored sheet piles
d. Bracings in cuts
e. Twin retaining walls for a cut

Retaining wall

The walls which are used to hold back a mass of soil are known as the retaining wall and it can be further divided into different types;

- Gravity type
- Cantilever type
- Counterfort type
- Piling type or piling wall
- Anchored walls

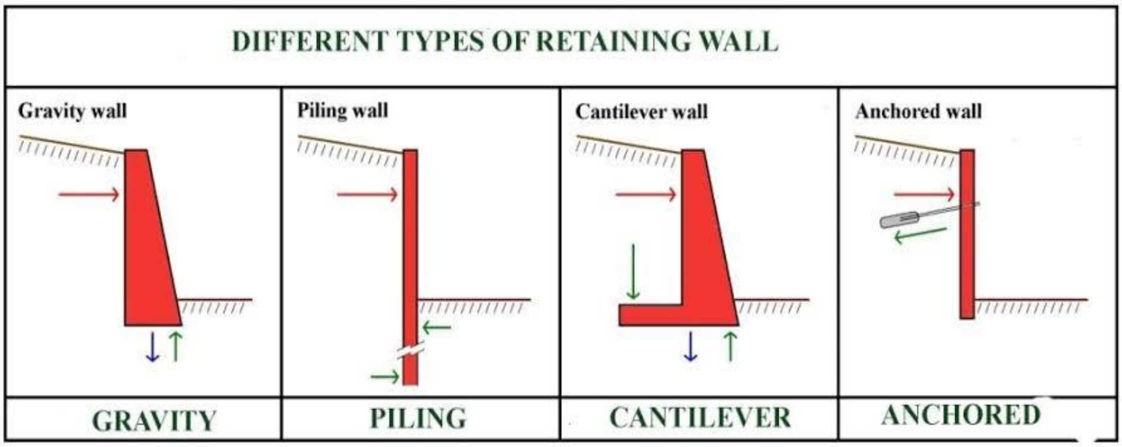


Fig1.9: Types of landslide

CHAPTER 2

LITERATURE REVIEW

2.1 Genreal:

This chapter talks about the reviews in regards to literature which were researched by great scholars in the field of landslide, slope stability, retaining wall and designing of buildings.

1. Lynn M Highland and Peter Bobrowsky (2008). [1] Landslide is the movement of soil and rock materials in downward direction under the effect of gravitational force. The landslide can be classified based on the materials involved and movement involved in it. The materials involved in landslide are soil and rock or both, so landslide can be classified as i) fall ii) topple iii) slide iv) spread v) flow v) Lahars(Volcanic debris flow) and etc.

Landslide can occur at any place, weather it may be land or under water. It can occur in bedrock or soils, cultivated or barren land but it is most of the landslide occur at hilly terrain area. Landslide due to its causes is classified in to natural and human activities. Water, seismic activity and volcanic activity are the example of natural causes of landslide whereas deforestation, irrigation, Lawn watering and leakage of pipe are example of human activities causes of landslide.

Its impossible to stop the landslide but it can be prevented so there measures can be taken toprevent the landslide such as building of strong retaining wall, reducing loads at top of the sloping area, proper drainage system, vegetation and etc.

2.Markus Holub and Jurgen Suda (2011).[2] Mountain regions and the hilly region are venerable to natural disaster such as landslide, earth quake, flood and etc. which cause huge loss to human life. Buildings on mountain regions should be well design with the proper possible loads and use high quality materials to resist the impact of torrent and snow avalanches.

Now a days we prefer the economical materials for the construction rather than the quality materials, it leads to be more prone to natural disaster. To decrease the vulnerability of the building it is important to construction design and appropriate interior use.

3. Aditi Singh and D.P Kanungo ShilpanPal (2019).[3] Due to the various natural and human activities about 12% of land areas excluding snow covering area are prone to landslide. Many building in hilly terrain of India are built without proper design or non-engineered buildings which have high chance of failure during landslide. Due to different geological and climatic condition of India, it is difficult to implement the methodologies to reduce the venerability of building expose to the landslide.

Safe structure is the only solution to reduce the risk during natural disaster as it can neither be stop nor be predicted. Expertise study the venerability by selecting the area and venerability of building is determined based on landslide intensity, resistance ability of building, proximity of building from debris flow zone and other characteristic of soil.

4. Jude Prasanna and Gnanatheepan (2017)[4]. Landslide is the downward movement of soil and rock particles with slow to rapid speed so it causes death to people and livestock mostly on mountainous region. So to study of the landslide hazards at slope region, they have selected the affected area and study based on it. In Badulla district in Sri Lanka majority of the house is design by its own and only 9.2% of house are design by expertise or architect. 90.06% of house is constructed without approval from building, so there was no proper drainage system, retaining wall and etc.

As the construction of building on hilly region faces many challenges and natural hazards, construction of building should be done with support of professional engineers and well design of buildings like proper drainage system and need of incorporating disaster resilience in planning, design and construction.

5. Fulvio Parisa and Giuseppe Sabella(2016). [5] Flow type of landslide occurs due to the rainfall which causes huge losses. So the fragility analysis was carried out by assuming flow velocity as intensity measures and different mechanical models for beams, column and masonry infill walls. If the infill wall has presence of masonry, it has greater impact on flow type landslide fragility of RC frames. For the gravity load designed buildings velocities of in filled frames and ultimate rotation in columns were 3.63 and 2.96 times the bare frames.

6. David M.Cruden and David J.Vernes(2000). [6] Landslide can be classified based on its materials and type of movement. Based on that Vernes have classified the materials in to rock, Debris and earth, and movement has been classified in to slides, flow, topples, spreads and fall. Landslide is called advancing if the surface of rapture is extending in the direction of movement. Landslide is called retrogressive if the surface is extending on one or both lateral margin. Landslide is called widening if surface is continuously enlarging and increasing the volume of displacement materials.

7. Richard M.Iversion(2000). [7] As landslide is mainly caused due to the rainfall which leads to the physical process which operate on desperate time scale. To evaluate the effect of rainfall infiltration is derived from the relationship between the scale guide develop from Richard equation, depth, timing and acceleration in diverse situation. With different intrinsic timescale it involves transient process of landslide response to rainfall. So landslide in response to rainfall involves physical process that operates on desperate time scale.

8. S.Hassiotis and M.Gunaratne (2017). [8] Single row of pile is use as methodology to design a slope reinforced. The method is based on theory of plasticity which determines the lateral force acting on piles of critical surface. In the stability analysis, the friction circular method is being used to determine the reaction force.

Plastic theory developed by Ito and Matsui was used to estimate the pressure exerted on the piles. To take the force exerted by piles on slope in account friction circular method for slope stability has been modified. The piles must be placed in the upper middle part of the slope to gain maximum factor of safe. The pile top should be fixed or hanged to minimize the bending moment and shear force on the piles.

9. Robert D. Holtz, et al (2017). [9] For designing the stable slope following data's and criteria should be included: field investigations, stability analysis, laboratory tests, proper construction control. As the most of the details involved in this work cannot be standardized, experience, good engineering judgment, and intuition must be coupled with the best possible data gathering and analytical techniques to achieve a safe and economical solution to solve stabilization.

To minimize the landslide there should have proper drainage system, so when there is improper drainage system the surface water cause erosion on face and leads to the failure of the face surface. So due to that the proper drainage system is considered as important treatment measures for any landslide. To increase the internal resistance which causes the more stability of slope, external force is being applied at toe such as retaining wall, counter weight fills and etc. From many methods of the prevention of landslide the vegetation is considered as best method because its more economical and effective to prevent the landslide as it contributes the stability through root reinforcement, rainfall interception and evaporation.

10. Y.M Cheng and C.K.Lau(2014). [10] As our planet is having different landscape and landscape occur regularly. In olden days due to less population, people settle at stable ground. At present the population is increasing rapidly so people have to build house on sloppy or hilly area. So it's very important to stabilize the slope. In this paper the slope is being stabilized by various methods such as finite element method, limit equilibrium method and etc with fundamental assumptions.

For the classical limit equilibrium method, before stabilizing we have to define the slip surface. There are different methods to ensure the critical slip surface. The finite element method which is also called Lagrangian analysis is used to analysis and evaluates the stability directly using the strength reduction algorithm.

11. Safa Hussain Abid Awn and Waad Abdulsattar Zakaria(2013).[11] Mostly the retaining wall are required where the place is unstable and gypsum present in soil is in large percentage. In general retaining wall can be classified in to gravity or free standing wall and embedded wall. Retaining wall is mainly built when slope stability limits stand suitable or available space.

12. Dr. Mohamed elaraby(2017).[12] Cantilever retaining wall, gravity retaining wall, Semi-gravity retaining wall, RC wall, counter fort retaining and etc wall are types of retaining wall. There will be lots of failure such as sliding failure, bearing capacity failure, overturning failure, global stability failure and etc. So before designing the retaining wall it's very important to have stability checks such as sliding check and overturning check.

Variation of the retaining walls is water or uplift pressure, drainage layer, stability of rough wall.

External load which is soil load- wall load, passive resistance mobilization and wall keys, wall base inclination, movement and etc.

13. Anurag Upadhyay and et al. (2011)[13] Due to the natural calamities such as earth quakes many retaining walls get damage. Under the seismic condition the behavior of earth retaining structure changes, so it's very important to analysis behavior. For many decades coulombs limit equilibrium analysis is being used for the seismic analysis of retaining wall. In this paper to study the dynamic behavior of retaining wall, numerical method was developed using the finite element methods.

Back fill density, angle of internal friction, structural design of wall, peak ground acceleration, duration of strong motion of earth quake are parameters on which the dynamic earth pressure depends on.

14. Anthony T.C. Goh. [14] Theoretical formation of Rankine and coulomb is used for retaining wall with the assumption that sufficient the lateral yield will occur to mobilize fully active conditions behind the wall. Some condition such as parameter of backfill and foundation subsoil, other complex initial conditions are not taken in to consideration. In this paper the finite element method is used to investigate the behavior of concrete cantilever retaining wall.

For the proper design of retaining wall, we need to take the accurate assessment of the expected deformation of wall and back fill. After doing the finite element method it concludes that for predicting the lateral earth pressure the wall and soil movement should be considered.

15. IR. Erizal, Magr(2018). [15]

Retaining walls are usually built to retain the soil mass. Earth pressure is the pressure exerted by the retaining materials on the retaining wall. Active earth pressure and passive earth pressure are type of pressure exerted on retaining wall. It depends on type of backfill, the height of wall and the soil conditions. For the stability it shouldn't over turn, slide and subside. Maximum pressure at the toe shouldn't exceed the safe bearing capacity of the soil under working conditions.

16. Moammen E. Abd EI Raouf. [16] As per the author retaining wall can be classified based on mechanism of load support, method of construction system rigidity and etc. Forces acting on retaining wall are lateral earth pressure, self-weight of retaining wall, weight of soil above base slab, surcharge and soil reaction below base slab.

To confirmation to check the stability of retaining wall are: i) check for sliding ii) check for returning iii) check for bearing capacity failure and iv) check for base shear failure. The minimum factor of safety for the stability of the wall is:

1) Factor of safety against sliding= 1.5
2) Factor of safety against overturning= 2.0
3) Factor of safety against bearing capacity failure= 3.0

17. Su Yang and et al. [17] Retaining wall is mainly built to prevent the movement of soil mass or used to keep the soil retain in certain shape and prevent from falling. The deformation of wall and the back fill to maintain its service function generates the lateral earth pressure on retaining wall. Mononobe and Okabe method which is also known as MO method is used to obtain the coefficient of active lateral seismic earth pressure.

18. Prachi's and Dr.G.D Awachat(2019). [18] From this paper we know the result of static analysis and design of retaining wall with and without shelves. The retaining wall with pressure relief shelves can be considered as special type of retaining wall. Pressure relief shelves on the retaining wall and other RCC structure is being provided so that it can reduce the earth pressure on the wall. Due to the introducing of the pressure relief shelves we can reduce the thickness of the wall which will be more economical way to construct the retaining wall.

19. Linda Al Altik and et al. [19] To evaluate the magnitude and distribution of seismically induced lateral earth pressure on cantilever retaining wall with dry medium dense sand back fill an experiment and analytical program was designed. After doing the centrifuge experiment and two dimensional non linear finite element analysis it gives a conclusion that maximum dynamic earth pressure increases with depth can be estimated using the triangular distribution. So as a result designing cantilever retaining wall with maximum dynamic earth pressure increment is conservative and doesn't reflect the seismic response of the wall-backfill system.

20. Swati Nagre and et al. (2017) [20] Retaining walls is built at the place of different elevation so that it can bond between two different elevation in terrain areas. It also provides lateral support to vertical slopes of soil. There are many retaining wall classified based on its different aspects so from that stepped cantilever wall is more feasible then the gabion and segment type of retaining wall. Gobion wall are most economical as it can be built for greater height and can be used in project without site restrictions where as segmental wall can be used in transportation project.

2.2 Summary of Literature Review:

According to literature review, the landslides are of different categories with respect to type of material, speed or rate of movement and on the basis of movement of materials. The landslides are both natural and man-made. The natural causes being the earthquake, gravity, rainfall etc. The human cause of landslide is mainly excavation for the constructions thus disturbing the stability of the soil mass.

There are various ways to stabilize the slopes which are prone to landslide. The commonly used methods are construction of retaining wall, nailing, by providing the drainage systems and also by using Geocomposites.

From all the stabilizing techniques, construction of retaining wall is more common, cost effective and easy way to stabilize the slope.

Retaining walls are also subdivided into various categories and different types are used for different heights of slope.

2.3 Need of study:

Every year thousands of people are being killed due to landslide and the collapse of buildings, bridges and roads which leads to questioning the work of very civil engineer. The very home we built end up taking our own lives.

During the recent tragic incident that had happened in Kumarihatti, few people died and several others were injured when a 3 storey building collapsed. The failure occurred because there was no retaining structure and moreover it was one of the heaviest rainy days. It is very important to stabilize the slope before the construction.

