

In preparation:

A HANDBOOK OF TROPICAL RESIDUAL SOIL ENGINEERING

Residual soils are found in many parts of the world. In tropical areas, residual soil layers are often extensive and may continue downwards for hundreds of meters before unweathered rock is reached. Since most foundations, excavations and embankments will therefore be built on or in such soil, and as residual soils are often used as construction materials, it is vital that the properties and peculiarities of tropical residual soils are well understood.

The Handbook of Tropical Residual Soil Engineering is intended as a complete reference source and manual for every engineer working on or interested in soil and foundation engineering in tropical areas. Almost all aspects of tropical residual soils are treated, including a range of engineering applications. A dedicated part of the book is focused on region and country specific sections, including typical characteristics, soil conditions and practical cases. Ultimately, the final pages present tables and charts with typical data.

This unique handbook will constitute an invaluable reference and should be a standard work in the library of any engineer involved in geological, foundation, and construction engineering work in tropical residual soil.

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Suggestions about the outline will be welcomed, please send an e-mail to the Editors

PRELIMINARY OUTLINE

Part A. General principles with theory and applications

- 1. Introduction:** Aims and Scope. Why tropical soils are different. Regions of the world where tropical residual soil engineering is important. Role of climate and hence why unsaturated behaviour is important.
- 2. Tropical Residual Soils:** Genesis and classification. Review of modes of formation of residual soils. Weathering profiles. Mineralogy and fabric. Classification schemes. Overview of different residual soil types: soils derived from volcanic deposits (volcanic ash, ancient lavas, basic and acid lavas), soils derived from igneous rocks (granites and other acid igneous rocks, dolerites, norites and other basic igneous rocks), soils derived from sedimentary rocks (sandstones, siltstones and mud rocks), soils derived from metamorphic rocks (quartzites, schists, slates, greywackes, greenstones, etc), soils derived from soluble rocks (limestones and dolomites), secondary cemented deposits (calcrete, ferricrete, silcrete, caliche).
- 3. Sampling and Testing Tropical Residual Soils:** Sampling techniques – tube samples, block samples, Mazier and other coring techniques. Classification testing – difficulties with Atterberg limits, gradings, compaction etc. Field testing – SPT, CPT, Vane, Pressuremeter, Plate loading, Permeability (lab and insitu).
- 4. Behaviour of Weakly Bonded Soil:** Framework of behaviour for weakly bonded soils. Strength and deformation. Yield and collapse.

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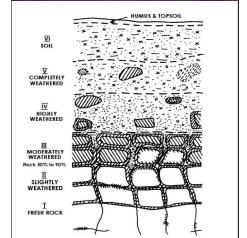
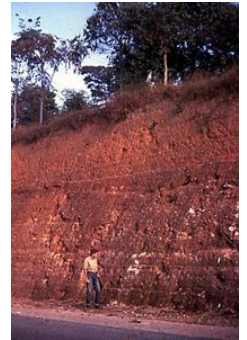
PRELIMINARY OUTLINE *Continued*

Part A. General principles with theory and applications

5. **Behaviour of Unsaturated Soil:** Suction concepts, water retention curves, role of suction in strength and deformation, shrinkage and swelling, unsaturated flow. Testing unsaturated soils - suction measurement in the lab and field, axis translation and osmotic suction control, unsaturated permeability.
6. **Volume Change of Tropical Residual Soils:** Laboratory and in situ measurements, compression, heave or expansion, shrinkage, collapse, saturated and unsaturated conditions.
7. **Shear Strength of Tropical Residual Soils:** Laboratory and in situ measurements, effects of mineralogy, anisotropy and relict soil structure, saturated and unsaturated conditions.
8. **Application: Slope Stability and Retaining Walls in Tropical Residual Soils:** Stability of slopes and retaining walls. Effects of climate and weather, effects of soil mineralogy and relict structure. Suction measurements in slopes. Role of suction in slope stability. Design, monitoring and remedial measures.
9. **Application: Tropical Soils as Road Construction Materials:** Properties of tropical gravels. Role of suction and fabric. Compaction: Laboratory and in situ measurements, effects of working at optimum water content and maximum dry density. Behaviour in road pavements.
10. **Application: Foundations:** Shallow and deep foundations, unsaturated conditions, heave and collapse, monitoring and proof testing.

Part B. Regional & Country case studies (topics to include: formation, profile and distribution of the residual soils; some physical-chemical properties; examples of engineering significance, problems and solutions of the specific region).

Planned: **Central Africa** (Ghana, Nigeria etc); **South America** (Brazil); **Hong Kong**; **India and Sri Lanka**; **Southeast Asia** (Malaysia, Singapore, Thailand, Philippines).



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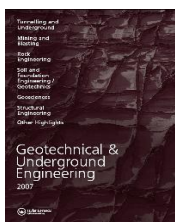
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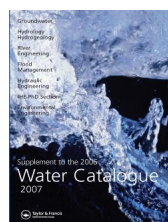
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