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A REVIEW PAPER ON SLOPE STABILITY ANALYSIS OF MALIN LANDSLIDE

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ABSTRACT

The main aim of this document is to convict, analyze and define high-level needs and features of the prevention of landslides. It concentrated on the abilities needed by the stakeholders, and the target users, and why these needs exist. The details of how the safety precautions for landslides fulfils these needs are detailed in the use-case and supplementary specifications. Landslides in mountainous terrain often occur during or after heavy rainfall, resulting in the loss of life and damage to the natural and /or built environment. A landslide is a common natural hazard that results in loss of human lives and causes widespread damage to property and infrastructure. Landslides, in general, include all downward or sudden movement of surface material like clays, sand, gravel and rock. Earthquake,, heavy rainfall, volcanic eruptions, etc. may act as triggering mechanisms to initiate a landslide. The downward movement of surface material takes place under the influence of gravity, and the mobility of such movement is enhanced by water content in the sediment.

Keywords:-*Landslides, terrain, Rainfall, Earthquake.*

I. INTRODUCTION

Landslides, mass movements of rock, debris or earth down a slope, are natural processes that have shaped much of the earth's landscape. However, with increased human settlement in unstable terrain, landslides pose a more serious threat to humans than ever before, causing an estimated 5000 fatalities each year .A landslide, also known as a landslip, is a geological phenomenon that includes a wide range of ground movements, such as rock falls, deep failure of slopes, and shallow debris flows. Landslides can occur in offshore, coastal and onshore environments. Although the action of gravity is the primary driving force for a landslide to occur, there are other contributing factors affecting the original slope stability. Typically, pre-conditional factors build up specific sub-surface conditions that make the area/slope prone to failure, whereas the actual landslide often requires a trigger before being released. Slope material that becomes saturated with water may develop into a debris flow or mud flow. The resulting slurry of rock and mud may pick up trees, houses and cars, thus blocking bridges and tributaries causing flooding along its path. Landslide is a geological phenomenon that includes a wide range of ground movement. Landslide are usually classified on the basis of material involved and the type of movement It is near to the Dimbhe dam of 5 km. Radius having capacity of dam is the volume content is 1,151.23 km3(276.19 cu mi) and gross storage capacity is 38,220.00 km3 (9,169.47 cu mi).

II. LOCATION OF MALIN LANDSLIDE

Name of village: Malin
Tal. Name :Ambegaon
District : Pune
State : Maharashtra
Region : Western Maharashtra
Division : Pune
Language : Marathi and Hindi, Devnagari, Pali
Time zone: IST (UTC+5:30)
Elevation / Altitude: 619 meters. Above Sea level
Telephone Code / STD Code: 02133 Pin Code: 410509
Post Office Name:Dimbhe Colony
Malin village is situated in a hilly area at an altitude of about 2000 feet. At coordinates of LatitudeN19°09'34.40", Longitude E73°41'19"

Photo gallery:

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Fig. No 1 Malin before landslide

Fig No 2 Satellite Image Of Malin

Fig No 3 Malin After Landslide

Fig No 4 Testing On Core Cutter

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Fig No 5 testing on oven drying method

Fig No 6 Landslide Llope Of Malin

III. DETERMINE WATER CONTENT OF GIVEN MALIN VILLAGE SOIL SAMPLE BY OVEN DRYING METHOD AS PER I.S. 2720 (PART- II)-1973

This is the commonly adopted and simplest method for determine the water content of soil sample.

- Clean the container with lid, dry it and find mass of container with lid ().
- Crumble and put loosely the required quantity of moist soil sample in the container from soil specimen. Replace lid and find its mass ().
- Remove the lid, put it under container and keep it in the oven. Maintain temperature in the oven at 110 5 for 24 hours.
- Take out the container from oven with the help of tongs and keep in desiccators to cool it. Use of desiccators avoids contact of moisture in surrounding air and oven dried soil mass.
- After cooling, replace lid of container and find the mass of container with dry soil sample ().
- Repeat the above steps for two more soil specimens from the same soil sample.
- Report the water content as average of five test.

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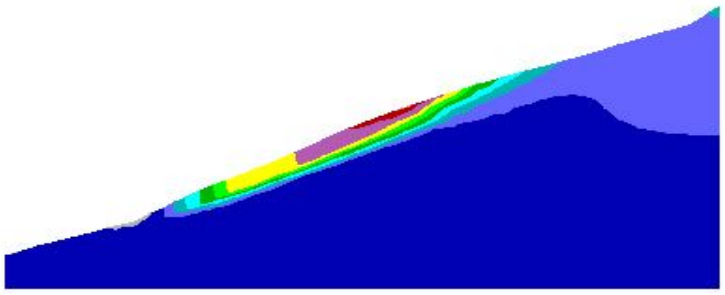

Fig No 7 slope at the time of failure (Factor of safety = 1.00)

