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Technical Bulletin

FROM SPEIGHT, MARSHALL & FRANCIS, P.C.

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Soils Reports

Useful information you can build on

Introduction

A soils report contains information crucial for design of foundations, retaining walls, roads, BMP's, and pavements. Though it is often seen as an unnecessary design cost, it is an important tool in preliminary building design and layout and should not be overlooked.

What does a soils report provide?

One of the more important bits of information a soils report provides is a soil's bearing capacity. Bearing capacity is the ability of a given soil to support loads applied to the ground. Geotechnical engineers evaluate soil profiles present at the site and apply a factor of safety to determine the allowable bearing capacity used for foundation design.

In softer soils, large settlements may occur before a soil reaches shear failure. In cases like this, the allowable bearing capacity will be governed by the allowable settlement. Settlement may not cause a collapse, but it could lead to structural damage or cracking of finishes or facades.

In other instances, the information provided in the soils report helps the Owner to develop accurate cost estimates as related to earthwork, particularly for sites where large amounts of fill are present and sites requiring undercutting.

Along with bearing capacity and settlement information, a soils report provides a profile showing the various layers of soil (strata), soil weight, lateral pressures for below grade walls, seismic characteristics, and recommendations for testing of soils during construction.

When is a soils report required?

Per IBC 2006 section 1802, a soil investigation must be conducted under the following circumstances:

- Questionable soils – where classification, strength, or compressibility are in doubt
- Expansive soils – subject to shrink/swell
- Ground-water table within 5 feet of lowest floor – when lowest floor is below finished ground level
- Pile/pier foundations
- Rock strata – to assure the soundness and consistency of the foundation bed
- Seismic Design Categories C, D, E or F.

However, the building official has the ability to waive a soils investigation where “satisfactory data from adjacent areas is available that demonstrates an investigation is not necessary for any of the conditions” listed.

Benefits of soils reports:

Without a soils report, a minimum bearing capacity must be assumed. For an area like South Hampton Roads in Virginia, the IBC states that a minimum bearing capacity of 1500 pounds per square foot should be used in design if a soils report is not available. Some soils investigation reports for the Hampton Roads area have reported allowable bearing capacities up to 3000 pounds per square foot. Using the higher allowable bearing capacity results in cost savings in terms of the amount of concrete and reinforcing used in foundation design.



Drill crew performing soil test borings

Who does it protect?

- Owner – more economical foundation design
- Designer (arch/str/civil) – alerts to total and differential settlements
- Builder – minimize encountering unknown poor soils during construction or building on poor soils

What can happen if no soils report is done?

Excessive settlement, failure, shrink/swell, long-term damage down the road. Fixing inadequate foundations is, more often than not, extremely expensive and highly disruptive to the occupants of buildings.

Conclusion

While soils investigations and reports can be waived by building officials, the value of the information they provide should not be disregarded. The additional cost incurred at the beginning of the project can reap great savings in the final design & construction costs and would minimize change orders. In this day and age it would be considered wise to obtain a soils report for all projects regardless of their size or dollar value.

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Future Technical Bulletins will address the different types and uses of piles and piers and look more closely at soil surcharge.

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