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Experimental Behavior of Model Mse Wall

P.Shivananda[1] and Bincy.V.K[*2]

[1]Professor,School of Civil Engineering,REVA University, Bengaluru, India
[2]PG student, School of Civil Engineering, REVA University, Bengaluru, India

ABSTRACT

This paper analyses the experimental behavior of model MSE wall. The load carrying capacity can be measured by applying static load. Performances of reinforced earth structures are analyzed in the laboratory model MSE walls are built using facing element as paver blocks and Geosysnthetic strips as a reinforcement of size 900mm×600mm×450mm, in three different casesOpen strip reinforcement, End block anchored strips, Continuous strips so one face to another face. The performance of continuous strip reinforcement so one face to another face performed well with respect to high load carrying capacity with less deformation. This method is suitable for construction of roads of embankments and minimizes the slope width of the roads.

KEYWORDS: -Static load, Geosysnthetic strips, load carrying capacity

***Corresponding author**

Bincy.V.K

PG Student,School of Civil Engineering,

REVA University, Yelahanka

Bangalore - 560064 Karnataka, INDIA.

Email:bincyvk22@gmail.com

Mob No: +91 7760177290

INTRODUCTION

Mechanically stabilized earth (MSE) walls, also called reinforced soil walls, are commonly used structures for retaining the earth under bridges, highways, railroads, water front ports, and various other types of infrastructure. These walls are constructed from the bottom up by placing alternating layers of soil and reinforcement. The reinforcement could be a relatively extensible product such as Geosynthetic strips used. The walls are in filled with granular soil, with reinforcement, while retaining the backfill soil. The RE wall was constructed in the laboratory in same way as the large walls in the fields. The wall was brought to failure by applyingload through the loading machine were observed. Load test evaluates the bearing capacity of foundation. The applied load is same as the moving vehicle load.

METHODOLOGY AND RESULTS

Performances of reinforced earth structures are analyzed in the laboratory model MSE walls are built using facing element as paver blocks and geosysnthetic strips as a reinforcement, in three different cases:

1. Open strip reinforcement
2. End block anchored strips
3. Continuous strips so one face to another face

Figure1.Loading machine

Performance of above MSE wall was tested under the using loading machine. The performance of continuous strip reinforcement so one faces to another face performed well with respect to high load carrying capacity with less deformation.

When the load applied through open strip method (or) cut strip method the walls get failure because the load is not distributed uniformly to the entire surface. But in the case of Continuous strips (or) full strip method reinforced strip connect one face to another face so there is no failure to be occurred because the load distributes back to back.

1. LOADING TEST ON OPEN STRIP REINFORCEMENT

Aim:

To determine the strength of the mechanically stabilized earth wall applying load

Procedure:

1. By using interlocking blocks built the first layer of facing element of both sides of the wall.
2. The geosynthetic strips are placed at 1/3rd of the width of the wall on either side, only one end of the both sides of the reinforcement is fixed to the facing wall.
3. The M-sand was placed in the first layer of the wall and it was compacted. The same strips are followed to construct the remaining height of the wall.
4. The load is applied on the wall and also the corresponding settlement is observed .

From the observation the maximum stress that the wall can withstand in open strip method is25.42kN/m^2 corresponding settlement is 600 mm at s/B% is 4%

2. LOADING TEST ON CONTINUOUS STRIPS SO ONE FACE TO ANOTHER FACE

Aim:

To determine the strength of the mechanically stabilized earth wall by applying load

Procedure:

1. By using interlocking blocks built the first layer of facing element of both sides of the wall.
2. The geosynthetic strips are connected one face to another face along the facing element.
3. The M-sand was placed in the first layer of the wall and it was compacted. The same strips are followed to construct the remaining height of the wall.
4. The load is applied on the wall and also the corresponding settlement is observed.

Figure2.Continuous strips so one face to another face

The maximum stress that the wall can withstand in continues strip so one face to another face is 177.45kN/m^{2}corresponding settlement is 600 mm at s/B% is 4%

3. LOADING TEST ON END BLOCK ANCHORED STRIPS

Aim:

To determine the strength of the mechanically stabilized earth wall by applying load

Procedure:

1. By using interlocking blocks built the first layer of facing element of both sides of the wall.
2. The geosynthetic strips are connected one face to another face along the facing element and introduce a block at the end of the reinforcement.
3. The M-sand was placed in the first layer of the wall and it was compacted. The same strips are followed to construct the remaining height of the wall.
4. The load is applied on the wall and also the corresponding settlement is observed
5. Finally the graph is plotted between stress v/s settlements.

