International Journal of Multidisciplinary Research and Development

Volume: 2, Issue: 8, 590-592
Aug 2015
www.allsubjectjournal.com
e-ISSN: 2349-4182
p-ISSN: 2349-5979
Impact Factor: 3.762

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Tension Pilling for Cell Filled Concrete Pavement

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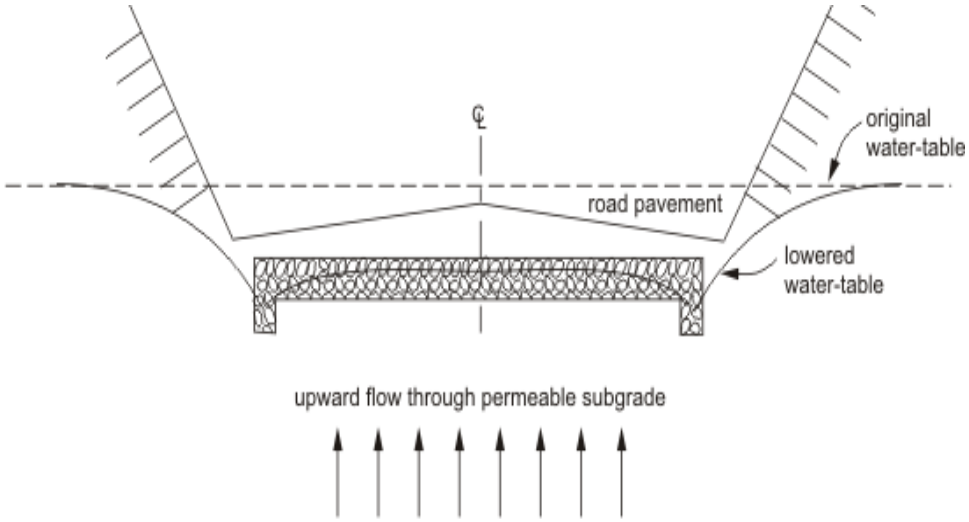
Abstract
Currently adopted method of concrete pavement is durable but comes with less economy, over small scale pavement construction this method is expensive and have some pre-construction requirements at site. A novel method of cheap and low depth concrete pavement is cell filled concrete pavement. But this method is prone to seepage stability and instability on maintaining structural integrity on the action of water. To counter this issue and make more stable pavement with low depth the hypothesis of providing low depth tension piles underneath at regular interval is described in this paper. Provision of this piles along with the cell at regular interval can provide seepage stability and structural integrity to the pavement making it more stable and durable to weathering actions.

Keywords: Cell Filled Concrete Pavement, Tension Piles, Uplift stability, Durable concrete Pavements, Structural Design, Structural Analysis.

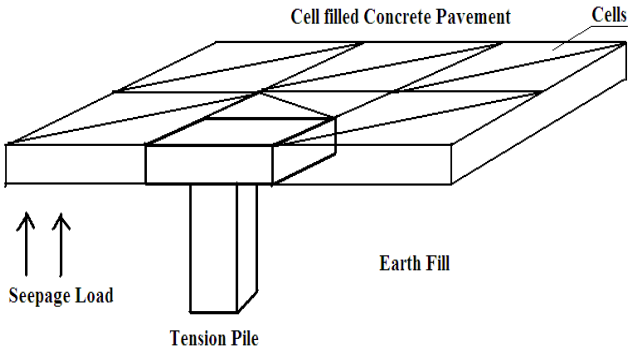
Introduction



Currently used techniques involves in laying off the polymer cell sheet onto the soil surface and filling the open cell cavities with a proper grade of cement concrete. This method is under experimental stage and provide the same strength at half the depth to the pavement. Some of the issues are less stability to seepage and water weathering actions. The stability toward maintaining the structural integrity is restricted to low loads and ideal conditions with optimum weathering conditions. Proposed solution for providing stability is anchor the pavement to the ground with short tension piles for increasing the stability and increase load carrying capacity without and structural failure.

2. Design Mechanism

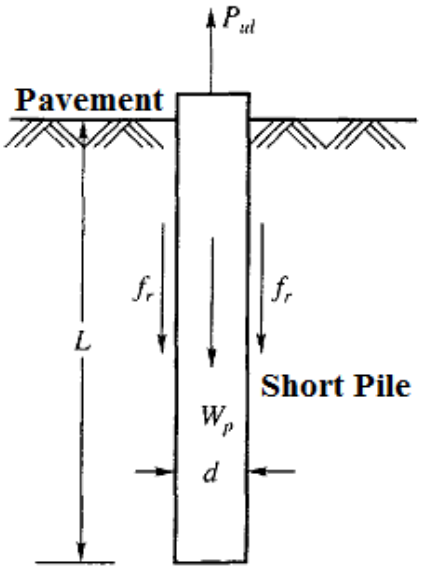
Proposed design consist of a short column of rectangular cross-section with a column cap and is punched into the soil before construction. This pile can be acted as an anchor for the pavement to be constructed. The pile have the property of taking on tension loads by using skin friction at its periphery. Design mechanism of friction piles is the cohesive nature of the soil to the concrete surface. The pile are connected to the pavement at regular intervals to provide chain of tension piles suitable or the design seepage pressure and weathering actions.



