

Construction of Flyover using Maccaferri MacRes® System

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Abstract :- Maccaferri MacRes® system has been developed to create vertical concrete faced soil reinforcement structures, it is used extensively in infrastructure and anywhere that requires a vertical faced structure capable of resisting high loads. The system consists of a combination of geostrip soil reinforcements (ParaWeb) connected to large concrete facing panels. The ParaWeb polymer geostrip linear reinforcement is placed between compacted layers of structural backfill and is intimately connected to the precast concrete fascia panels. The fascia panels are erected in progressive layers as the height of the reinforced compacted backfill rises behind. The concrete panels are designed and detailed according to the requirement of the project. The panels can be supplied with specific face finishes depending on the aesthetic demands of the client. The following paper discusses the details of the same system.

Keywords: - Boundary walls, Bridge Abutments, Construction of Flyover, Crusher walls, Maccaferri MacRes System, Reinforced Soil walls.

I. INTRODUCTION

Maccaferri MacRes® is a cost effective engineered solution through vertical walls with concrete panels which can be used where only narrow construction corridors are available or a reinforced soil structure with a vertical face in urban areas is required.

The basic principle of MacRes® is Reinforced soil. *Soil is strong in compression (when confined) but weak in tension. Resistance to tensile strain can be provided by reinforcements.* Interaction between reinforcement and soil is provided by friction and/or mechanical interlock depending on the condition of the soil and site.

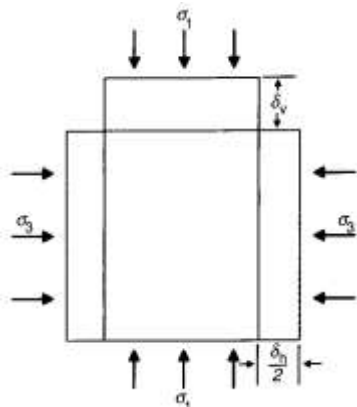


Fig 1:- Soil without reinforcement

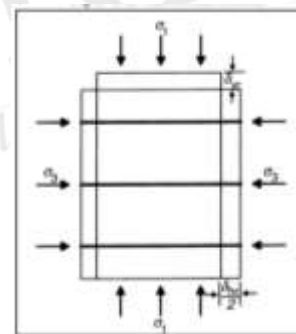


Fig 2:- Soil with reinforcement

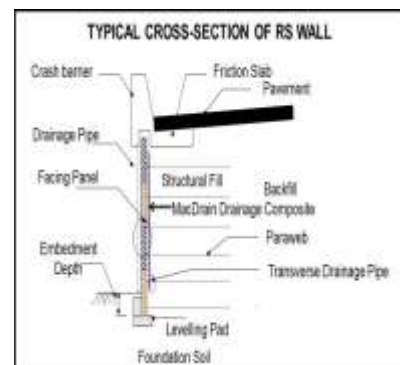


Fig 3: Typical Cross Section of RS Wall

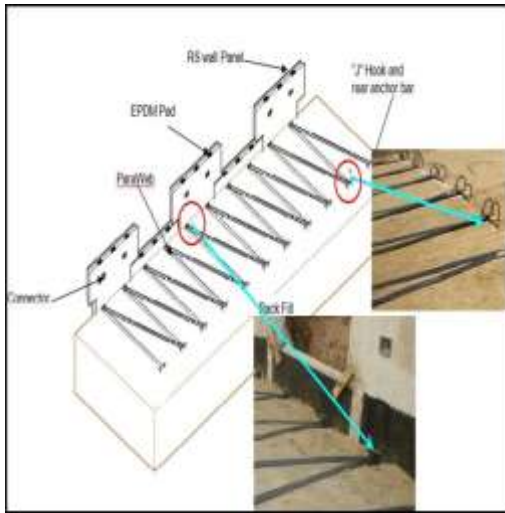


Fig 3: Laying of ParaWeb™



Crusher Plant (Crusher walls)



Building Sector (Boundary walls)

II. APPLICATIONS OF RS WALLS



Road Sector (Flyovers, Underpasses, Rail over Bridge (ROB), etc)



Water Front Structures



Bridge Abutments

III. INSTALLATION OF RS WALLS

A. Casting of Panels:

The panels shall be cast at the casting area using moulds.