Figure3. Block at the end of the reinforcement

From the observation the maximum stress that the wall can withstand in end block anchored strip is 63.55kN/m^2 corresponding settlement is 650 mm at s/B% is 4.33%

Performance of the MSE wall using 900mm×600mm×450mm model box using M sand and Geosynthetic strips as reinforcement with confinement using loading machine are carried out. Loads are applied in three cases 1. Open strip reinforcement, 2. End block anchored strips and 3.Continuous strips so one face to another face. The maximum stress that the wall can withstand in open strip method is 25.42kN/m^2, maximum stress that the wall can withstand in End block anchored strips is 63.55kN/m^2 and the maximum stress that the wall can withstand in Continuous strips so one face to another face is 177.45kN/m^2. Settlement at maximum stress and s/B % at maximum stress are shown in table 1.

Table1.Loading Test on model RE wall results

Sl no	Experimental details	Maximum Stress (kN/m^2)	Settlement at Maximum Stress (s) mm	s/B % at Maximum Stress
1	Loading test on Open strip reinforcement	25.42	650	4
2	Loading test on Continuous strips so one face to another face	177.95	600	4
3	Loading test on End block anchored strips	63.55	650	3

Comparison between performances of reinforced earth structures are analyzed in three different cases. Open strip reinforcement, end block anchored strips continuous strips so one face to another face. Continuous strips reinforcement gives maximum strength followed by than end block anchored strips and open strip reinforcement.

Stress strain behaviorand bearing capacity s/B % behavior graph obtained by the above laboratory tests. Stress strain graph should be plotted by settlement (mm) and stress (kN/m^2) acting on the soil block. Whereas bearing capacity s/B % graph plotted by bearing pressure (kPa) and footing settlement (s/B in %).

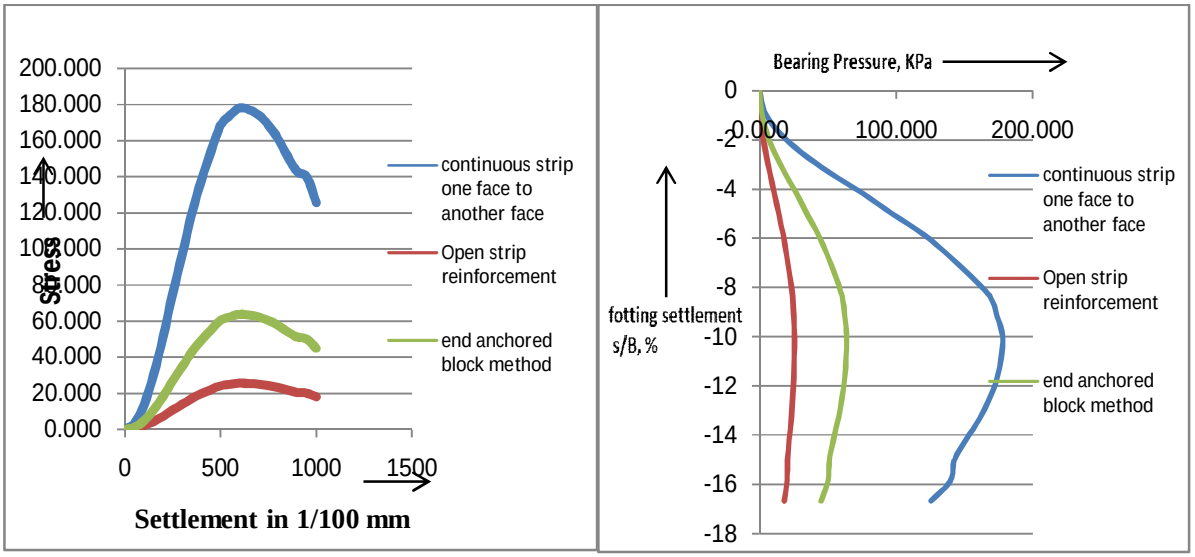

Chart1. Stress strain behavior graphChart2. Bearing capacity s/B % behavior graph

CONCLUSIONS

Performance of the MSE wall using 900mm X 600mm X 450mm model box using M sand and Geosynthetic strips as reinforcement with confinement using loading machine are carried out. Loads are applied in three cases 1. Open strip reinforcement, 2. End block anchored strips and 3. Continuous strips so one face to another face.

- By providing End block anchored to the strips takes $63.55kN/m^2$, stress at failure which is almost 2.5 times more than open strip method, due to anchor blocks, resists and transfers the stress to soil.

- By providing Continuous strips so one face to another takes 177.95 kN/m^2, stress at failure which is almost 7 times more than open strip method, due to facing elements resists and transfers the stress to soil.
- Hence, instead of free end strip providing End block anchored or Continues strip method are more stronger and stiffer compared to open strip method.

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