

## **ADVANCED CLARITY HECTARES SDN. BHD.**

An Experienced & Reliable Green & Sustainable  
Technologist cum Valued Engineering Provider



**GEOBAMTILE**



# **GEOBAMTILE**

AN EXPERIENCE-BASED PROVEN INNOVATIVE, GREEN & SUSTAINABLE TECHNOLOGY CAPABLE OF SUPPORTING VERY HEAVY CONSTRUCTION SAFELY OVER VERY THICK SOFT SUBGRADE WITHOUT ATTRACTING UNCONTROLLABLE SETTLEMENTS WHILE ENSURING THE ACHIEVEMENT OF ENORMOUS TIME AND COST SAVINGS IN PROJECTS

[www.geobamtile.com](http://www.geobamtile.com)



# GEOBAMTILE

AN EXPERIENCE-BASED PROVEN GREEN & SUSTAINABLE TECHNOLOGY WITH ENORMOUS COST & TIME SAVINGS IN PROJECTS

## INTRODUCTION

This is to introduce an experience-proven soft ground treatment technique known as “BAMBOO-GEOTEXTILE BUOYANT SYSTEM” (acronym: “GEOBAMTILE”). It is agreed that building over deep soft ground is still a very critical engineering problem facing construction industry worldwide including Malaysia. Signs show it worsens as good ground for construction is fast reducing and thus compel more and more constructions to be carried out on soft margin lands. No doubt there are a number of ground improvement methods being used in the market but the fact that failures after failures continue to be reported; some involving major projects, means more reliable awaiting technique(s) should be encouraged, researched & developed upon before being commercialized to benefit worldwide construction industry eventually.

Apart from reliability/dependency consideration the realization that the few commonly used techniques are generally costly and time consuming it provides greater justification for wanting the emergence of an alternative method(s) which devoid these shortcomings. Geobamtile technique, which by virtue of its very successful applications and superb performance shown in ALL previous projects built over myriad deep & critically soft grounds like mangrove swamp, peaty swamp and marine clay or a combination thereof, it may be viewed as a positive move towards the effort of adding a highly reliable and dependable ground treatment method to what already in existence but at the same time must assure that expediency accompanies by enormous project cost and time savings are realizable.

## PROBLEMS CONFRONTING CONSTRUCTION OVER SOFT GROUND

- ◆ Excessive and unceasing settlements in soft ground; may it be total or differential or a combination, cause severe distresses to constructions built above it; may it be geotechnical and/or structural.
- ◆ High construction cost plus long project gestation period caused by sophistication of prevailing ground improvement techniques e.g. Piled embankment, PVD cum surcharging etc.
- ◆ Despite above shortcomings, frequent failures occurred among some commonly used methods would further dampen and compound the sufferings of project implementers concerned.

## PRINCIPLES OF WORKING OF GEOBAMTILE

- ◆ Creates large inexpensive surface area to spread & distribute load applied and thus minimize stress impose on underlain soft subgrade and resulted in reduction of settlement that might produce; bearing in mind the amount of settlement yielded is proportionate to the magnitude of stress applied.
- ◆ Capitalize on buoyancy effect afforded by light bamboo culms (SG = 0.7-0.8) used in the buoyant system. This further minimizes load applied and consequently resulted in stress minimization and consequently the amount of settlements that might develop in the soft subgrade.
- ◆ The Bamboo-geotextile buoyant system devised has allowed heavy constructions to be built directly atop soft subsoil while **relying very little on the strength of the in-situ soft soil for support**, a design notion which is vastly different from most, if not all, Ground Improvement methods which often rely on improving the physical properties & strength of soft subgrade that via, say, the consolidation process.
- ◆ Furthermore, as construction is ‘floated’ on the soft soil foundation where at any one time bamboo-geotextile buoyant system enables an **equilibrium** to be set up between the weight of construction above and the in-situ strength of the soft ground below such that the combined system comes into balance at all times; may it be during or after construction