2.4 Scope of study:

To know about the soil profile or the bearing capacity of the soil, different types experimental test on the soil should be performed whether in lab or in situ.

The various tests begin with the simplest test of sieving the soil sample to know the type of soil. The test determines whether the soil is pure sand or clay or silt or sandy slit etc. Other tests like moisture content, specific gravity of soil, direct shear test are also conducted on the soil to know the various properties of soil.

The slope angle of the slope in kumarihatti was measured using Total station.

After knowing the vertical height, safe bearing capacity and internal angle of friction, then a retaining wall of height 13m is designed and which will be checked for stability.

After stabilizing the slope, residential building of four storeys is designed.

2.5 Objective of the study:

The main objective of this study is:

- To stabilize the slope by constructing a stepping retaining wall.
- To design of a residential building which will be safe during the heavy rainy days and during the time of landslide.

CHAPTER 3

METHODLOGY

3.1 General

This chapter represents the materials, equipments used in testing and the laboratory methods which had been used in this study. It is also explained how the tests were being performed and what procedures were followed in detail.

3.2 Moisture content determination

Water content or the moisture content in soil is defined as the weight or the mass of water to the weight or mass of the solids in soil. Determination of moisture content is very important especially in fine grain soils. Its helps in understanding the behaviour of soil with the variation of water content in it. With the value of moisture content we can also calculate the slope stability, earth pressure from the backfill to retaining structures and bearing capacity of the soils in the foundation. There are various types of test to determine the water content namely, oven drying method in the lab, infra lamp with the help of torsion moisture meter, pycnometer method.

And the one we used in this study is Oven drying method

Equipment used: 3 non corrodible container, weighing machine of accuracy 0.01g and oven

Procedure followed;

First measured the empty containers and let the weight be = W1

Then filled the containers with soil and measured. Let its weight be =W2

Later put the container in the oven to dry for 24 hours at the temperature of 105 degree to 110 degree and measured the dried soil. Let its weight be =W3

Fig3.1: Moisture content of soil

Formula used;

Moisture content (w) = [(W2-W3)/(W2-W1)]*100% ------------- Equation no.1

Moisture content (w) = [(weight of container and moist soil – weight of container and dry soil) / (weight of moist soil and container – weight of container)] *100%

3.3 Performing of sieve analysis

Sieve analysis is performed on the soil to classify the soil into different categories of soil.

Soils which have the particle size larger than 75 microns are terms as the coarse grain soil and which has the smaller than 75 microns are termed as the fine grain soil. Dry sieve analysis is done for the soils which have the fines are less than 5% and if it is more than 5% and the soil is of more cohesive then wet sieve analysis is performed.

Equipments used; sieve s6izes of 10mm, 4.75mm, 2.36mm, 1.18mm, 600microns, 425, 300, 150, 75, pan, weighing balance and oven

Procedure followed;

First, the soil sample which was collected from the study area is dried in the oven for 24 hours at 105 degree Celsius. Next, after a day the sieve sizes were arranged accordingly as per IS code recommendations having the largest size on top and smallest at the bottom just above the pan. Then the oven dried soil was measured on weighing machine and took exactly 1kg of soil and poured on the top sieve. Later had sieved it for 10 minutes and weighed the retaining soil on sieve. The sum of all the soil passing and retained is compared with the original mass. The sieve evaluation is showed graphically.

Fig3.2: Performing sieve analysis

3.4 Determination of Specific gravity of soil sample (SG)

Specific gravity is defined as the weight or mass of solids in a given volume of dry soil samples to the weight or mass of equivalent volume of water at 4 degree centigrade. The knowledge of specific gravity of soil is necessary in the calculation of porosity, void ratio and degree of saturation etc. It sometimes helps in the identification of soil and also its classification. And also provides the idea whether the soil is suitable for various constructions and as constructing materials. The construction of test should be done at temperature 27 degree Celsius.

Equipments required; weighing machine, pycnometer, distilled water, glass rod, 4.75mm sieve and oven

Procedure followed;

First measured the weight of empty dry pycnometer with the cap tightly closed and let the weight be = W1

Then sieved the sample through 4.75mm sieve, poured the soil at around 200g of soil in the dry pycnometer, closed the cap and took the weight. Let it be = W2

To the above, added water and screw the cap and took the weight. Let it be = W3Lastly emptied the pycnometer, dried it completely, filled the water to the height till which we took for the soil and water and measured its weight. Let its weight be = W4

Fig3.3: Determination of specific gravity using pycnometer

Formula used:

G = {(W2-W1) / (W2-W1)-(W3-W4)} -------- Equation no.2

3.5 Compaction Test

Compaction is a method to densify the soil mass by expulsion of the air void from the soil. The degree to which the soil can be compacted is measured in terms of its dry density.

The degree to which a soil can be compacted depends upon its water content, type of soil and the compaction energy. Compaction test is performed to determine the optimum moisture content (OMC) and its optimum or maximum dry density.

Optimum moisture content is that particular moisture content for which the soil attains its maximum dry density.

Equipments required; proctor test cylinder of 1000cc, ht of 12.7cm and internal diameter of 10cm, rammer of 2.6kg, weighing machine, mixing pan, drying crucibles

Procedure followed;

First weighed the soil to be taken for the test and also weighed the cylinder without the collar.

Then started mixing with 10% water content, increasing each time by 2% till 20% in that same soil mix.

At all the different water content, mixed it thoroughly and tamped 25times in 3 layers, removed the collar, trimmed till the height of cylinder and have taken its weight with the soil filled in it.

Also took the soil sample for the test of moisture content.

Fig3.4: Mixing of soil for the compaction

Fig3.5: Compacted soil in cylinder

3.6: Triaxial Shear test:

Triaxial shear test is performed to determine or to get the parameters of shear strength i.e. the cohesion and the shear resistance angle of a provided sample of soil. Though there are several other laboratory test which can determine the same parameters, yet triaxial test is more preferred over others as confining pressure is to be exerted and shear failure plane is not a predetermined one.

With the help of Mohr's circles cohesion and angle of shear resistance is found.

Equipments required: Triaxial test cell, proving rings, membrane stretches, rubbers, rubber membranes, stop watch, split mould and assembly of lateral pressure.

Procedure followed:

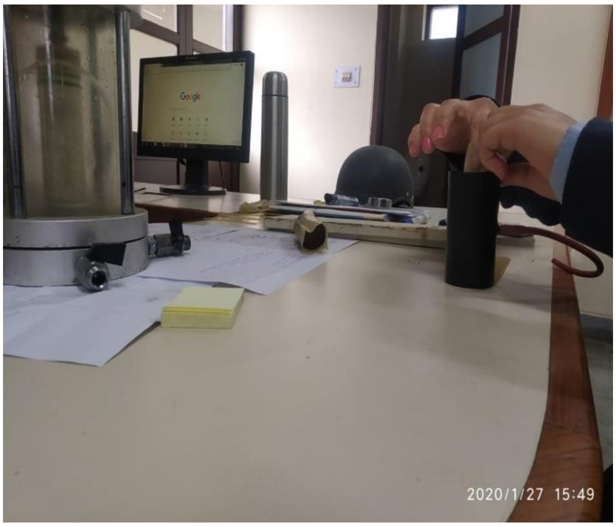
The sample obtained is inserted inside the rubber membrane carefully and sealed with robbers from both ends.

Then the sample is put inside the compression machine and on the top pressure plate is kept. The cell should be set up properly and clamped down uniformly so that pressure leakage is avoided while performing the test.

After the sample is setup properly, water is allowed to flow inside fully and then closed from the top. Air pressure is raised in the reservoir to increase the hydrostatic pressure at the amount needed.

Then the pressure gauge is constantly watched so that pressure is maintained constantly during the test.

Time and the proving ring values are thoroughly noted until the reading gets reversed. The highest reading and the time is noted.



(A) (B)

Fig3.6: Preparation of sample (A) and insertion of sample in the rubber membrane (B)

Fig3.7: Triaxial setup for the test

3.7 Measurement of slope by using Total station

A total station or a total station theodolite is an optical or an electronic device being used in surveying and construction of buildings. It is integrated with electronic data collector, electronic data and a system for storage.

Equipments required for the survey; total station, tripod stand, meter tape, and staff

Procedure followed:

First we went to the site where the building collapsed and set our instrument out. We fixed the total station in tripod stand, read the height of instrument (HI) with the help of meter tape and made it ready to take the reading. One person went down the slope with the levelling staff and we focused the total station according to staff.

We constantly took different reading on different location of the slope and also noted the reading of horizontal and vertical distance from the tripod.

Fig3.8: Total station

Fig3.9: Measurement of the slope using Total station

3.8 Designing of retaining wall

Table 3.1: Designing of retaining wall

Input Data	**Values**	**Units**
Height of retaining wall	13	m
Safe bearing capacity	350	kN/mm^2
Density(Y) (kN/mm^3)	18	kN/mm^2
Coefficent of friction (μ)	0.55	
M20 concrete	20	
Fe 415 steel	415	
angle of internal friction	28	'

sin28	0.47	
Coefficient of active earth pressure (K_a)		
K_a=1-sin Θ/1+sinΘ	0.360544218	
Input Data	**Values**	**Units**
Height of retaining wall	13	m
Safe bearing capacity	350	kN/mm^2
Density(Y) (kN/mm^3)	18	kN/mm^2
Coefficent of friction (μ)	0.55	
M20 concrete	20	
Fe 415 steel	415	
angle of internal friction	28	'
sin28	0.47	
Coefficient of active earth pressure (K_a)		
K_a=1-sin Θ/1+sinΘ	0.360544218	
K_p=1+sin Θ/1-sinΘ	2.773584906	
Minimum depth of foundation		
h_{min}= q/Y [(1-sinΘ)/(1+sinΘ)] ^{2}	2.527624807	m
so will take h_{min} as	2.5	m
Preliminary dimension of the retaining wall		
Base width(b)= It varies from 0.4H to 0.6H		

so taking b as	6.5	m
length of toe slab(mm)= 0.3b to 0.4b		
so taking length of toe slab as	2.275	m
so will take it as	3	m
Thickness of the Base Slab		
It is assumed to be H/10	1.3	m
so will take it as	2	m
Thickness of vertical wall or steam		
It is assumed as H/12	1.083333333	
so take it as	1	m

Table no 3.2: Forces on the retaining wall

Types of force	**Magnitude of force(kN)**	**Position of force from toe end O (m)**	**Bending moment of toe end O (kNm)**
1) Overturing force		H/3	
Pah=0.5(KayH).H	**548.3877551**	4.333333333	2376.346939
2) Restoring force		**∑Mo**	**2376.34**
a)Weight of Backfill	594	5	2970
b) weight of steep 1	99	2.75	272.25
gf	180	1.75	315
d) weight of step 3	189	1.5	283.5
e) Weight of step 4	234	3.25	760.5
∑W	**1296**	**∑Mr**	**4601.25**

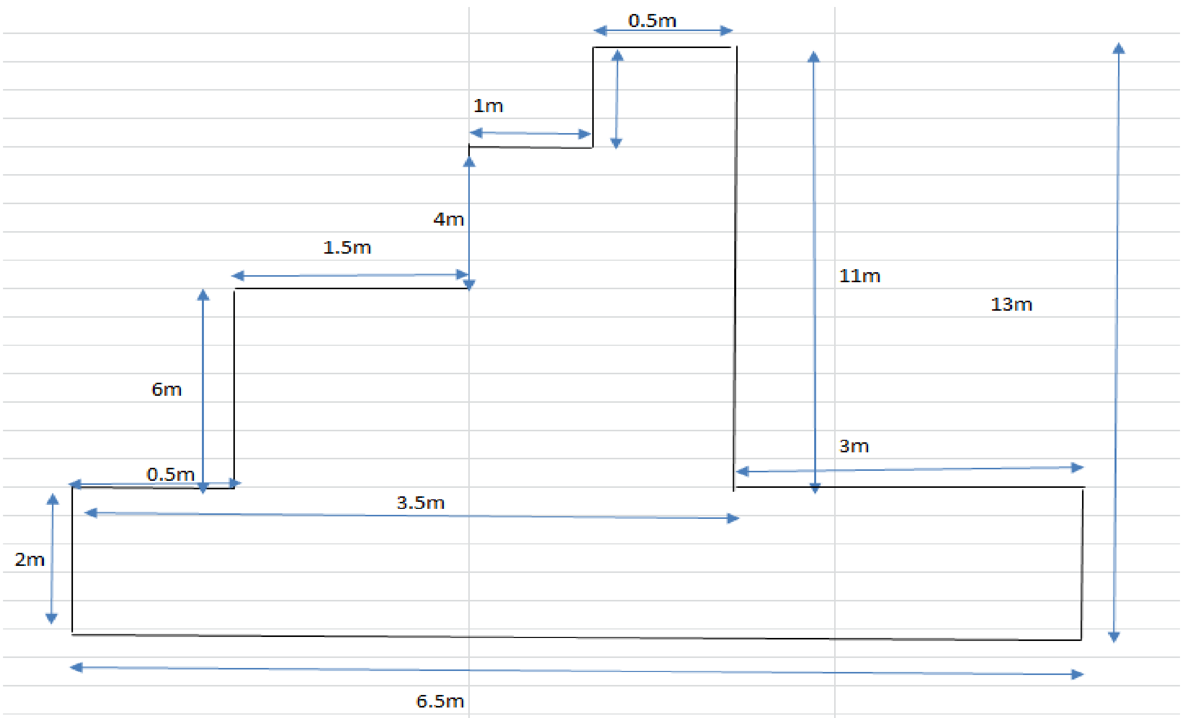


Fig3.10: Dimension of designed retaining wall

3.9: Designing of residential building:

Arrangement of rooms;

- Living room
- Bedroom 1
- Toilet 1
- Living room
- Bedroom 2
- Toilet 2
- Closet
- Kitchen and dining
- Stair case

Living room:

Living room is for the general use and it will be the room as soon as one enters inside from the door. This area is spacious and it provides the entry to both bedrooms opposite to one another. It also provides the access to kitchen. The dimension of the living room is 4 meters * 4 meters

Kitchen:

This area will both serve the purpose of kitchen and dining room and it is quite spacious comparing gto normal kitchen. The area of kitchen and dining will be 4 meters to 4 meters.