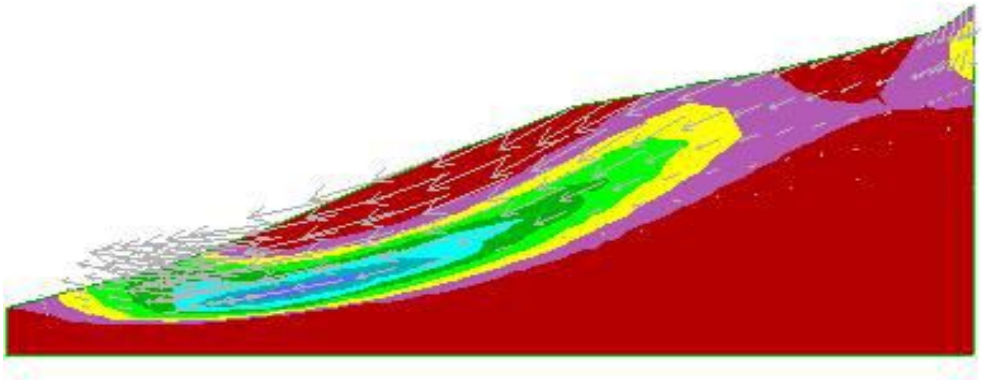

Fig No 8 Slope after the failure

Table NO 1 Water contain Sample reading

Sr. No.	Description	Observations				
1	Sample no.	1	2	3	4	5
2	Container no.					
3	Mass of empty container with lid () g.	19.29	20.57	13.45	23.78	21.48
4	Mass of container with lid and moist soil () g.	63.01	75.28	62.27	75.66	57.38
5	Mass of container with lid and dry soil () g.	61.21	72.48	60.18	73.31	55.75
6	Mass of water () = - g.	1.8	2.8	2.09	2.35	1.63
7	Mass of dry soil () = - g.	41.92	51.91	45.73	49.53	34.27
8	Water content	4.29	5.39	4.57	4.74	4.76
9	Average water content	4.75				

Water content (moisture content):
It is ratio of weight of water to the weight of solids in soil-mass.
Result:

Average water content (W) of Malingaon soil sample in percentage's = 4.75%

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IV. DETERMINE DRY DENSITY OF SOIL IN FIELD BY CORE CUTTER METHOD AS PER I.S. 2720 (PART-XXIX)-1975 REAFFIRMED 2010

- Measure the height and internal diameter of the core cutter. (Nearest to 0.25 mm)
- Find the mass of empty core cutter nearest to 1.0 gm (). Apply grease to inner surface of core cutter and dolly.
- Expose and level small are, approximately 30 cmX30 cm on the ground where field density is to be determined.
- Place the core cutter with cutting edge on the debris or ground. Place dolly on the top of the core cutter.
- Ram the core cutter down vertically in to the soil layer until only 15 mm of the dolly protrudes above the surface.
- Remove soil surrounding to cutter with pickaxe till bottom of core cutter is seen. Remove the dolly.
- Take out the core cutter with soil such that some soil shall be projected from the lower end.
- Trim ends of the soil core flat to the ends of the cutter using straight edge. Clean outside surface of core cutter.
- Find mass of the core cutter containing soil core nearest to 1.0 gm..
- Remove soil core from the cutter. Take representative sample of the soil for its water content determination. (Sample to be taken from middle of the cutter.)
- Repeat the above procedure in near vicinity at two more places such that average should not after significantly.
- Calculate and report average bulk density and dry density of the soil.

Observations:

Internal diameter of core cutter (d)=10 cm.
Height of core cutter (h) = 13cm.
Volume of core cutter (v) = = 1021.01c

Table No 2 Dry Density Sample reading

SR. NO	DESCRIPTION	OBSERVATION				
1	Sample no.	1	2	3	4	5
2	Mass of empty core cutter ()gm.	0.970	0.970	0.970	0.970	0.970
3	Mass of core cutter +soil core()gm.	1.430	1.750	1.630	1.500	1.480
4	Mass of soil core (W= -)=gm.	0.460	0.780	0.660	0.530	0.510
5	Bulk density(gm.	0.045	0.07639	0.0646	0.0519	0.0499
6	Water content container no.	A	B	C	D	E
7	Mass of empty container with lid(.)gm.	13.29	29.96	17.12	17.69	12.81
8	Mass of container with lid and moist soil.gm.	50.42	69.94	53.15	52.49	45.25
9	Mass of container with lid and dry soil.gm.	47.25	66.27	47.82	47.49	40.72
10	Mass of water (=-)gm.	3.17	3.67	5.33	5	4.53
11	Mass of dry soil	33.96	36.31	30.7	29.8	27.91

	(= -)gm.					
12	Water content	9.33	10.107	17.36	16.778	16.23
13	Average water content(W)	13.95%				
14	Dry density	0.041	0.069	0.055	0.044	0.0429

V. RESUIT

Average bulk density of soil in field () is=0.057558 kg/cu.m.
Average dry density of soil in field () is=0.05038kg/cu.m.
Different zones are depicted in different colour shades.
FLAC evaluates factor of safety using strength reduction method. It is found that for the combination of shear strength parameters considered, factor of safety evaluated is one. Also the modeled slip surface agrees well with the observed one as the failure surface covers part of 4th zone, whole of 3rd zone and part of 2nd zone.

VI. CONCLUSION

Rainfall-induced landslides are very common natural disasters which cause damage to infrastructure and may result in the loss of human life.
These phenomena often take placein unsaturated soil slopes and are triggered by the saturation of the soil profile due to raininfiltration which leads to the decrease of effective stresssand loss of shear strength.
Often, rainfall-induced landslides develop into debrisflows which can experience high velocities andresult in catastrophic outcomes. The study of the initiation conditionsfor rainfall-inducedlandslides is very important in order to predict these phenomena and be able to develop reliable.
The unstable slopes are really challenge in the study area, the landslide caused in mainly in rainy season causes the loss of property human life.
From the above study it is clear observe that though landslide is naturally occurring disaster, happened in Malin village was triggered due to many human causes and main factor with the heavy rainfall.

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