# GEOBAMTILE

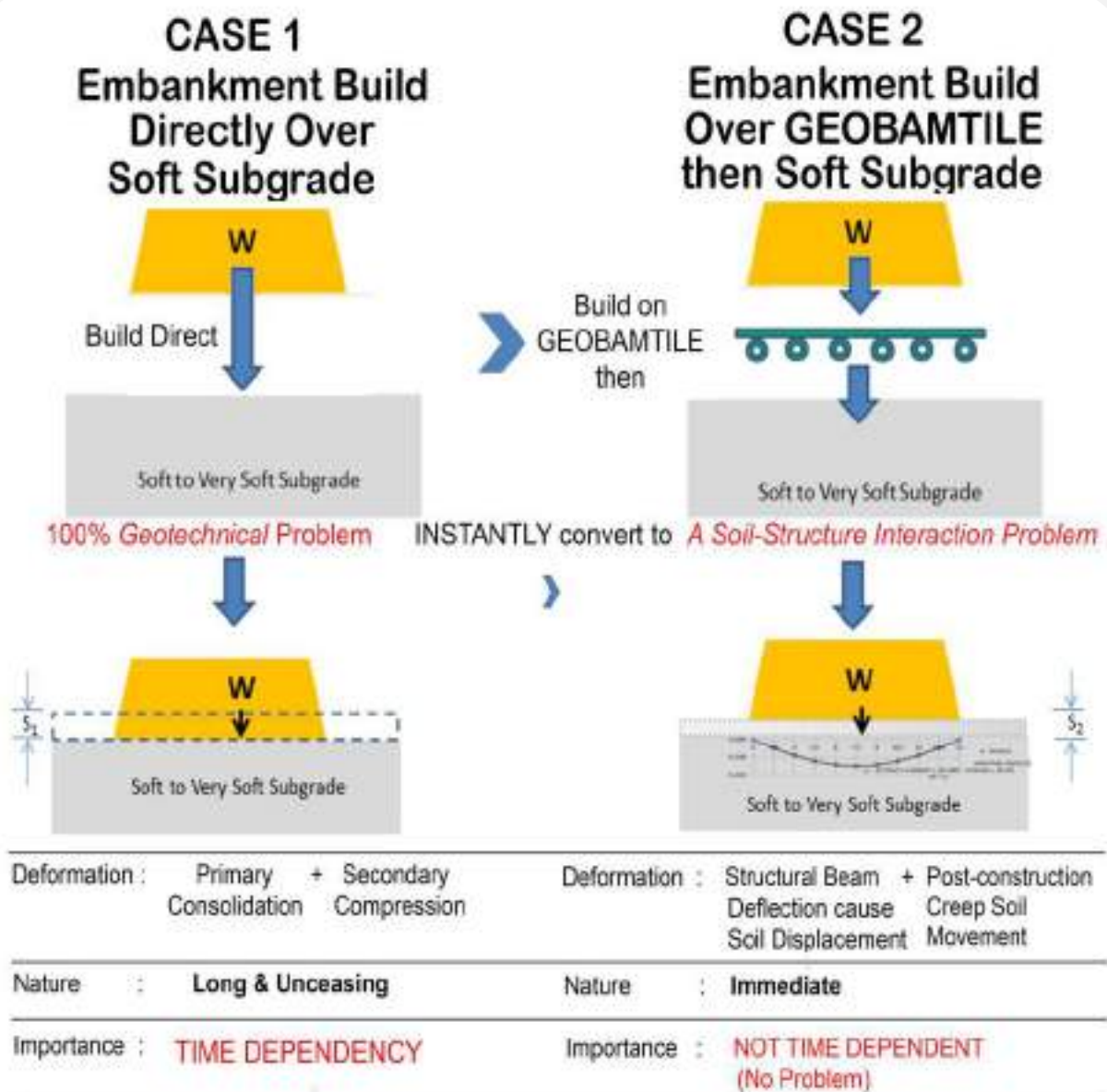
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## COMPARE & CONTRAST GEOBAMTILE AS A GROUND TREATMENT METHOD vs ANY OTHER GROUND IMPROVEMENT METHODS

What is the Most Important Advantage of GEOBAMTILE being a Ground Treatment Method that prevent construction build directly over the soft ground?

Realise this by comparing with any other Ground Improvement/Treatment Method that place construction DIRECTLY over the soft ground.