Bedrooms:

Both the bedrooms are designed with attached toilet. Both the bedrooms are 4meters * 3 meters.

The second bedroom is also attached with closet where we will find all the clothing, dressing mirror and foot wears.

Toilets:

The dimension of toilet 1 is 2 meters * 2 meters and toilet 2 is 2meters *1.5 meters

Closet:

The area of closet is 2 meters *2 meters and it should fulfil the purpose of dressing room also.

Stairs:

The stairs provide easy access to all the floors in the building. Since the lift is not included in the structure, stairs are made wide so there in can accommodate all the residents of the building.

The dimension of stair case is 4 meters * 2.30 meters.

Designing of floor plan using auto cad:

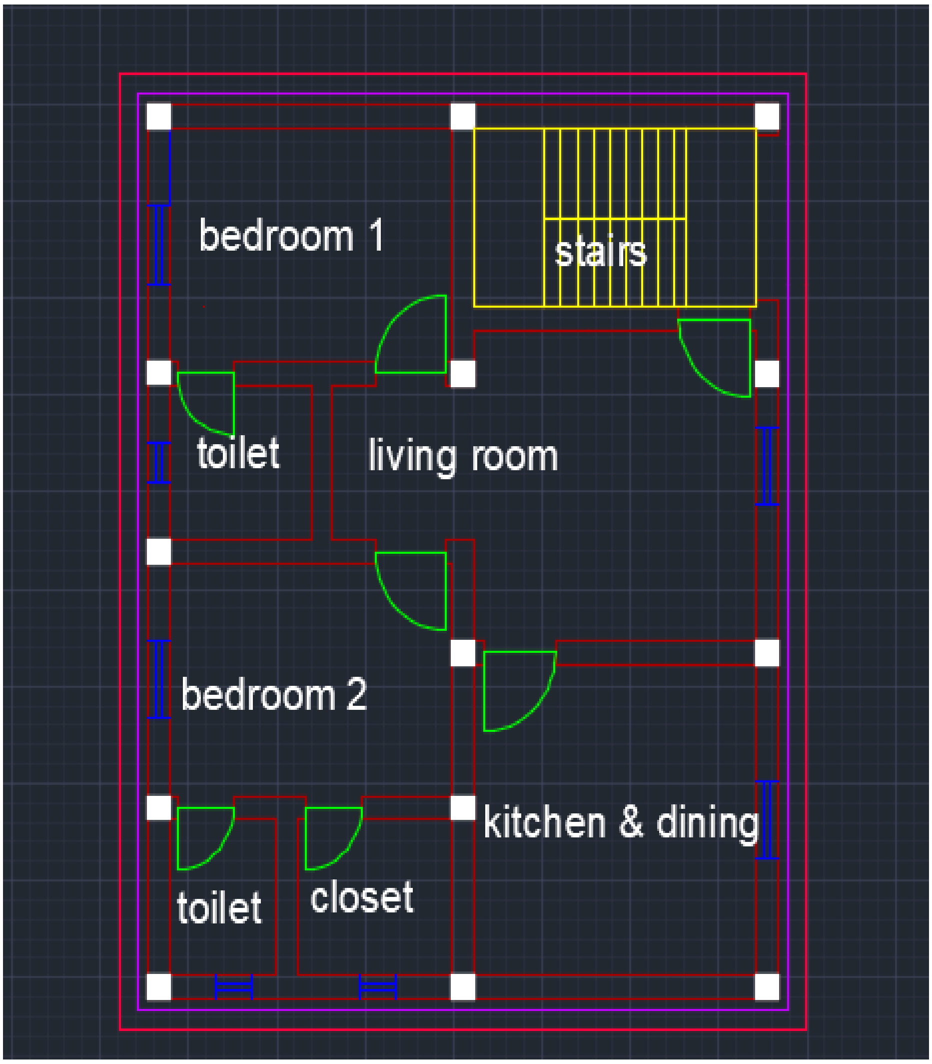


Fig3.11: Floor plan of the building

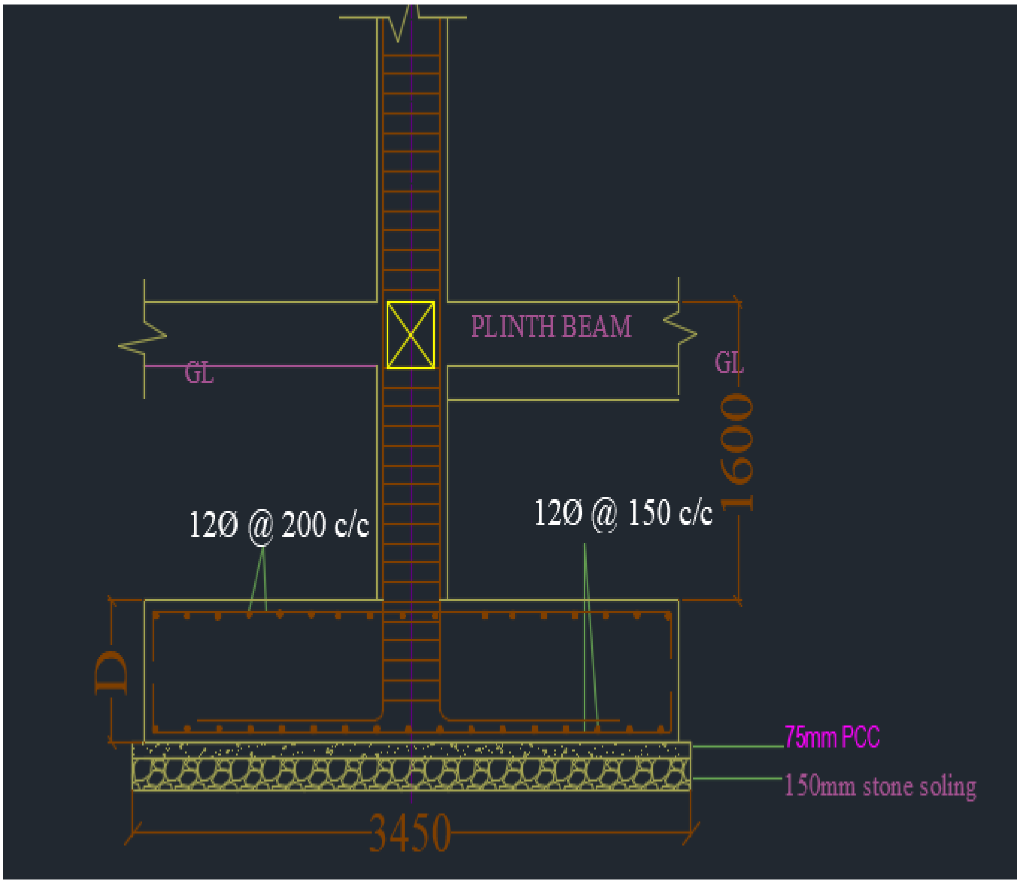
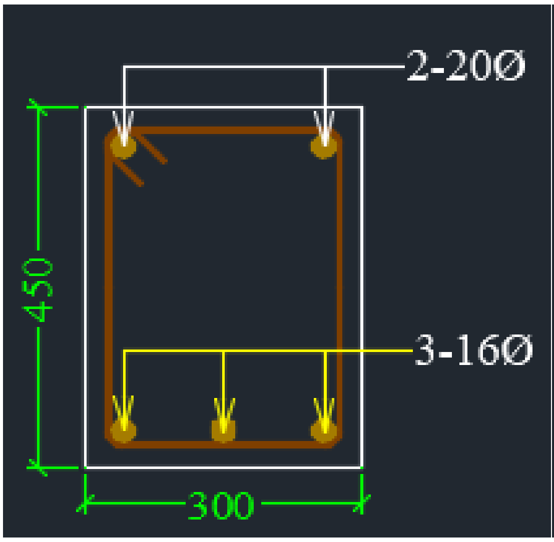


Fig 3.12: Reinforcement detailing in foundation



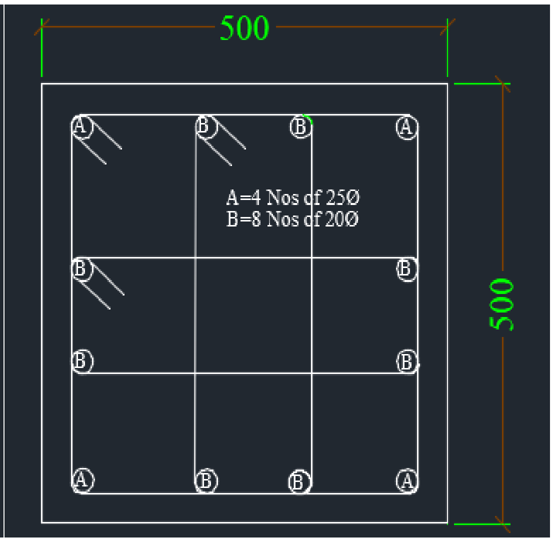


Fig 3.13: Reinforcement detaining in beam **Fig 3.14:** Reinforcement detailing in column

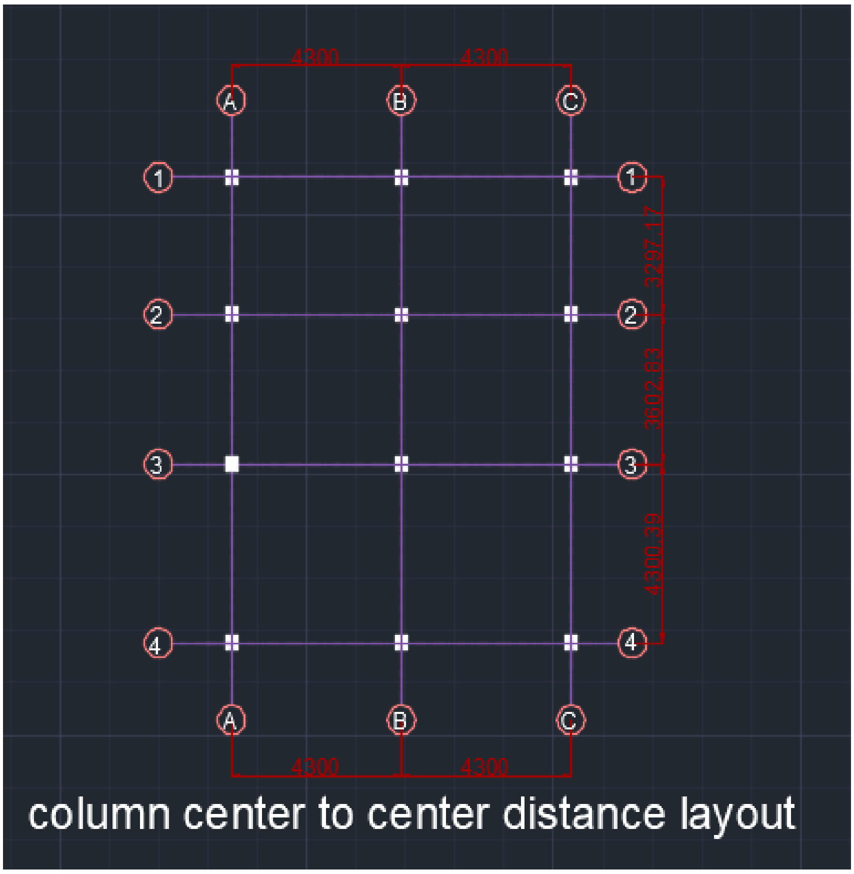


Fig3.15: Column layout

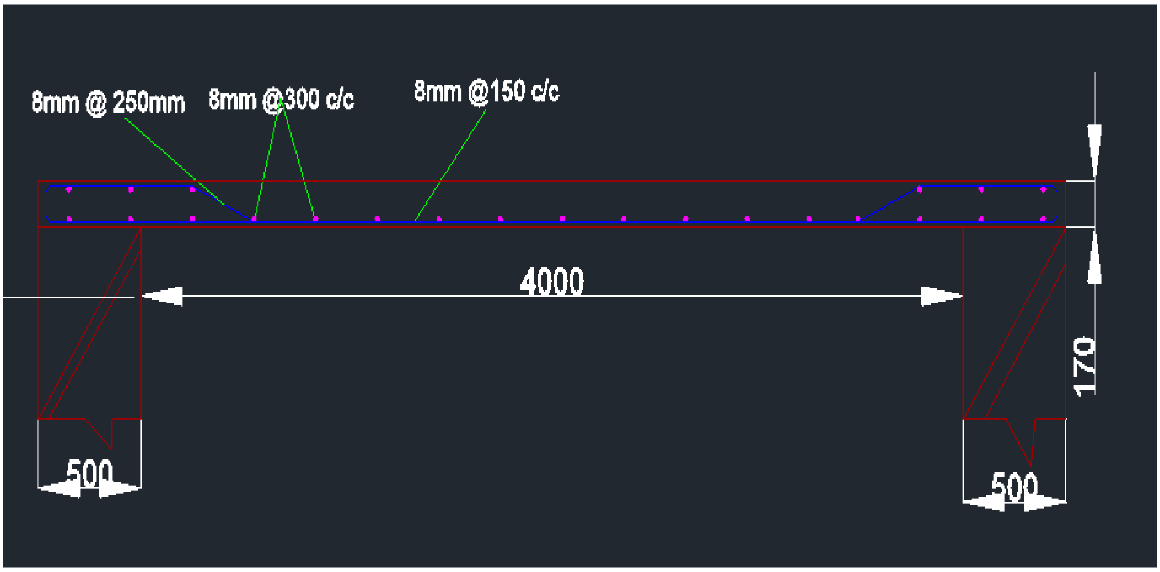


Fig 3.16: Reinforcement detailing in slab

3.10: Modelling of structure using staad pro;