Mould



Stacking of Panels

B. Panel Erection:

The Panels are transported from the casting yard to the site on trailers. The panels are then erected on site using a Hydra Crane. Alignment of the panels is checked.



Casting Process



Erection of Panels



Panel after De-shuttering



Alignment of Panels



Curing Process



Timber supports to prevent over-turning

C. Filling and Compacting:

For filling material, it is advisable to use granular fill materials with fines less than 15%. Minimum angle of internal friction should be 30 degrees and plasticity index should be less than 6.

Care should be exercised when placing, spreading and compacting fill to ensure that heavy plant is not used within 2.0m of the panels. Light or Baby roller must be used in this area. Fill should be spread in a direction parallel to the facing panels.

Filter media must be provided behind the panels to allow excess water to flow out.


Dumping of Fill Material

Compaction with 1 ton roller immediately behind the panels.

Grading of Fill Material
D. Tests on Backfill:

After proper rolling and compaction is completed, the density of the compacted soil is checked. This is done by using the Modified Proctor Test and the Field Dry Density test by sand replacement. The Density achieved must be 97% of the Maximum Dry Density(MDD)


Rolling and compaction of soil



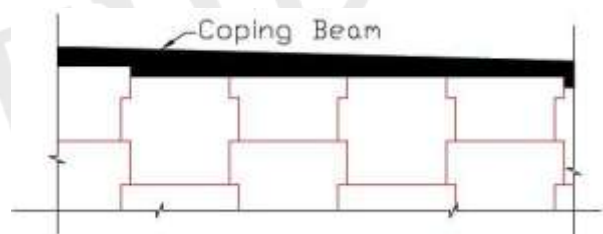
E. Laying of ParaWeb:

Laying of ParaWeb

Laying of ParaWeb

F. Coping Beam:

In case of highway projects, crash barrier friction slab is provided on the Reinforced soil wall to avoid any vehicle accidentally jumping off the RS Wall retained embankment. To negotiate the slope of the approach, panels are stepped by 200mm


Coping Beam

IV. ADVANTAGES OVER CONVENTIONAL SYSTEMS

- **Economical:-** Lower cost of system in general (considering polymeric reinforcement & thin concrete fascia), simple and efficient means of erection. Cost saving in the range of 30% to 50% due to less execution time.
- **Speed:-** Much faster than a reinforced concrete structure. The rate of output may vary. In Situations where conditions permit, 75 m² to 100 m² of work can be done per day.
- **No Specialized labour required**
- **Appearance:-** The concrete panels are designed and detailed according to the requirement of the project. The panels can be supplied with specific face finishes depending on the aesthetic demands of the client.
- **Flexibility:-** it can allow differential movement of 1 in 100. Which means it has good earthquake resistance Design.
- **Resistance against corrosion**
- **Indian Production.**

V. CONCLUSION

Maccaferri MacRes® system is ideal for the construction of vertical walls subject to high loads, or where architectural requirements demand a specific finish to the exposed wall face. The development of innovative solutions for retention works is one of Maccaferri's main research areas.

Installation instructions are provided with the construction components (Concrete facing panels, soil reinforcement and connectors) for the MacRes system which, together with preliminary design based on the characteristics of the reinforced soil, offer:

- High load bearing capacity
- Durability
- Overall cost effectiveness for implementation over a large area due to its simplicity and speed of installation
- Flexibility to meet layout requirements
- Ease of inclusion within various architectural contexts (Different types of finish)
- It has been possible to achieve this result by combining the geotechnical skills, structural engineering and know-how and materials knowledge which has been acquired by Maccaferri over many years.

VI. ACKNOWLEDGEMENT

I would like to thank Maccaferri Environmental Solutions Pvt Ltd for giving me an opportunity to do my internship at their MacRes vertical wall site.

I would like to thank Mr Thomas Cherien, Head of quality, and Mr Ratnakar Mahajan, Head of Technical (Core), who directed me and gave me insights of the projects. They also guided and supported me and imparted in-depth knowledge throughout my period of internship.

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