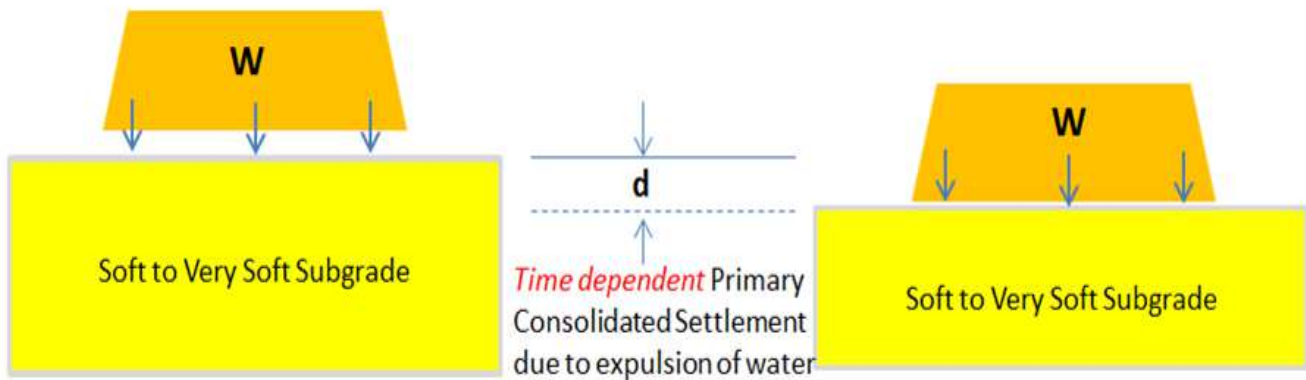
Refer to following diagrams for explanation and clarification.



# GEOBAMTILE

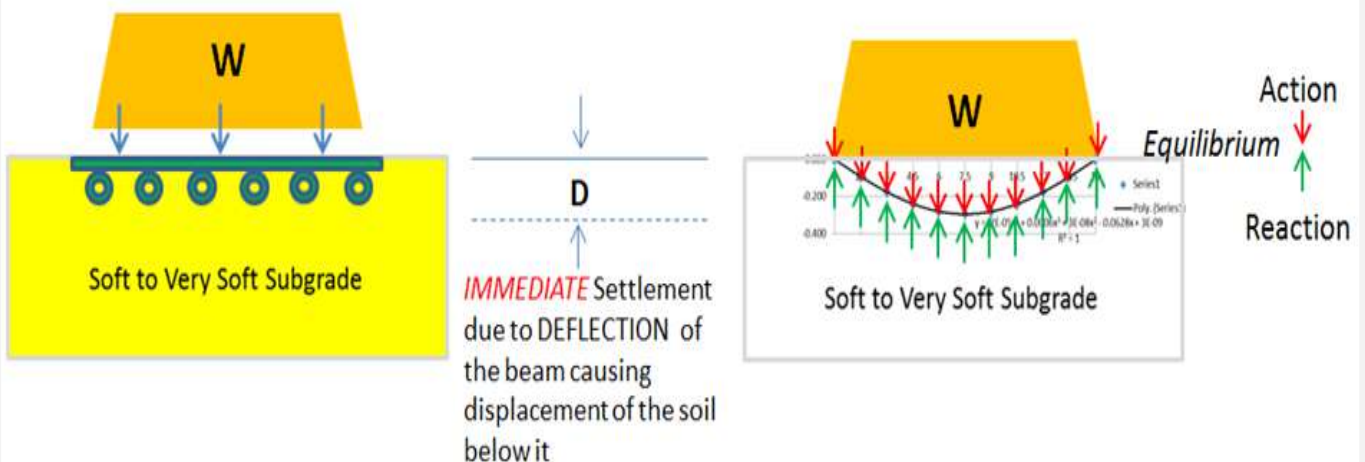
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## CASE 1 - Building Embankment Directly Above Subgrade



Building embankment directly above soft subgrade is **Purely a Geotechnical Problem** that invokes **Consolidation** (expulsion of water) which essentially a **Time Dependent** process