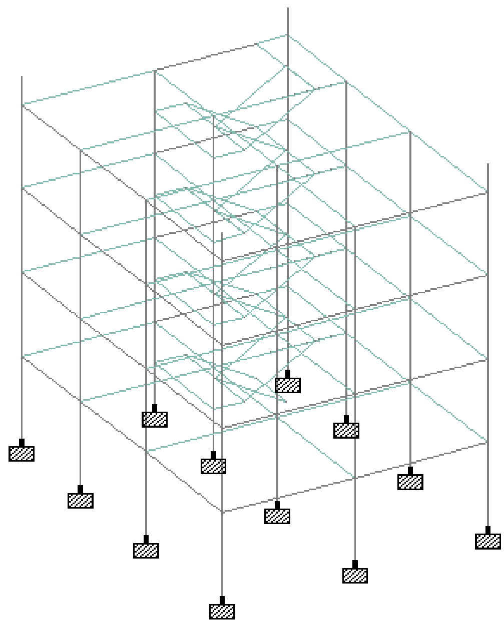


Fig 3.17: Building model in staad pro

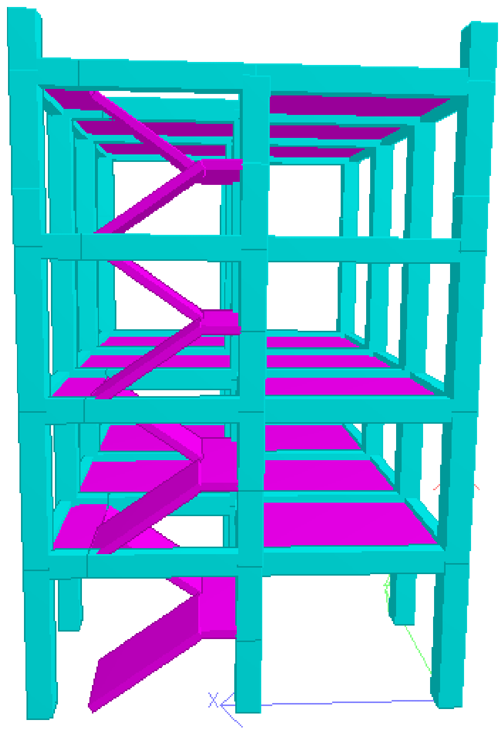
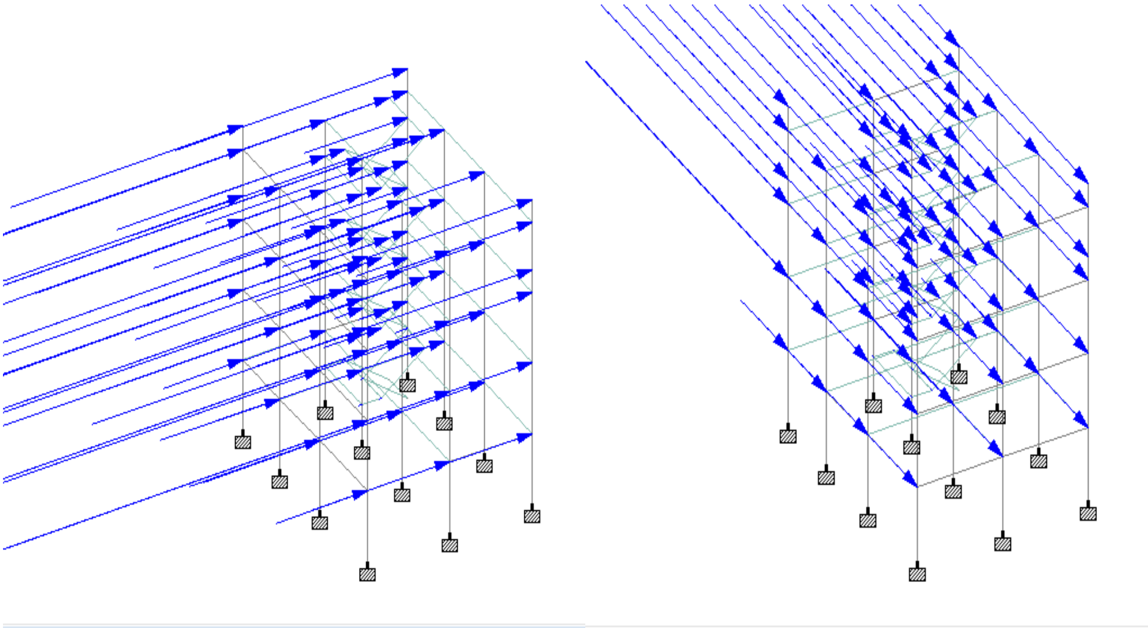


Fig 3.18: Buiding model with assigned properties

3.11: Loadings and details;



(A) (B)

Fig 3.19: Earthquake loading in X (A) and Z directions (B)

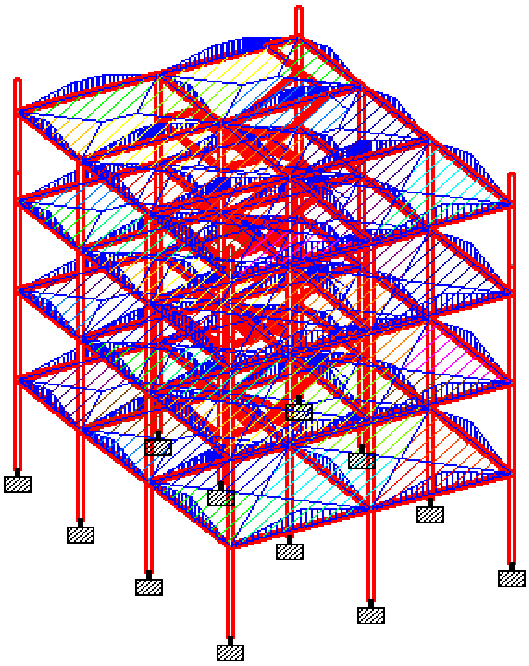


Fig3.20: Application of live load

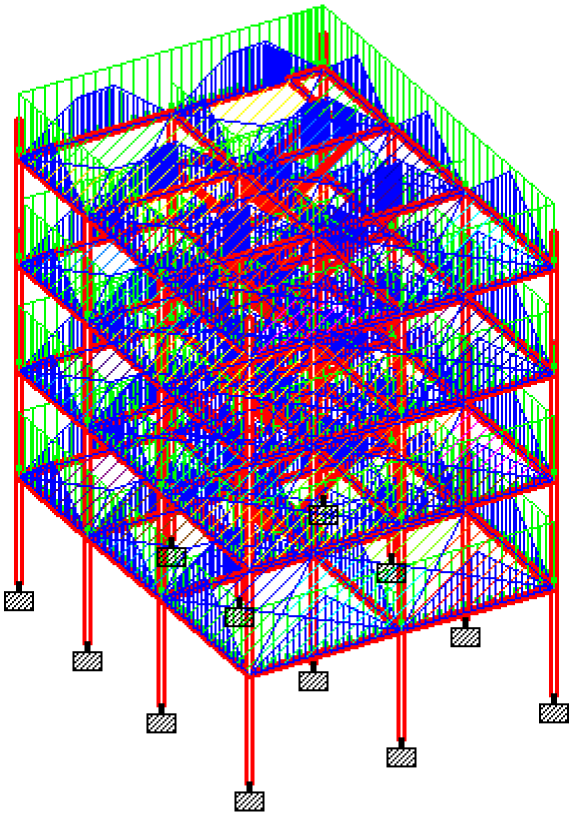


Fig3.21: Application of dead loads on the structure

CHAPTER 4

RESULTS AND DISCUSSION

4.1 General

Results of the tests are purely experimental based on the soil collected from the field study and according to the result we got certain discussion and conclusion are made about the soil parameters

4.2 Determination of moisture content

Table 4.1: Moisture content of the soil samples

S.No	Determination No	Sample 1	Sample 2	Sample 3
1	Container no	PL1	2	3
2	Weight of empty container (W1) g	18.9	19.3	19.4
3	Weight of container + wet soil (W2) g	80.1	78.5	84.6
4	Weight of container + dry soil (W3) g	74.9	73.7	79.2
5	Moisture content (w) %	9.29	8.82	9.03

Average moisture content (w) % = (9.29 + 8.82 + 9.03) /3

=**9.05 %**

After the calculation in the above table, we get the moisture content of the given soil sample is 9.05 %

The mass of water used in the above expression is the mass of free water only. Hence for moisture content determination the soil sample dried to the temperature at which only pore water is evaporated i.e. 105-110 degree Celsius.

4.3 Performing of sieve analysis

Table 4.2: Observation of Sieve Analysis

Sl.No	Is sieve size (mm)	Retained weight on each sieve (g)	Retained Percentage (%)	Retained Cumulative percentage	Percentage finer (%)
1	10	60	6	2.54	97.46
2	4.75	90	9	11.54	88.46
3	2.36	170	17	28.54	71.46
4	1.18	180	18	46.54	53.46
5	0.6	135.9	13.59	60.13	39.87
6	0.425	110	11	71.13	28.87
7	0.3	80	8	79.13	20.87

8	0.15	75	7.5	86.63	13.37
9	0.075	63.8	6.38	93.01	6.99
10	Pan	35	3.5	96.51	3.49
	sum=	999.7			

From the table,

Size of sieve having percentage finer 60% (D_{60}) = 2 mm

Size of sieve having finer percentage or percentage finer 30% (D_{30}) =0.6 mm

Size of sieve having percentage finer 10% (D_{10})= 0.15 mm

Coefficient of uniformity, $Cu = D_{60} / D_{10}$ -----------Equation no.3

$= 2 / 0.15$

$= 13.33$

Coefficient of curvature, $Ct = (D_{30})^2 / (D_{60} * D_{10})$ --------- Equation no.4

$= 0.6^2 / (2 * 0.15)$

$= 1.2$

Since the Cu is greater than 6 and Ct between 1 to 3 it is a well graded soil

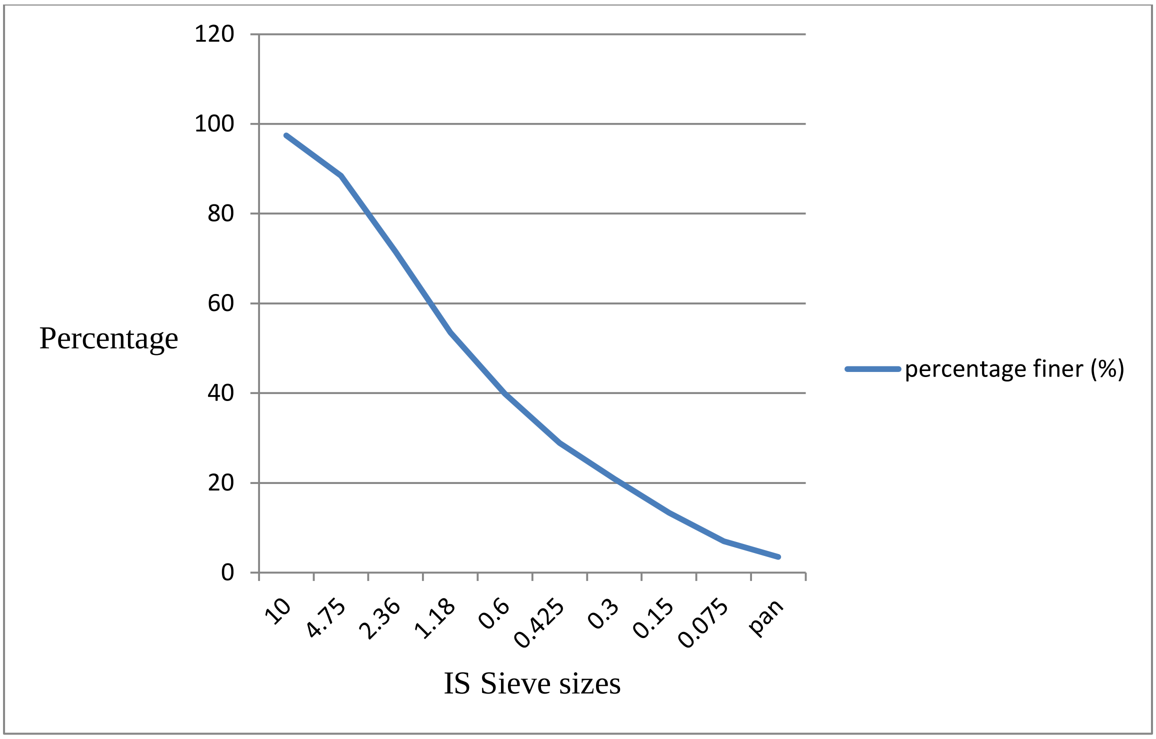


Fig 4.1: Percentage finer Vs moisture content curve

4.4 Determination of specific gravity

Table 4.3: Calculation of specific gravity of soil

S.No	Determination No	Sample details
1	Weight of empty dry pycnometer W1 (g)	583.1
2	Weight of dry pycnometer + dry soil, W2 (g)	762.3
3	Weight of pycnometer + soil +water, W3 (g)	1655.2
4	Weight of pycnometer + water, W3 (g)	1542.4
5	Specific gravity of soil samples (SG)	2.70

Since the specific gravity of soil is coming out to be 2.69 which is equivalent to 2.7, we can conclude that the soil sample is coarse grain soil

4.5 Compaction test

Weight of soil taken = 2560 g

Weight of Cylinder used excluding the collar = 3673 g

Height of cylinder = 12.7 cm

Internal Diameter of the cylinder = 10cm

Radius of cylinder = 5 cm

Volume of cylinder = $\pi r^2 h$

Weight of rammer = 2.6 kg

Number of layers = 3

Number of blows per layer = 25

Table 4.4: Value of dry densities at different moisture content

S.No	Determination No	w = 10%	w= 12%	w=14%	w=16%	w=18%	w= 20 %
1	Weight of cylinder + compacted soil	5821.2	5892.5	5845.3	5768.2	5745.1	5712.4
2	Volume of cylinder =$\pi r^2 h$ (cm3)	997.9	997.9	997.9	997.9	997.9	997.9
3	Weight of compacted soil (g)	2148.2	2219.5	2172.3	2095.2	2072.1	2039.4
4	Bulk Density (g/cc)	2.15	2.22	2.18	2.10	2.08	2.04
5	Container no	Cont= 3	Cont =48	Cont =42	Cont = bt5271	Cont =100	Cont =5
6	weight of empty container W1 (g)	19.6	18.3	19	18.4	20.7	23.4
7	Weight of container + wet soil W2 (g)	70.2	85	69.7	77.2	89.5	130
8	Weight of container + dry soil W3 (g)	65.8	77.8	63.4	69.3	79.2	112.5
9	Moisture content w (%)	0.10	0.13	0.14	0.16	0.18	0.20
10	Dry density (g/cc)	1.97	1.98	1.91	1.82	1.77	1.71