3. Components and installation

3.1 Components

Major components are the Polymer cell sheet with adjacent cells connected to each other. The provision of a gape at regular interval in the sheet for installation of pile cape. Other major components are a suitable concrete mix with a suitable workability.



3.2 Installations

- Leveling off the ground.
- Transferring of the layout to the field with proper alignment.
- Punching of the tension piles at specified points.
- Using Hydraulic media or hammers.
- Installation of the polymer cell sheet at proper alignment.
- Preparing of the concrete mix of suitable workability and pre designed slump.
- Pouring of the concrete into the cell and the adjacent of the pile cape.
- Compacting of the fill with vibratory compactors.
- Curing for 27 days with optimum standard water.

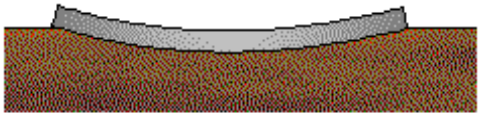
4. Design Limitations/Aspects

The design aspects involves;

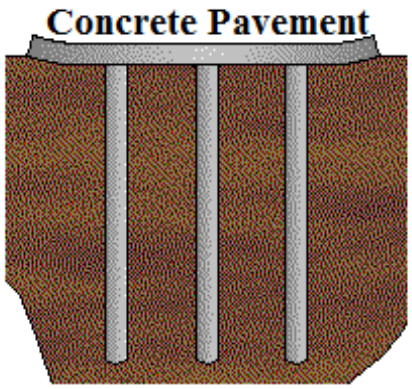
- Calculation of seepage pressure at the site using standard experiments.
- Determination of the soil properties related to water action like swelling and contracting.
- Design of the pile cape to stand against punching shear and crushing.
- Suitable cross section of pile for limited settlement.
- Optimum depth to the pavement for the design load.
- Intervals suitable for the provision of the tension pile.
- As concrete is weak in tension, so provision of steel reinforcement for tensile stresses.

5. Target Applications/ Improvements

- Increased Stability against seepage pressure.
- Increased structural integrity on higher loads.



Settlement Instability



Structural Stabilizing Piles

- Reduction in depth from conventional concrete pavement.
- Increased economy efficiency from currently adopted cell filled pavements.
- Application for fast techniques for pavements in new and difficult terrains with high weathering actions.

6. Acknowledgment

We wish to thank our mentors and college for supporting us in completing our work on Tension Pilling for Cell Filled Concrete Pavement. We also wish to thank our parents for providing us with assets that helped us completing research regarding this concept.

7. References

1. Fleming, W. G. K. *et al.*, 1985, Piling Engineering, Surrey University Press; Hunt, R. E., Geotechnical Engineering Analysis and Evaluation, 1986, McGraw-Hill.
2. Coquito, Donald P. *Foundation Design:* Principles and Practices 2nd ed., Prentice-Hall Inc., 2001.
3. NAVFAC DM 7.02 Foundations and Earth Structures U.S. Naval Facilities Engineering Command, 1986.
4. Rajapakse, Rowen. Pile Design and Construction Guide, 2003
5. Tomlinson, P.J., Pile Design and Construction Practice, 1984.
6. Fast full-depth pavement repair: To open a pavement to traffic quickly, it takes more than just fast-setting concrete. By Gerald F. Voigt. Concrete Repair Digest. April/May 1995.

7. Concrete Pavement Rehabilitation, Guide for Full-Depth Repairs. U.S. Department of Transportation, Federal Highway Administration, August 2003. By Angel Correa and Bing Wong. 24 pages.
8. State of California DOT, Division of Engineering Services. The Effectiveness of Diamond Grinding Concrete Pavements in California, May 2005. 33 pages.
9. Love, Dean (1982). Reef Lights, Key West, Florida: The Historic Key West Preservation Board. ISBN 0-943528-03-8
10. Tomlinson, ed. (1852–54). Tomlinson's Cyclopedia of Useful Arts. London: Virtue & Co. p. 177. [Maplin Sands] was not, however, the first screw-pile lighthouse actually erected, for during the long preparation process which was carried on at Maplin Sands, a structure of the same principle had been begun and completed at Port Fleetwood.