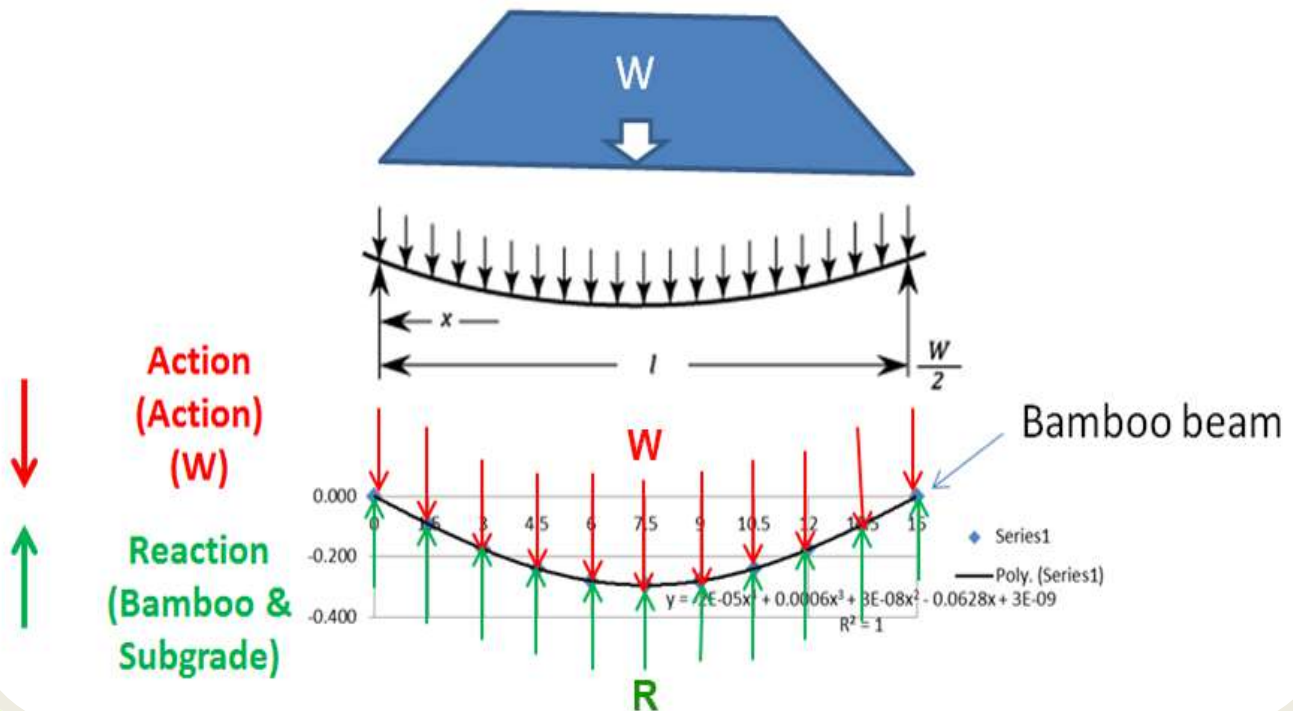
## CASE 2 - Building Embankment Over Soft Subgrade Interfaced by GEOBAMTILE



Building embankment Over Soft Subgrade Interface by Bamboo Grid Frame (as interlayer) would convert into a **Soil-Structure Interaction Problem**