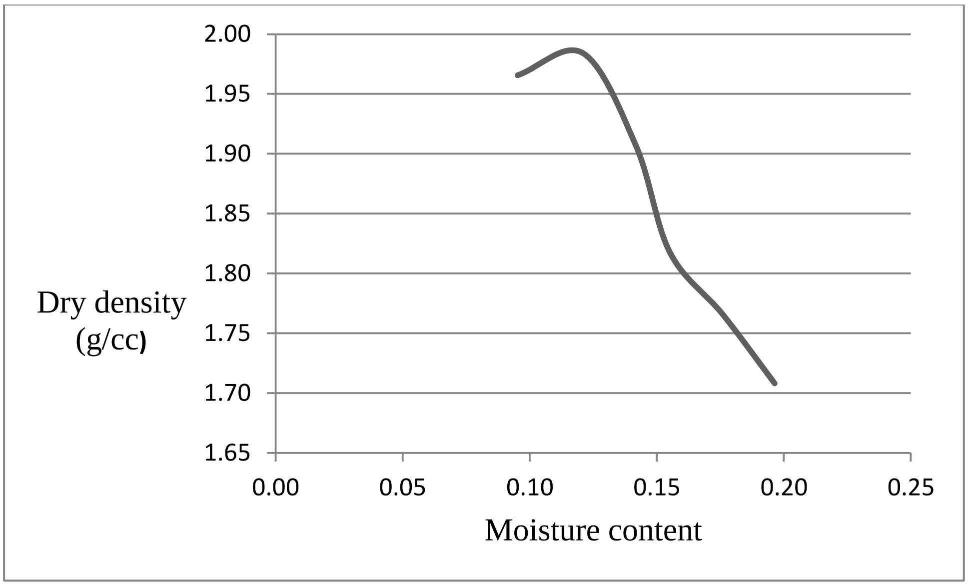


Fig4.2: Graph between dry densities and corresponding moisture content

4.6 Triaxial shear test:

Observation and calculations

Proving ring reading =135

Time = 10minutes and 10 seconds

Length of specimen = 76mm

Diameter of specimen = 38mm

Area of the specimen(A_o) = (π/4)* diameter^2

= 1134.115 mm^2

Proving ring 1 division = 0.26kg (constant)

135 division = 0.26*135

= 35.1kg

10 mins 10 sec = 10.167mins

Change in length = 10.167*1.25

= 12.708mm

Strain (ξ) = change in length / original length ---------Equation no.5

=12.708/76

=0.167

$1-\xi$ = 1-0.167

= 0.833

Corrected area (A_c) = Area of the specimen (A_o) / $1-\xi$ --------- Equation no. 6

= 1134.115/ 0.833

= 1361.48mm^2

σ_d = 35.1kg/1361.48*10^2

= 2.57 kg

Confining lateral pressure (σ_3) = 0.5kg/cm^2

$\sigma_1 = \sigma_3 + \sigma_d$ ---------- Equation no. 7

= 0.5 + 2.57

= 3.07 kg/cm^2

From Mohr's circle:

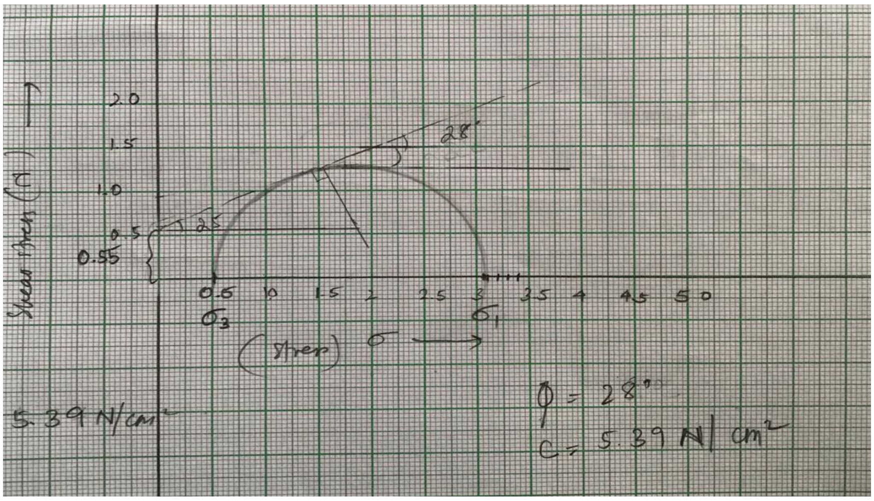


Fig 4.3: Calculation of failure angle and cohesion from Mohr's circle.

Therefore, the cohesion = 5.39 N/cm2

The failure angle or the angle of shearing resistance = 28 degree

4.7 Determination of slope using Total station

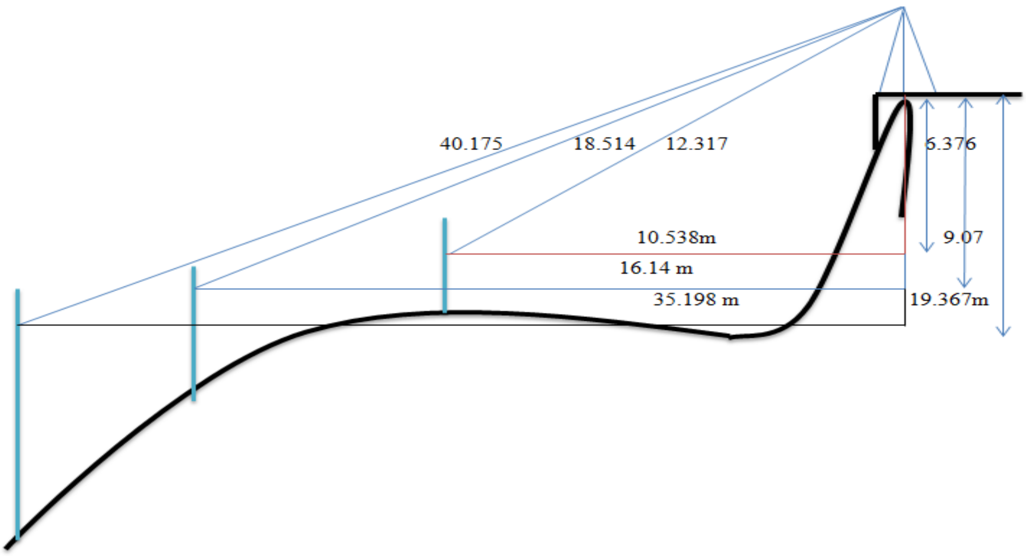


Fig4.4: The slope of the study site

Determination of slope of site:

Total station is placed on the horizontal road

Staff is placed at ‘1’ which is at 6.376m height vertically and 10.538m horizontally.

Next, staff is kept at ‘2’ which is at 9.07m vertically and 16.14m horizontally from the total station.

Then staff is moved and taken to location ‘3’ and measured the vertical and horizontal distance which read out to be 19.367m and 35.198m respectively.

Slope of the ground= (opposite/adjacent)

$$= \tan^{-1}(19.367/35.198)$$

$$= 28.74 \text{ degree}$$

4.8 Check for the stability of cantilever retaining wall

Table 4.5: Check for the wall stability

3) Base Pressure		
Resultant Moment at Toe end=		
Mr-Mo	2224.91	kNm
x= Resultant moment/∑W	1.71675154	
e=b/2-x	22.9480509	
Maximum pressure at toe		
Pmax=∑W/b[1+6e/b]	97.2976175	kN/m^3
	165.5<350	Hence ok
Minimum pressure at heel end		
Pmin=∑W/b[1-6e/b]	22.3511191	kN/m^3
Design of steam		
as we have taken D as 500 mm and cover 60 mm, so d	440	mm
Area of steel in stem(Ast)		

mu=0.87fyAstd(1-(fyAst/fckbd))		
Ast required	1693	mm^2
using 16 mm dia Ast required	201	mm^2
Spacing required	118.724158	mm
Hence providing 16 mm dia, Fe 415 bars @100mm c/c		
Distribution steel		
Distribution steel is provided @ 0.12% of Total X section area		
(150+350)/2 is the average thickness of the stem	250	
Ast required	300	
using 8 mm diameter bars, Ast required	50.3	mm^2
Spacing required	167.666667	mm
Hence provided8 mm dia Fe 415 bars @ 150mm c/c		
Check of shear		
shear force at this section of the stem= 0.5(Kayh).h	361.850253	
h= 11-0.44=10.56		
Vu	542.77538	

Nominal shear stress(*tv*)		
Vu/bd	1.23358041	
	0.22727273	
Design of heel slab		
W	198	kN
Pf	62.7069259	kN/m^2
Pe	56.9418107	kN/m^2
self weight of heel slab	54	kN
Total load	252	kN
Maximum bending moment	996.494401	
Mu	1494.7416	
Depth required	0.70586628	m
	0.69<2m Hence ok	
Area of steel required	610	mm^2
Ast required		
Using 12 mm dia bars		
spacing	185.245902	
	186	mm
Design of shear key		
as there is no safe in sliding, shear key is provided below stem		

Pressure at face share key =110.9kN/m		
passive earth pressure=		
Kp=(1+sinϴ)/(1-sinϴ)	2.77358491	
let the depth of key be X		
resistance offered by shear key=		
Kp*Pressure of face*X	333X	
Factor of safety against sliding along with shear key=1.4		
(0.9μ∑W+333X)/Pah = 1.4		
X	0.6	m

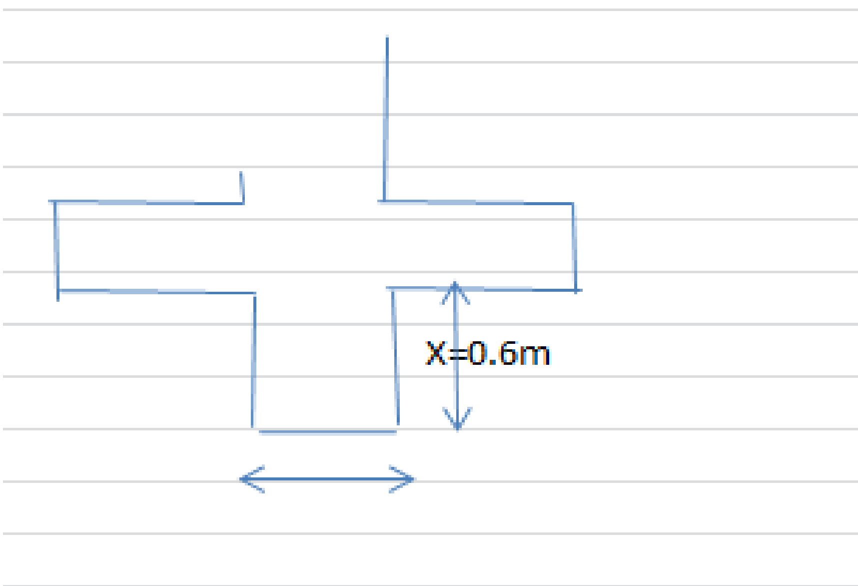


Fig4.5: Shear key

4.9Analysis of multi storeyed residential building:

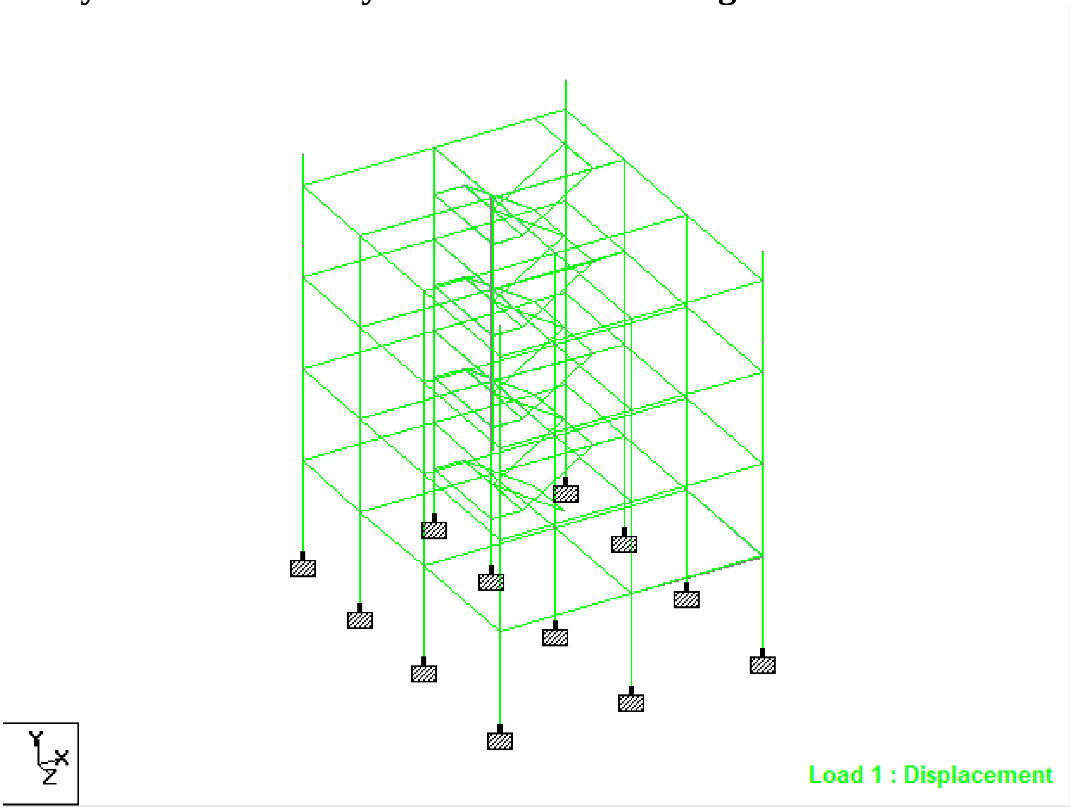


Fig4.6: Node displacement of structure

Table 4.6: Summary of node displacement

			Horizontal	Vertical	Horizontal	Resultant	Rotational		
	Node	L/C	X mm	Y mm	Z mm	mm	rX rad	rY rad	rZ rad
Max X	104	13 GENERAT	8.664	-1.083	-0.885	8.776	-0.000	0.000	-0.001
Min X	100	15 GENERAT	**-8.731**	-1.088	-0.714	8.827	0.000	-0.000	0.001
Max Y	87	1 EQX	1.295	**0.624**	-0.012	1.438	-0.000	0.000	-0.001
Min Y	35	13 GENERAT	-4.689	**-10.814**	-0.609	11.803	-0.001	-0.001	-0.005
Max Z	100	14 GENERAT	-0.199	-1.091	**8.110**	8.185	0.001	0.000	0.000
Min Z	103	16 GENERAT	-0.199	-1.007	**-7.706**	7.774	-0.001	0.000	0.000
Max rX	86	15 GENERAT	-2.282	-2.366	0.182	3.292	**0.001**	0.000	-0.001
Min rX	33	13 GENERAT	1.600	-1.879	0.043	2.468	**-0.001**	-0.001	-0.002
Max rY	85	19 GENERAT	-1.753	-1.461	0.139	2.286	-0.001	**0.000**	-0.001
Min rY	31	13 GENERAT	0.834	-2.273	0.091	2.423	-0.001	**-0.001**	-0.002
Max rZ	87	15 GENERAT	-2.060	-2.574	0.254	3.307	0.000	-0.000	**0.001**
Min rZ	36	13 GENERAT	-4.013	-10.556	-0.675	11.313	-0.001	-0.001	**-0.005**
Max Rs	35	13 GENERAT	-4.689	-10.814	-0.609	**11.803**	-0.001	-0.001	-0.005

Table 4.7: Summary of reactions on support

			Horizontal	Vertical	Horizontal	Moment		
	Node	L/C	Fx kN	Fy kN	Fz kN	Mx kNm	My kNm	Mz kNm
Max Fx	8	15 GENERAT	**90.001**	1397.853	-16.113	-8.199	-9.739	-96.863
Min Fx	8	17 GENERAT	**-61.057**	704.549	2.254	1.328	15.619	83.900
Max Fy	9	6 GENERATE	-1.622	**1663.132**	3.817	3.679	0.303	2.471
Min Fy	7	2 EQZ	-0.183	**-92.276**	-27.053	-46.968	0.872	-0.833
Max Fz	7	16 GENERAT	8.565	1125.597	**50.768**	76.246	0.981	3.670
Min Fz	8	14 GENERAT	16.801	1339.193	**-48.550**	-76.551	3.428	-6.462
Max Mx	9	16 GENERAT	-1.486	1443.212	44.579	**78.679**	0.397	2.204
Min Mx	8	14 GENERAT	16.801	1339.193	-48.550	**-76.551**	3.428	-6.462
Max My	8	13 GENERAT	-53.820	1230.149	-1.211	-0.390	**17.089**	80.660
Min My	8	19 GENERAT	82.765	872.252	-12.648	-6.482	**-11.209**	-93.622
Max Mz	8	17 GENERAT	-61.057	704.549	2.254	1.328	15.619	**83.900**
Min Mz	8	15 GENERAT	90.001	1397.853	-16.113	-8.199	-9.739	**-96.863**

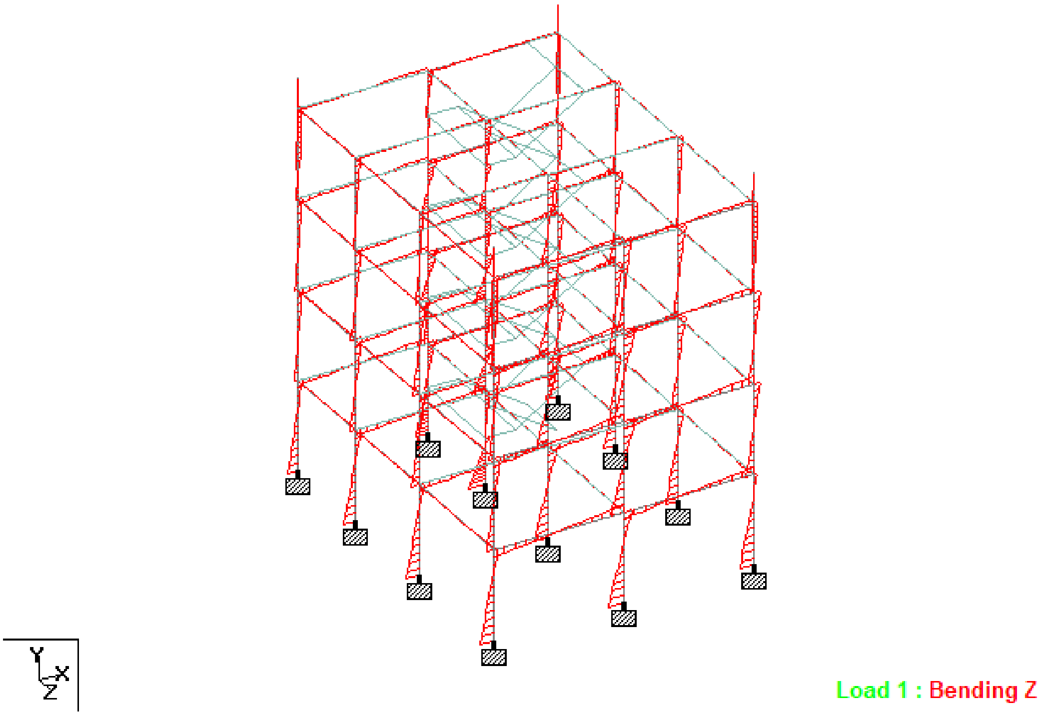


Fig4.7: Beam and column bending of the structure

Table 4.8: Summary of forces on beams and column

	Beam	L/C	Node	Fx kN	Fy kN	Fz kN	Mx kNm	My kNm	Mz kNm
Max Fx	65	6 GENERATE	9	1663.132	1.622	3.817	0.303	-3.679	2.471
Min Fx	57	2 EQZ	7	-92.276	0.183	-27.053	0.872	46.968	-0.833
Max Fy	127	15 GENERAT	40	0.093	84.040	-0.157	-0.524	0.333	88.840
Min Fy	110	13 GENERAT	23	0.424	-104.006	-22.539	-0.439	-8.498	86.201
Max Fz	155	16 GENERAT	52	929.537	0.583	63.980	-0.043	-15.087	1.559
Min Fz	134	14 GENERAT	20	989.395	-8.467	-56.719	1.024	68.879	-2.909
Max Mx	61	13 GENERAT	8	1230.149	53.820	-1.211	17.089	0.390	80.660
Min Mx	113	13 GENERAT	30	1218.948	13.136	0.457	-17.132	2.249	-3.034
Max My	155	16 GENERAT	42	916.284	0.583	63.980	-0.043	80.883	0.685
Min My	65	16 GENERAT	9	1443.212	1.486	44.579	0.397	-78.679	2.204
Max Mz	127	15 GENERAT	40	0.093	84.040	-0.157	-0.524	0.333	88.840
Min Mz	61	15 GENERAT	8	1397.853	-90.001	-16.113	-9.739	8.199	-96.863

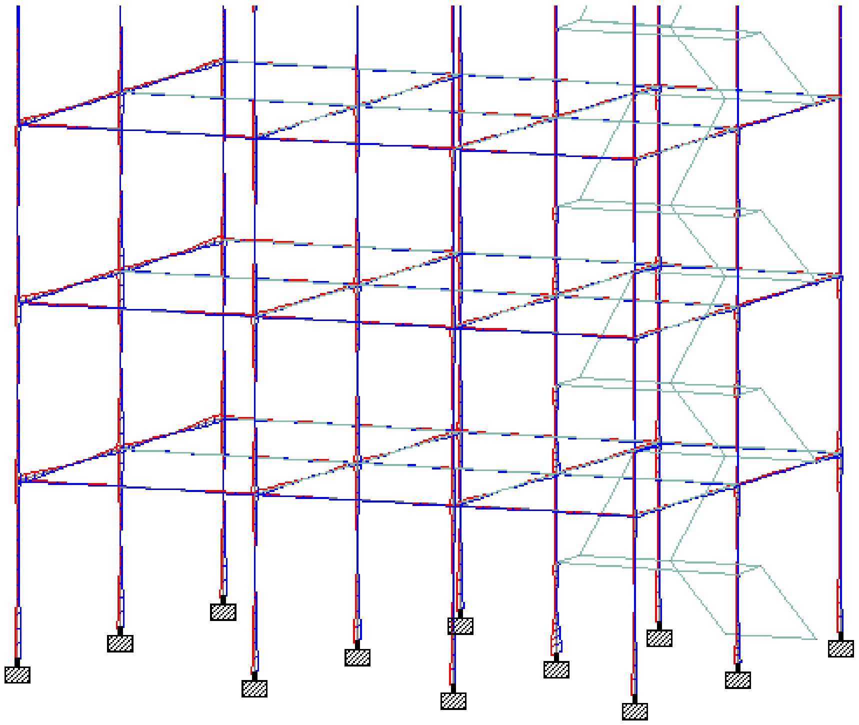


Fig4.8: Beam stresses of the structure

CHAPTER 5

CONCLUSION

5.1 General

In this chapter conclusions are drawn according to the experiment performed.

5.2 Conclusion drawn

From the study conducted, the soil at the study site is:

Well graded soils (reddish soil)
specific gravity of 2.7
Slope of 28.8 degree
it has low optimum moisture content i.e. only 12%

The soil if experiences a heavy rainfall it can easily get saturated and flow down the slope leading to slope failure. Thus, stabilizing the soil on the slope before the construction of a building is inevitable.

The soil is stabilised by constructing a cantilever retaining wall. Using a cantilever retaining wall to stabilize the slope is not just convenient but also very economical comparing to other retaining wall as cantilever retaining wall has shorter width at top and broader width towards the foundation.

The designed retaining wall was safe from two aspects that are

safe in overturning
safe in failure of under soil

but failed in sliding. This failure had overcome by providing the shear key below the foundation.

FUTURE SCOPE:

With the increase of population every year, settlement on the slopes shall be more than ever in the world thus requiring the stabilization of slope for the reduction of loss of lives and damage to properties occurring due to landslide.

The construction of retaining wall with use of various shapes and material will be not only cost effective but also an effective method.

The scope of student who worked in this project shall be not only be gaining knowledge about the experimental test performed on the soils but also be equipped the software skills like Auto cad and Staad pro which is vital in the field of civil engineering.

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APPENDIX

Table: Detailed support reaction on the supports of the structure

		Horizontal	Vertical	Horizontal	Moment		
Node	L/C	Fx kN	Fy kN	Fz kN	Mx kNm	My kNm	Mz kNm
1	1 EQX	-16.314	-48.77	-2.227	-4.896	-0.443	34.685
	2 EQZ	-1.239	-72.267	-19.547	-42.632	-0.022	1.154
	3 DL	4.119	450.617	4.316	4.616	0.169	-2.73
	4 LL	0.64	29.602	0.421	0.404	0.004	-0.52
	5 FL	0.32	14.801	0.21	0.202	0.002	-0.26
	6 GENERATED INDIAN CODE GENRAL_STRUCTURES 1	7.139	720.328	7.105	7.531	0.26	-4.876
	7 GENERATED INDIAN CODE GENRAL_STRUCTURES 2	5.711	576.262	5.684	6.024	0.208	-3.901
	8 GENERATED INDIAN CODE GENRAL_STRUCTURES 3	-13.866	517.738	3.011	0.149	-0.324	37.721
	9 GENERATED INDIAN CODE	4.224	489.542	-17.773	-45.135	0.182	-2.516

	GENRAL_STRUCTURES 4						
	10 GENERATED INDIAN CODE GENRAL_STRUCTURES 5	25.288	634.786	8.357	11.899	0.74	-45.522
	11 GENERATED INDIAN CODE GENRAL_STRUCTURES 6	7.198	662.982	29.141	57.183	0.234	-5.285
	12 GENERATED INDIAN CODE GENRAL_STRUCTURES 7	6.178	675.925	6.474	6.924	0.254	-4.095
	13 GENERATED INDIAN CODE GENRAL_STRUCTURES 8	-18.293	602.77	3.133	-0.42	-0.411	47.932
	14 GENERATED INDIAN CODE GENRAL_STRUCTURES 9	4.32	567.526	-22.847	-57.025	0.221	-2.364
	15 GENERATED INDIAN CODE GENRAL_STRUCTURES 10	30.65	749.081	9.815	14.268	0.919	-56.122
	16 GENERATED INDIAN CODE GENRAL_STRUCTURES	8.037	784.325	35.795	70.873	0.287	-5.826

	11						
	17 GENERATED INDIAN CODE GENRAL_STRUCTURES 12	-20.764	332.4	0.543	-3.189	-0.512	49.57
	18 GENERATED INDIAN CODE GENRAL_STRUCTURES 13	1.848	297.155	-25.437	-59.794	0.12	-0.726
	19 GENERATED INDIAN CODE GENRAL_STRUCTURES 14	28.178	478.711	7.226	11.498	0.817	-54.484
	20 GENERATED INDIAN CODE GENRAL_STRUCTURES 15	5.566	513.955	33.205	68.103	0.185	-4.188
4	1 EQX	-18.791	-51.315	-2.268	-4.908	-0.3	39.035
	2 EQZ	0.359	12.691	-25.56	-48.466	-0.067	-0.371
	3 DL	4.812	626.263	1.619	1.982	0.278	-3.876
	4 LL	1.336	58.471	0.157	0.15	0.005	-1.213
	5 FL	0.668	29.236	0.078	0.075	0.002	-0.607
	6 GENERATED INDIAN CODE GENRAL_STRUCTURES 1	9.221	1027.102	2.663	3.198	0.424	-7.634