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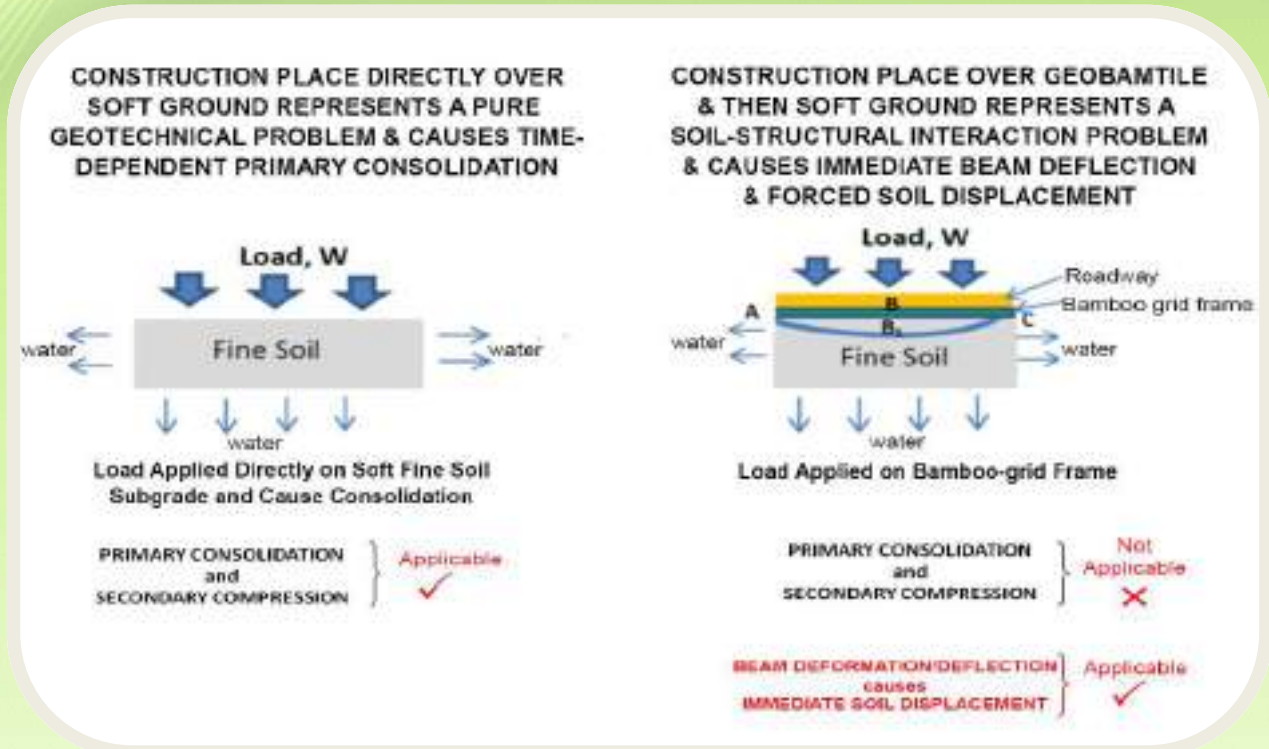


- ◆ At ANY ONE Time, an equilibrium is established at Bamboo-Soil interface because where **Action ( $W$ )** = **Reaction ( $R$ )** (Newton's Laws). When in static equilibrium, the acceleration of the system is zero and the system is either at rest, or its center of mass moves at constant velocity.
- ◆ As such there is little if any pressure is transferred to the soft subgrade (soil) below.
- ◆ In GEOBAMTILE treated soil, vertical load applied is supported by the bamboo-grid frames while *relying little, if any, on the strength of the soft soil below.*
- ◆ A design concept vastly different from ground improvement methods which rely on improved strength properties of soft subgrade via the consolidation process to support construction above.
- ◆ It is important to know that at any one time the GEOBAMTILE system would bend and deflect until an **equilibrium** between the Action due to load applied and Reaction generate by Bamboo Beam/Subsoil interaction is reached and would stop quickly soon after whenever a balanced state is achieved.
- ◆ This will occur at all times; may it be during or after construction.



# GEOBAMTILE

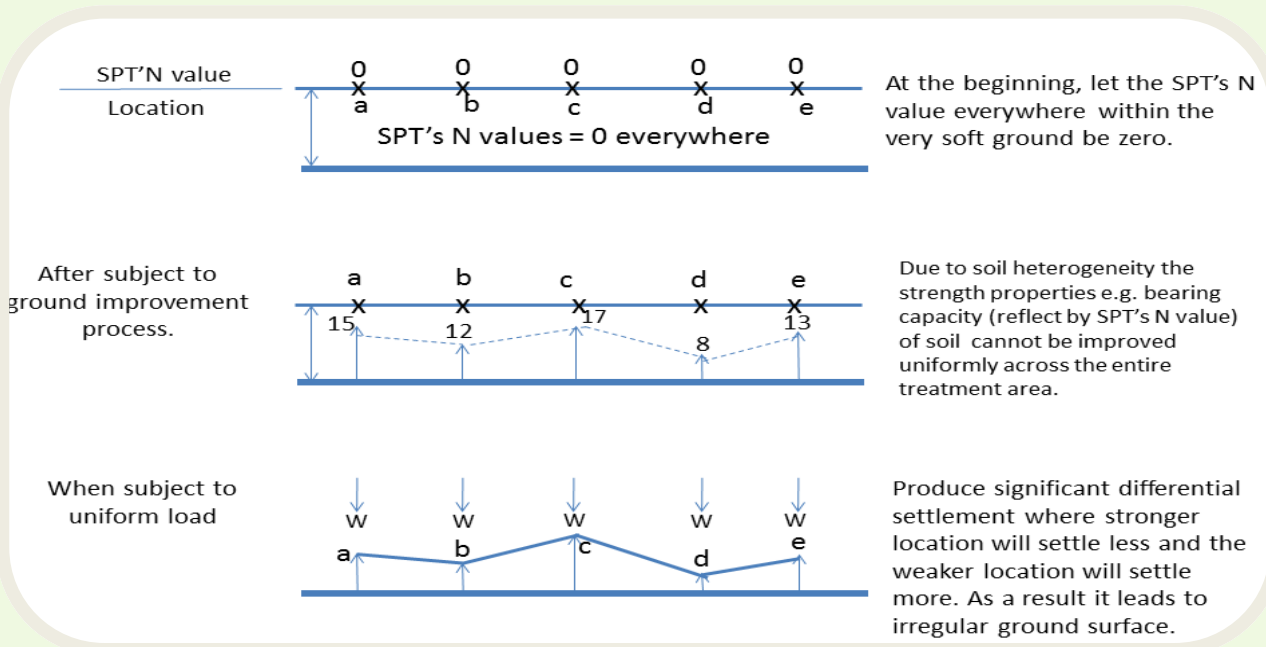
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## POSSIBLE SERIOUS CONSEQUENCES FACING CONSTRUCT DIRECTLY OVER SOFT GROUND

Furthermore, whenever construction is built DIRECTLY over soft ground including that adopt the ground improvement method it is imperative that the strength properties including the bearing capacity of every single inch of the entire treated area cannot be IMPROVED to the same extent due to high heterogeneity of any natural ground.

As a result, at a location of the ground where its bearing capacity is improved to a higher level it would cause the soil to displace/settle to a lesser amount than that at another location where its bearing capacity has been improved to a lower level and accordingly the soil displacement/settlement there would be comparatively higher than the former location. As a result, considerable differential displacement/settlement would arise and this is highly undesirable of course because in the case of a roadway its riding quality and safety to its road users would be adversely affected. In the case of building its columns could be under severe stress.



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## ADVANTAGES

Based on all housing and roadway projects, some prestigious, carried completed using the 'Geobamtile' system, the oldest being ~ 20 years since year 1997 (the New Miri Supply Base Project at Miri, Sarawak, Malaysia) the following advantages are ALWAYS realized from experience without fail and ALWAYS proved itself to compare most favourably with most, if not all, existing ground improvement methods. The advantages summarized are:

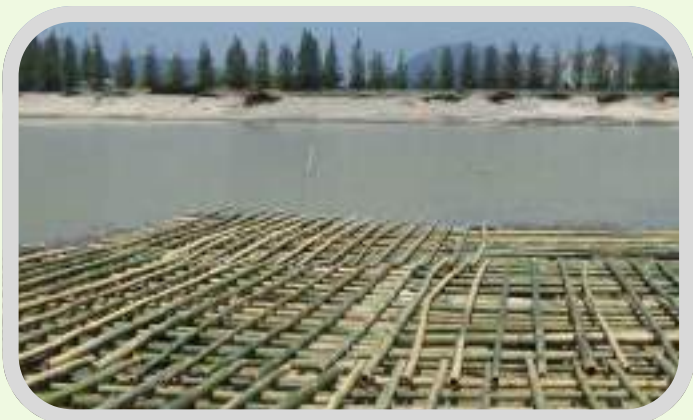
- ◆ Enormous project cost and time savings.
- ◆ Safely support very heavy constructions e.g. building platform & embankment over very soft ground/peat of great depth.
- ◆ Do not attract or able to arrest the development of significant uncontrollable long-term settlements, total and differential alike.
- ◆ Build directly on existing extremely awkward ground like tidal mangrove swamp with little or no site preparation for removal of unsuitable materials (USM) required
- ◆ No surcharging, no bringing in more materials to accelerate consolidation and remove/dispose excess material thereafter and thus avoid costly operation and achieve time saving through no idling of time during surcharging.
- ◆ Due to simplicity of technique it entails no significant construction problem right from its commencement till completion (e.g. bog in or lost of heavy expensive construction machineries/equipment) and even during maintenance and/or servicing periods. All these would mean further project cost and time savings.
- ◆ A truly innovative, green and sustainable approach and thus a most environmental friendly technology.
- ◆ Impart significant positive social impact by bringing economic benefits to rural and indigenous population who harvest and supply large quantity of bamboo material needed for the project. This would compliment the noble aspirations of most governments including Malaysia in their effort to upgrade the standard of living of these groups of usually underprivileged peoples.