	7 GENERATED INDIAN CODE GENRAL_STRUCTURES 2	7.377	821.681	2.131	2.558	0.339	-6.107
	8 GENERATED INDIAN CODE GENRAL_STRUCTURES 3	-15.172	760.103	-0.591	-3.332	-0.02	40.735
	9 GENERATED INDIAN CODE GENRAL_STRUCTURES 4	7.807	836.911	-28.541	-55.601	0.259	-6.552
	10 GENERATED INDIAN CODE GENRAL_STRUCTURES 5	29.925	883.26	4.852	8.448	0.699	-52.949
	11 GENERATED INDIAN CODE GENRAL_STRUCTURES 6	6.946	806.452	32.803	60.718	0.419	-5.662
	12 GENERATED INDIAN CODE GENRAL_STRUCTURES 7	7.217	939.395	2.428	2.972	0.417	-5.814
	13 GENERATED INDIAN CODE GENRAL_STRUCTURES 8	-20.968	862.422	-0.974	-4.39	-0.033	52.739

	14 GENERATED INDIAN CODE GENRAL_STRUCTURES 9	7.756	958.432	-35.912	-69.727	0.317	-6.37
	15 GENERATED INDIAN CODE GENRAL_STRUCTURES 10	35.403	1016.368	5.83	10.335	0.866	-64.367
	16 GENERATED INDIAN CODE GENRAL_STRUCTURES 11	6.679	920.358	40.768	75.672	0.517	-5.258
	17 GENERATED INDIAN CODE GENRAL_STRUCTURES 12	-23.855	486.664	-1.945	-5.579	-0.199	55.065
	18 GENERATED INDIAN CODE GENRAL_STRUCTURES 13	4.869	582.674	-36.883	-70.916	0.15	-4.044
	19 GENERATED INDIAN CODE GENRAL_STRUCTURES 14	32.516	640.61	4.859	9.146	0.699	-62.041
	20 GENERATED INDIAN CODE GENRAL_STRUCTURES 15	3.792	544.6	39.797	74.483	0.35	-2.932

5	1 EQX	-19.967	-58.82	-2.366	-5.035	-0.456	42.334
	2 EQZ	0.099	10.584	-24.753	-47.685	-0.075	-0.061
	3 DL	5.524	699.777	2.45	2.593	0.175	-4.837
	4 LL	1.439	68.481	0.272	0.254	0.005	-1.335
	5 FL	0.719	34.241	0.136	0.127	0.002	-0.667
	6 GENERATED INDIAN CODE GENRAL_STRUCTURES 1	10.445	1152.388	4.083	4.271	0.27	-9.258
	7 GENERATED INDIAN CODE GENRAL_STRUCTURES 2	8.356	921.911	3.267	3.417	0.216	-7.406
	8 GENERATED INDIAN CODE GENRAL_STRUCTURES 3	-15.605	851.326	0.427	-2.626	-0.331	43.394
	9 GENERATED INDIAN CODE GENRAL_STRUCTURES 4	8.475	934.612	-26.438	-53.805	0.126	-7.48
	10 GENERATED INDIAN CODE GENRAL_STRUCTURES 5	32.316	992.495	6.106	9.459	0.763	-58.207
	11 GENERATED	8.236	909.209	32.971	60.639	0.306	-7.332

	INDIAN CODE GENRAL_STRUCTURES 6						
	12 GENERATED INDIAN CODE GENRAL_STRUCTURES 7	8.286	1049.666	3.675	3.89	0.262	-7.255
	13 GENERATED INDIAN CODE GENRAL_STRUCTURES 8	-21.664	961.435	0.126	-3.663	-0.421	56.245
	14 GENERATED INDIAN CODE GENRAL_STRUCTURES 9	8.435	1065.543	-33.455	- 67.637	0.15	-7.348
	15 GENERATED INDIAN CODE GENRAL_STRUCTURES 10	38.237	1137.897	7.224	11.443	0.946	- 70.756
	16 GENERATED INDIAN CODE GENRAL_STRUCTURES 11	8.137	1033.789	40.805	75.417	0.375	-7.163
	17 GENERATED INDIAN CODE GENRAL_STRUCTURES 12	-24.979	541.569	-1.344	-5.219	-0.526	59.147
	18 GENERATED INDIAN CODE	5.121	645.676	-34.925	-	0.045	-4.445

	GENRAL_STRUCTURES 13				69.193		
	19 GENERATED INDIAN CODE GENRAL_STRUCTURES 14	34.922	718.03	5.754	9.887	0.841	-67.854
	20 GENERATED INDIAN CODE GENRAL_STRUCTURES 15	4.823	613.923	39.335	73.861	0.27	-4.261
6	1 EQX	-19.455	-46.423	-0.374	-3.13	-0.459	44.509
	2 EQZ	0.984	48.385	-18.442	-41.561	-0.017	-0.875
	3 DL	5.746	519.967	-5.754	-5.378	0.19	-5.162
	4 LL	0.769	38.309	-0.791	-0.774	0.006	-0.714
	5 FL	0.384	19.154	-0.395	-0.387	0.003	-0.357
	6 GENERATED INDIAN CODE GENRAL_STRUCTURES 1	9.772	837.413	-9.817	-9.229	0.294	-8.815
	7 GENERATED INDIAN CODE GENRAL_STRUCTURES 2	7.818	669.93	-7.854	-7.383	0.235	-7.052
	8 GENERATED INDIAN CODE GENRAL_STRUCTURES	-15.529	614.222	-8.303	-11.14	-0.316	46.359

	3						
	9 GENERATED INDIAN CODE GENRAL_STRUCTURES 4	8.998	727.993	-29.984	-57.257	0.215	-8.102
	10 GENERATED INDIAN CODE GENRAL_STRUCTURES 5	31.164	725.638	-7.404	-3.627	0.786	-60.463
	11 GENERATED INDIAN CODE GENRAL_STRUCTURES 6	6.637	611.868	14.277	42.49	0.255	-6.002
	12 GENERATED INDIAN CODE GENRAL_STRUCTURES 7	8.619	779.95	-8.63	-8.068	0.285	-7.743
	13 GENERATED INDIAN CODE GENRAL_STRUCTURES 8	-20.564	710.315	-9.192	-12.763	-0.404	59.021
	14 GENERATED INDIAN CODE GENRAL_STRUCTURES 9	10.095	852.528	-36.293	-70.409	0.26	-9.056
	15 GENERATED INDIAN CODE GENRAL_STRUCTURES	37.801	849.585	-8.069	-3.372	0.974	-74.507

	10						
	16 GENERATED INDIAN CODE GENRAL_STRUCTURES 11	7.143	707.372	19.032	54.274	0.31	-6.43
	17 GENERATED INDIAN CODE GENRAL_STRUCTURES 12	-24.011	398.335	-5.74	-9.536	-0.518	62.118
	18 GENERATED INDIAN CODE GENRAL_STRUCTURES 13	6.647	540.548	-32.841	-67.182	0.146	-5.959
	19 GENERATED INDIAN CODE GENRAL_STRUCTURES 14	34.354	537.605	-4.617	-0.145	0.86	-71.41
	20 GENERATED INDIAN CODE GENRAL_STRUCTURES 15	3.695	395.392	22.485	57.501	0.196	-3.333
7	1 EQX	-24.944	-48.549	-6.18	-3.444	-2.682	41.294
	2 EQZ	-0.183	-92.276	-27.053	-46.968	0.872	-0.833
	3 DL	5.527	658.122	6.793	3.862	1.526	1.614
	4 LL	0.16	59.047	0.89	0.695	0.206	0.11
	5 FL	0.08	29.524	0.445	0.348	0.103	0.055

	6 GENERATED INDIAN CODE GENRAL_STRUCTURES 1	8.531	1075.754	11.525	6.837	2.599	2.587
	7 GENERATED INDIAN CODE GENRAL_STRUCTURES 2	6.824	860.603	9.22	5.469	2.079	2.069
	8 GENERATED INDIAN CODE GENRAL_STRUCTURES 3	-23.108	802.344	1.804	1.336	-1.14	51.622
	9 GENERATED INDIAN CODE GENRAL_STRUCTURES 4	6.605	749.871	-23.243	-50.893	3.126	1.07
	10 GENERATED INDIAN CODE GENRAL_STRUCTURES 5	36.757	918.862	16.636	9.602	5.298	-47.484
	11 GENERATED INDIAN CODE GENRAL_STRUCTURES 6	7.044	971.334	41.683	61.831	1.032	3.069
	12 GENERATED INDIAN CODE GENRAL_STRUCTURES 7	8.29	987.182	10.189	5.794	2.29	2.421

	13 GENERATED INDIAN CODE GENRAL_STRUCTURES 8	-29.126	914.359	0.919	0.627	-1.734	64.363
	14 GENERATED INDIAN CODE GENRAL_STRUCTURES 9	8.016	848.768	-30.39	-64.659	3.598	1.172
	15 GENERATED INDIAN CODE GENRAL_STRUCTURES 10	45.706	1060.006	19.46	10.96	6.313	-59.52
	16 GENERATED INDIAN CODE GENRAL_STRUCTURES 11	8.565	1125.597	50.768	76.246	0.981	3.67
	17 GENERATED INDIAN CODE GENRAL_STRUCTURES 12	-32.442	519.486	-3.157	-1.69	-2.65	63.394
	18 GENERATED INDIAN CODE GENRAL_STRUCTURES 13	4.699	453.895	-34.465	-66.976	2.683	0.204
	19 GENERATED INDIAN CODE GENRAL_STRUCTURES 14	42.39	665.133	15.384	8.643	5.397	-60.489

	20 GENERATED INDIAN CODE GENRAL_STRUCTURES 15	5.249	730.724	46.693	73.929	0.065	2.702
8	1 EQX	-47.941	-55.901	4.967	2.603	8.943	59.174
	2 EQZ	-0.86	16.795	-26.592	-48.171	-0.164	1.093
	3 DL	12.06	876.001	-5.775	-2.863	2.45	-5.401
	4 LL	0.758	114.325	0.337	0.317	-0.326	-0.298
	5 FL	0.379	57.163	0.168	0.158	-0.163	-0.149
	6 GENERATED INDIAN CODE GENRAL_STRUCTURES 1	19.227	1485.489	-8.157	-3.82	3.186	-8.548
	7 GENERATED INDIAN CODE GENRAL_STRUCTURES 2	15.382	1188.391	-6.526	-3.056	2.549	-6.839
	8 GENERATED INDIAN CODE GENRAL_STRUCTURES 3	-42.147	1121.31	-0.565	0.068	13.28	64.17
	9 GENERATED INDIAN CODE GENRAL_STRUCTURES 4	14.35	1208.545	-38.436	-60.861	2.351	-5.527
	10 GENERATED	72.91	1255.473	-12.487	-6.18	-8.183	-

	INDIAN CODE GENRAL_STRUCTURES 5						77.848
	11 GENERATED INDIAN CODE GENRAL_STRUCTURES 6	16.413	1168.237	25.384	54.75	2.746	-8.151
	12 GENERATED INDIAN CODE GENRAL_STRUCTURES 7	18.09	1314.001	-8.662	-4.295	3.675	-8.102
	13 GENERATED INDIAN CODE GENRAL_STRUCTURES 8	-53.82	1230.149	-1.211	-0.39	17.089	80.66
	14 GENERATED INDIAN CODE GENRAL_STRUCTURES 9	16.801	1339.193	-48.55	-76.551	3.428	-6.462
	15 GENERATED INDIAN CODE GENRAL_STRUCTURES 10	90.001	1397.853	-16.113	-8.199	-9.739	-96.863
	16 GENERATED INDIAN CODE GENRAL_STRUCTURES 11	19.38	1288.809	31.225	67.962	3.921	-9.742
	17 GENERATED INDIAN CODE	-61.057	704.549	2.254	1.328	15.619	83.9

	GENRAL_STRUCTURES 12						
	18 GENERATED INDIAN CODE GENRAL_STRUCTURES 13	9.565	813.593	-45.085	-74.834	1.958	-3.221
	19 GENERATED INDIAN CODE GENRAL_STRUCTURES 14	82.765	872.252	-12.648	-6.482	-11.209	-93.622
	20 GENERATED INDIAN CODE GENRAL_STRUCTURES 15	12.144	763.208	34.69	69.68	2.451	-6.501
9	1 EQX	-26.653	-2.747	0.012	-0.089	-0.457	48.765
	2 EQZ	-0.003	13.332	-27.628	-50.403	-0.069	0.036
	3 DL	-0.994	975.473	2.092	2.049	0.196	1.505
	4 LL	-0.087	133.281	0.453	0.404	0.006	0.142
	5 FL	-0.044	66.641	0.226	0.202	0.003	0.071
	6 GENERATED INDIAN CODE GENRAL_STRUCTURES 1	-1.622	1663.132	3.817	3.679	0.303	2.471
	7 GENERATED INDIAN CODE GENRAL_STRUCTURES	-1.297	1330.506	3.053	2.943	0.243	1.977

	2						
	8 GENERATED INDIAN CODE GENRAL_STRUCTURES 3	-33.28	1327.209	3.068	2.836	-0.305	60.495
	9 GENERATED INDIAN CODE GENRAL_STRUCTURES 4	-1.301	1346.504	-30.1	-57.541	0.16	2.02
	10 GENERATED INDIAN CODE GENRAL_STRUCTURES 5	30.686	1333.802	3.039	3.05	0.791	-56.541
	11 GENERATED INDIAN CODE GENRAL_STRUCTURES 6	-1.294	1314.507	36.206	63.427	0.325	1.934
	12 GENERATED INDIAN CODE GENRAL_STRUCTURES 7	-1.49	1463.21	3.138	3.074	0.295	2.258
	13 GENERATED INDIAN CODE GENRAL_STRUCTURES 8	-41.469	1459.09	3.156	2.94	-0.39	75.406
	14 GENERATED INDIAN CODE GENRAL_STRUCTURES	-1.495	1483.208	-38.304	-72.531	0.192	2.312