## SERVICES RENDERED

**Advanced Clarity Hectares Sdn. Bhd.** is staffed with experienced and competent professionals to render the following services on a one-stop design-and-build basis. They, among other, include:

- ◆ Prepare preliminary project proposal, including cost estimation, design computations and analyses based on data provided
- ◆ Prepare detailed design and construction drawings
- ◆ Provide all materials, labour, equipment and supervision to construct bamboo-geotextile buoyant system as per design at site.

**SOME ACTUAL CRITICAL SOFT GROUNDS WHERE BAMBOO-GEOTEXTILE SYSTEM HAVE BEEN DEPLOYED SUCCESSFULLY TO BUILD TALL EMBANKMENTS AND BUILDING PLATFORMS OVER THEM**





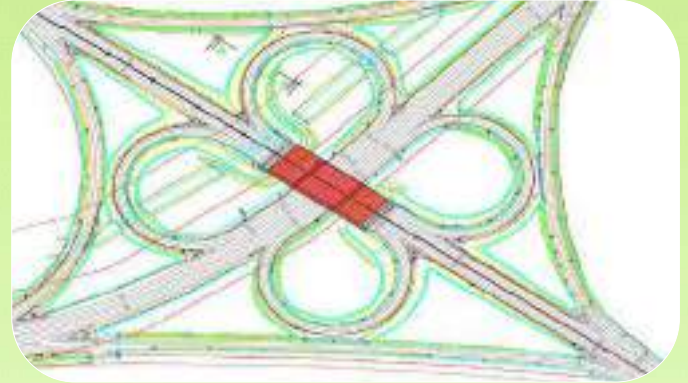
# WONDERFUL TRACK RECORDS

## Some Striking Project Implementation Photos

Cadangan Pembangunan Membina 4 Blok Pangsapuri Yang Terdiri Daripada: Blok A 19 Tingkat 288 Unit, Nlok B 20 Tingkat 304 Unit, Blok C 20 Tingkat 304 Unit, Blok D 20 Tingkat 304 Unit, Serta Kemudahan Lain Untuk Perumahan Penjawat Awam 1 Malaysia, Mukim Lumut, Daerah Manjung, Perak Darul Ridzuan - Alternative Design Proposal For Ground Treatment Method Using Bamboo-Geotextile Buoyant Platform System, 2018



**Cadangan Pembinaan Semula Jambatan dan Kerja-kerja Pembaikan, Persimpangan Bertingkat Jenis Cloverleaf Di KM P2.2 Lebuhraya Sambungan Putrajaya dan Kerja-kerja Yang Berkaitan Ke Selangor Science Park 2, Bukit Baja, Mukim Dengkil, Daerah Sepang, Selangor Darul Ehsan Untuk Tetuan Perbadanan Kemajuan Negeri Selangor (PKNS) – Bamboo-geotextile Buoyant System to Support Highway Construction Over Peaty Ground.**



Stage 1 : Excavation works including removal of premix



Stage 4 : Backfilling Works



Stage 2 : Bamboo Installation Works



Stage 5 : Ground Compaction



Stage 3 : Laying Geotextile



Done

**The Construction and Completion of the Proposed (Bonded) New Miri Supply Base (N.M.S.B.) Complex, Lot 1996, Kuala Baram Land District Miri, Sarawak, Untuk Tetuan Esteem Century Sdn. Bhd., 1996-1998 – Ground treatment using Bamboo-geotextile Buoyant System.**



**Proposed Construction of : 1 Unit Single Storey Bungalow House, 28 Units Single Storey Semi-detached House on Lot 4604, Jalan Haji Iman Yusof/KS13, Klang Selatan, Pulau Indah, Pelabuhan Klang, Selangor Darul Ehsan for Cemerlang Jutabina Enterprise - Ground Improvement with Bamboo-geotextile Buoyant System, December 2012**



**Cadangan Kerja-kerja Pembersihan dan Pengindahan Sungai Melaka (Fasa 1) Phase 1: From Old Clock Tower at Jalan Hang Jebat to Jambatan Hang Jebat near Kg.Morten (Sungai Melaka Rehabilitation and Beautification Project )**



**Projek Kerajaan Persekutuan: Membina Pasar Borong Batu Pahat Di Atas Lot 34477 & Lot 34478, Taman Kota Murni, Batu Pahat, Johor Darul Ta'zim, Untuk Tetuan Majlis Perbandaran Batu Pahat – EA River Wall System dan Bamboo-geotextile Buoyant System for Soft Ground Treatment, Mei 2013.**



**KERJA-KERJA PENAMBAKAN BAGI PEMBANGUNAN SEMULA PERKAMPUNGAN NELAYAN TELUK MUROH, LUMUT, MANJUNG, PERAK—Ground Treatment Work Using 1-Tier Tyre-Bamboo-Geotextile Buoyant System (TBGBS) or Geobamtile, March 2019**



**Permohonan Pelan Bangunan Mengikut Akta 133 Bagi Cadangan Pembangunan Industri Sederhana Yang Mengandungi: 1 Unit Gudang 1 Tingkat Untuk Penyimpanan Kapas Mentah, 1 Unit Kilang 1 Tingkat Berserta Bilik Servis 3 Tingkat , 1 Unit Gudang 1 Tingkat Untuk Penyimpanan Cone Benang Kapas, 1 Unit Kebuk Sampah Di Atas PTD 32642 (PLO 10, Sebahagian PTD 32164), Taman Perindustrian Sedenak, Mukim Bukit Batu, Daerah Kulai Jaya. Johor Darul Ta'zim**



**Cadangan Membina dan Menyiapkan 10 Unit Kilang Berkembar (Fasa 2) Di Atas Sebahagian PT. 646 HS (D) 3778, Taman Perindustrian Zurah, Mukim Rasa, Daerah Hulu Selango, Selangor Darul Ehsan Untuk Tetuan Perbadanan Kemajuan Negeri Selangor (PKNS) – Kerja-kerja Pembinaan “Geobamtile”- Januari- June 2016**





## Advanced Clarity Hectares Sdn. Bhd. (1213774-K)

29, Lorong Datuk Sulaiman 8

Taman Tun Dr Ismail, 60000 Kuala Lumpur

Tel/Fax: +(603) 77286653

Mobile: +(6012) 320 1678

[www.geobamtile.com](http://www.geobamtile.com)

Email : [clarity@geobamtile.com](mailto:clarity@geobamtile.com), [drkslow@gmail.com](mailto:drkslow@gmail.com)



**Ir Dr Low Kaw Sai**  
BSc(Hons) PhD, FEng, FEM, ACP, MISCE  
Director  
+6012-320 1678



**Dr Tioh Ngee Heng**  
BSc (Hons) PhD, BSA DBA  
Director  
+6019-224 9560

**Advanced Clarity Hectares Sdn Bhd** (1213774-K)  
29 Lorong Datuk Sulaiman 8  
Taman Tun Dr Ismail  
60000 Kuala Lumpur, Malaysia  
Tel/Fax: +603-77286653  
Website: [www.geobamtile.com](http://www.geobamtile.com)  
Email: [clarity@geobamtile.com](mailto:clarity@geobamtile.com), [drkslow@gmail.com](mailto:drkslow@gmail.com)

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**Advanced Clarity Hectares Sdn Bhd** (1213774-K)  
29 Lorong Datuk Sulaiman 8  
Taman Tun Dr Ismail  
60000 Kuala Lumpur, Malaysia  
Tel/Fax: +603-77286653  
Website: [www.geobamtile.com](http://www.geobamtile.com)  
Email: [clarity@geobamtile.com](mailto:clarity@geobamtile.com), [dmhtioh@gmail.com](mailto:dmhtioh@gmail.com)

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