	9						
	15 GENERATED INDIAN CODE GENRAL_STRUCTURES 10	38.489	1467.33	3.119	3.208	0.979	-70.89
	16 GENERATED INDIAN CODE GENRAL_STRUCTURES 11	-1.486	1443.212	44.579	78.679	0.397	2.204
	17 GENERATED INDIAN CODE GENRAL_STRUCTURES 12	-40.873	873.806	1.901	1.71	-0.508	74.503
	18 GENERATED INDIAN CODE GENRAL_STRUCTURES 13	-0.898	897.924	-39.559	-73.761	0.074	1.408
	19 GENERATED INDIAN CODE GENRAL_STRUCTURES 14	39.085	882.047	1.864	1.978	0.862	-71.793
	20 GENERATED INDIAN CODE GENRAL_STRUCTURES 15	-0.89	857.928	43.324	77.449	0.28	1.301
10	1 EQX	-26.236	0.443	-0.019	-0.079	-0.494	51.096
	2 EQZ	-0.096	63.189	-20.322	-43.35	-0.064	0.207

	3 DL	-0.636	747.138	-6.321	-6.015	0.181	1.048
	4 LL	-0.043	74.503	-1.571	-1.55	0.005	0.072
	5 FL	-0.021	37.252	-0.785	-0.775	0.003	0.036
	6 GENERATED INDIAN CODE GENRAL_STRUCTURES 1	-1.018	1232.462	-11.837	-11.347	0.28	1.68
	7 GENERATED INDIAN CODE GENRAL_STRUCTURES 2	-0.814	985.969	-9.47	-9.078	0.224	1.344
	8 GENERATED INDIAN CODE GENRAL_STRUCTURES 3	-32.298	986.501	-9.493	-9.173	-0.369	62.659
	9 GENERATED INDIAN CODE GENRAL_STRUCTURES 4	-0.93	1061.796	-33.857	-61.098	0.147	1.592
	10 GENERATED INDIAN CODE GENRAL_STRUCTURES 5	30.669	985.438	-9.447	-8.983	0.817	-59.971
	11 GENERATED INDIAN CODE GENRAL_STRUCTURES 6	-0.698	910.143	14.917	42.942	0.301	1.096

	12 GENERATED INDIAN CODE GENRAL_STRUCTURES 7	-0.954	1120.707	-9.481	-9.023	0.272	1.573
	13 GENERATED INDIAN CODE GENRAL_STRUCTURES 8	-40.308	1121.371	-9.51	-9.141	-0.47	78.217
	14 GENERATED INDIAN CODE GENRAL_STRUCTURES 9	-1.098	1215.49	-39.965	-74.048	0.176	1.883
	15 GENERATED INDIAN CODE GENRAL_STRUCTURES 10	38.401	1120.042	-9.452	-8.905	1.013	-75.071
	16 GENERATED INDIAN CODE GENRAL_STRUCTURES 11	-0.809	1025.923	21.002	56.003	0.368	1.262
	17 GENERATED INDIAN CODE GENRAL_STRUCTURES 12	-39.927	673.089	-5.718	-5.532	-0.579	77.587
	18 GENERATED INDIAN CODE GENRAL_STRUCTURES 13	-0.717	767.208	-36.172	-70.439	0.067	1.254

	19 GENERATED INDIAN CODE GENRAL_STRUCTURES 14	38.782	671.76	-5.66	-5.296	0.905	-75.7
	20 GENERATED INDIAN CODE GENRAL_STRUCTURES 15	-0.428	577.641	24.795	59.612	0.259	0.633
11	1 EQX	-19.077	97.395	3.767	6.669	-0.501	38.288
	2 EQZ	1.821	-80.182	-19.975	-42.965	0.46	-2.022
	3 DL	-12.483	457.402	5.185	5.474	0.073	14.325
	4 LL	-1.051	30.494	0.419	0.363	-0.019	1.166
	5 FL	-0.526	15.247	0.209	0.181	-0.009	0.583
	6 GENERATED INDIAN CODE GENRAL_STRUCTURES 1	-20.302	731.843	8.405	8.755	0.081	23.237
	7 GENERATED INDIAN CODE GENRAL_STRUCTURES 2	-16.241	585.474	6.724	7.004	0.065	18.589
	8 GENERATED INDIAN CODE GENRAL_STRUCTURES 3	-39.133	702.348	11.244	15.007	-0.537	64.534
	9 GENERATED INDIAN	-14.056	489.255	-17.247	-	0.617	16.163

	CODE GENRAL_STRUCTURES 4				44.553		
	10 GENERATED INDIAN CODE GENRAL_STRUCTURES 5	6.651	468.6	2.204	-0.999	0.666	-27.356
	11 GENERATED INDIAN CODE GENRAL_STRUCTURES 6	-18.427	681.693	30.694	58.561	-0.488	21.016
	12 GENERATED INDIAN CODE GENRAL_STRUCTURES 7	-18.725	686.102	7.777	8.211	0.109	21.488
	13 GENERATED INDIAN CODE GENRAL_STRUCTURES 8	-47.34	832.195	13.427	18.215	-0.643	78.919
	14 GENERATED INDIAN CODE GENRAL_STRUCTURES 9	-15.993	565.828	-22.186	-56.236	0.8	18.455
	15 GENERATED INDIAN CODE GENRAL_STRUCTURES 10	9.89	540.01	2.127	-1.793	0.861	-35.943
	16 GENERATED INDIAN CODE	-21.457	806.376	37.74	72.658	-0.581	24.521

	GENRAL_STRUCTURES 11						
	17 GENERATED INDIAN CODE GENRAL_STRUCTURES 12	-39.85	557.754	10.316	14.93	-0.687	70.324
	18 GENERATED INDIAN CODE GENRAL_STRUCTURES 13	-8.503	291.388	-25.297	-59.52	0.756	9.86
	19 GENERATED INDIAN CODE GENRAL_STRUCTURES 14	17.38	265.569	-0.984	-5.077	0.818	-44.539
	20 GENERATED INDIAN CODE GENRAL_STRUCTURES 15	-13.967	531.935	34.629	69.373	-0.625	15.926
12	1 EQX	-19.282	108.089	1.809	4.718	-0.671	38.996
	2 EQZ	0.258	19.853	-25.403	-48.123	-0.155	-0.354
	3 DL	-9.452	612.466	-0.144	0.106	0.229	9.697
	4 LL	-1.503	57.489	0.062	0	0.018	1.551
	5 FL	-0.751	28.744	0.031	0	0.009	0.776
	6 GENERATED INDIAN CODE GENRAL_STRUCTURES	-16.433	1004.932	-0.124	0.16	0.371	16.872

	1						
	7 GENERATED INDIAN CODE GENRAL_STRUCTURES 2	-13.146	803.946	-0.099	0.128	0.297	13.497
	8 GENERATED INDIAN CODE GENRAL_STRUCTURES 3	-36.285	933.652	2.072	5.79	-0.509	60.293
	9 GENERATED INDIAN CODE GENRAL_STRUCTURES 4	-12.836	827.77	-30.582	- 57.619	0.111	13.072
	10 GENERATED INDIAN CODE GENRAL_STRUCTURES 5	9.992	674.239	-2.27	-5.534	1.102	- 33.298
	11 GENERATED INDIAN CODE GENRAL_STRUCTURES 6	-13.457	780.122	30.384	57.875	0.483	13.922
	12 GENERATED INDIAN CODE GENRAL_STRUCTURES 7	-14.179	918.699	-0.216	0.16	0.344	14.545
	13 GENERATED INDIAN CODE GENRAL_STRUCTURES	-43.101	1080.832	2.498	7.237	-0.663	73.04

	8						
	14 GENERATED INDIAN CODE GENRAL_STRUCTURES 9	-13.791	948.478	-38.32	-72.024	0.112	14.014
	15 GENERATED INDIAN CODE GENRAL_STRUCTURES 10	14.744	756.566	-2.93	-6.918	1.351	-43.95
	16 GENERATED INDIAN CODE GENRAL_STRUCTURES 11	-14.566	888.919	37.888	72.343	0.576	15.076
	17 GENERATED INDIAN CODE GENRAL_STRUCTURES 12	-37.43	713.352	2.584	7.173	-0.8	67.222
	18 GENERATED INDIAN CODE GENRAL_STRUCTURES 13	-8.12	580.999	-38.234	-72.088	-0.026	8.196
	19 GENERATED INDIAN CODE GENRAL_STRUCTURES 14	20.415	389.086	-2.844	-6.982	1.213	-49.768
	20 GENERATED INDIAN CODE GENRAL_STRUCTURES	-8.895	521.439	37.974	72.28	0.438	9.258

	15						
13	1 EQX	-19.917	59.62	2.461	5.115	-0.437	42.302
	2 EQZ	-0.035	10.951	-24.533	-47.318	-0.057	0.071
	3 DL	-7.364	694.901	1.957	1.93	0.218	7.698
	4 LL	-1.575	68.311	0.209	0.142	0.006	1.58
	5 FL	-0.787	34.156	0.105	0.071	0.003	0.79
	6 GENERATED INDIAN CODE GENRAL_STRUCTURES 1	-13.408	1144.819	3.248	3.107	0.336	13.917
	7 GENERATED INDIAN CODE GENRAL_STRUCTURES 2	-10.726	915.855	2.599	2.485	0.269	11.133
	8 GENERATED INDIAN CODE GENRAL_STRUCTURES 3	-34.626	987.399	5.552	8.624	-0.255	61.896
	9 GENERATED INDIAN CODE GENRAL_STRUCTURES 4	-10.768	928.996	-26.841	-54.296	0.2	11.219
	10 GENERATED INDIAN CODE GENRAL_STRUCTURES 5	13.174	844.311	-0.355	-3.653	0.793	-39.629

	11 GENERATED INDIAN CODE GENRAL_STRUCTURES 6	-10.684	902.714	32.038	59.266	0.338	11.048
	12 GENERATED INDIAN CODE GENRAL_STRUCTURES 7	-11.046	1042.352	2.935	2.894	0.327	11.547
	13 GENERATED INDIAN CODE GENRAL_STRUCTURES 8	-40.921	1131.781	6.627	10.567	-0.328	75
	14 GENERATED INDIAN CODE GENRAL_STRUCTURES 9	-11.098	1058.777	-33.864	-68.082	0.242	11.654
	15 GENERATED INDIAN CODE GENRAL_STRUCTURES 10	18.829	952.922	-0.757	-4.779	0.983	-51.906
	16 GENERATED INDIAN CODE GENRAL_STRUCTURES 11	-10.993	1025.926	39.734	73.871	0.413	11.44
	17 GENERATED INDIAN CODE GENRAL_STRUCTURES 12	-36.502	714.84	5.453	9.41	-0.459	70.381

	18 GENERATED INDIAN CODE GENRAL_STRUCTURES 13	-6.679	641.837	-35.038	-69.24	0.111	7.035
	19 GENERATED INDIAN CODE GENRAL_STRUCTURES 14	23.248	535.982	-1.931	-5.936	0.852	-56.525
	20 GENERATED INDIAN CODE GENRAL_STRUCTURES 15	-6.575	608.985	38.56	72.713	0.282	6.821
14	1 EQX	-19.517	46.98	0.418	3.108	-0.473	44.616
	2 EQZ	-1.106	48.944	-18.284	-41.254	-0.11	1.22
	3 DL	-6.859	517.543	-6.417	-6.199	0.167	7.106
	4 LL	-0.843	38.246	-0.857	-0.89	0.006	0.847
	5 FL	-0.421	19.123	-0.428	-0.445	0.003	0.423
	6 GENERATED INDIAN CODE GENRAL_STRUCTURES 1	-11.552	833.684	-10.911	-10.633	0.259	11.93
	7 GENERATED INDIAN CODE GENRAL_STRUCTURES 2	-9.242	666.948	-8.729	-8.507	0.207	9.544
	8 GENERATED INDIAN	-32.662	723.324	-8.227	-4.777	-0.36	63.083

	CODE GENRAL_STRUCTURES 3						
	9 GENERATED INDIAN CODE GENRAL_STRUCTURES 4	-10.569	725.681	-30.67	-58.012	0.075	11.008
	10 GENERATED INDIAN CODE GENRAL_STRUCTURES 5	14.179	610.572	-9.231	-12.236	0.775	-43.996
	11 GENERATED INDIAN CODE GENRAL_STRUCTURES 6	-7.914	608.214	13.212	40.998	0.339	8.08
	12 GENERATED INDIAN CODE GENRAL_STRUCTURES 7	-10.288	776.315	-9.626	-9.299	0.25	10.659
	13 GENERATED INDIAN CODE GENRAL_STRUCTURES 8	-39.564	846.785	-8.999	-4.637	-0.459	77.583
	14 GENERATED INDIAN CODE GENRAL_STRUCTURES 9	-11.948	849.732	-37.052	-71.18	0.085	12.489
	15 GENERATED INDIAN CODE	18.987	705.845	-10.253	-13.96	0.96	-

	GENRAL_STRUCTURES 10						56.265
	16 GENERATED INDIAN CODE GENRAL_STRUCTURES 11	-8.629	702.899	17.8	52.583	0.415	8.829
	17 GENERATED INDIAN CODE GENRAL_STRUCTURES 12	-35.448	536.259	-5.149	-0.918	-0.559	73.32
	18 GENERATED INDIAN CODE GENRAL_STRUCTURES 13	-7.832	539.206	-33.202	-67.46	-0.015	8.226
	19 GENERATED INDIAN CODE GENRAL_STRUCTURES 14	23.102	395.319	-6.403	-10.241	0.859	-60.529
	20 GENERATED INDIAN CODE GENRAL_STRUCTURES 15	-4.514	392.373	21.651	56.302	0.315	4.565

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