



eco Proactive™

Latent Hydraulic Binders

MANY USES, MANY SOLUTIONS

eco Proactive™

**IS AN INORGANIC LATENT HYDRAULIC BINDER FOR SOIL STABILIZATION
APPLICATIONS AND PAVEMENT LAYERS**

Providing rapid, cost-effective roads, sub-base's and hard standing's.

The ecoProactive™ product can:

- utilize the local available base materials without the need to import.
- provide durable long life roads instantly.
- stabilize widely varying and different soil compositions.
- allow for severe continental climate conditions such as frost heave.
- allow for humidity effects found in the tropical regions.
- deal with monsoon and flood conditions.
- provide a system where the most basic labor and tools can apply.



ecoProactive was developed after years of research and development following exhaustive investigation of is impervious to moisture and will existing stabilizers

The use of abundant local raw materials and indigenous soils that are normally set aside and discarded, ecoProactive will hydraulically bind and stabilize these soils and waste materials creating an impermeable layer that will not leach.

The following recognized organizations recommend the use of new technology as methods of constructing new Infrastructure.

Department for International Development;
www.dfid.gov.uk

Asian Development Bank
www.adb.org

International forum for Rural Transport and Development
www.ifrtd.org

Cambodian Ministry of Public Works and Transport
www.mpwt.gov.kh

International Labour Organization (Asia)
www.ilo.org/asia

World Bank
www.worldbank.org



- **How ecoProactive™ works in Asia**
- The extremely low capillary absorption of ecoProactive™ allows the chemical reaction to continue in the most adverse wet conditions.
- The unique blend of ingredients prevents water from entering the layer while retaining the moisture within the layer for hydration and strength gain.
- The low absorption also slows down the rate of thermal heat in the pavement layer thus reducing the stresses and strains due to temperature fluctuations at night.
- **How ecoProactive™ works in Europe**
- The unique subtle change in the blend of the ecoProactive™ prevents moisture from entering or leaching from the treated layer and eliminates the major source of frost damage which is water.
- The low capillary absorption eliminates the water entering the layer during thawing thus preventing heave damage.
- The low thermal conductivity

Durability and Volume Stability

The U.K. Transport Research Laboratory frost heave test indicates that CBM show negligible heave when their compressive strength exceeds 2N/mm^2 . In other words the specimens still maintain their integrity at this strength and can be considered as bound materials and thus superior to unbound materials.

With other HBM designed to achieve a lower strength i.e. CBR values in the range of 15 – 50% past practice has submitted the mixture to frost heave testing and apply the maximum heave criteria – about 12mm that is applicable to unbound materials. However, with such a degree of heave the integrity of the HBM is actually destroyed during the test and it is impossible to know whether the HBM can still be considered "bound" and thus perform as "bound" in the pavement.

Recently using data accumulated during the drafting of the European Standards for HBM, it has been possible to formulate more relevant durability recommendations for these lower strength HBM also including a limit for indirect tensile strength based on French and Belgian experience. The recommendations shown in the table, it should be noted, apply to all HBM irrespective of the frost susceptibility of the aggregate or the soil in the unbound condition.

How ecoProactive works with soils

1. When mixed with a soil ecoProactive and the soil exchange ions creating ionic bonds between the soil and the ecoProactive particles.
2. The soil voids are then filled with “crystalline reaction products” which produce mechanical ties between the soil and ecoProactive stabilising particles.
3. The chemical process continues over a period of time therefore improving soil strength over time.
4. ecoProactive reduces the liquid limit and plasticity index.
5. ecoProactive increases the UCS value significantly.
6. ecoProactive creates a highly impermeable layer.
7. The fines are locked in by chemical reaction and the riding surface is dust free.
8. Any contaminants within the soil are also locked in by a crystalline reaction and there is no leaching.

1. Volume stability: Prevents “swell and shrink” condition by forming an impervious homogenous mass which resists the internal forces created by “swell and shrink”.
2. Strength: Increases the soil strength by the reaction created and provides increased load bearing capacity.
3. Durability: Provides increased resistance to freeze thaw cycles (where applicable) and internal load bearing strains induced over longer period of time.
4. Permeability: Provides greatly increased ability for prevention of water egress.

Development

***from August 2019 there is a single variant**

- Widely different climate conditions and soil types as shown in the previous photographic examples convinced us that research into providing the basic ingredients but with subtle blending changes and activators would provide a stabilizing powder that would meet the difficult and varied demands of each region. We now have 2 variants of stabilizing powder 1 for Asia and 1 for Europe and we are currently involved in a program of research and development further enhancing the efficiency of our stabilizing powders.
- ecoProactive™ slow hydraulic binders comply, and exceed current European Standards for durability and volume stability. These tests are considered mandatory as part of an overall durability assessment.

- ## European Variant

• Strength	N/mm ²
• Sealed cured 07 day	1.56
• Sealed cured 28 day	2.40
• Water cured 28 day	2.00

- ## Asian Variant

• Strength	N/mm ²
• Sealed cured 07 day	1.36
• Sealed cured 28 day	2.70
• Water cured 28 day	2.00

Step 1; Remove all vegetation



2020

Step 2; Grade the area



Step 3; Loosen the base materials to accept ecoProactive powders



Step 4; Spread the ecoProactive powders evenly over pre-arranged grids



Step 5; Carefully homogenise the base material and ecoProactive powders



Step 6; Add correct water dosage



Step 7; Create final Falls and Levels



Step 8 (a) Hydraulically roll and compress using correct pattern of passes



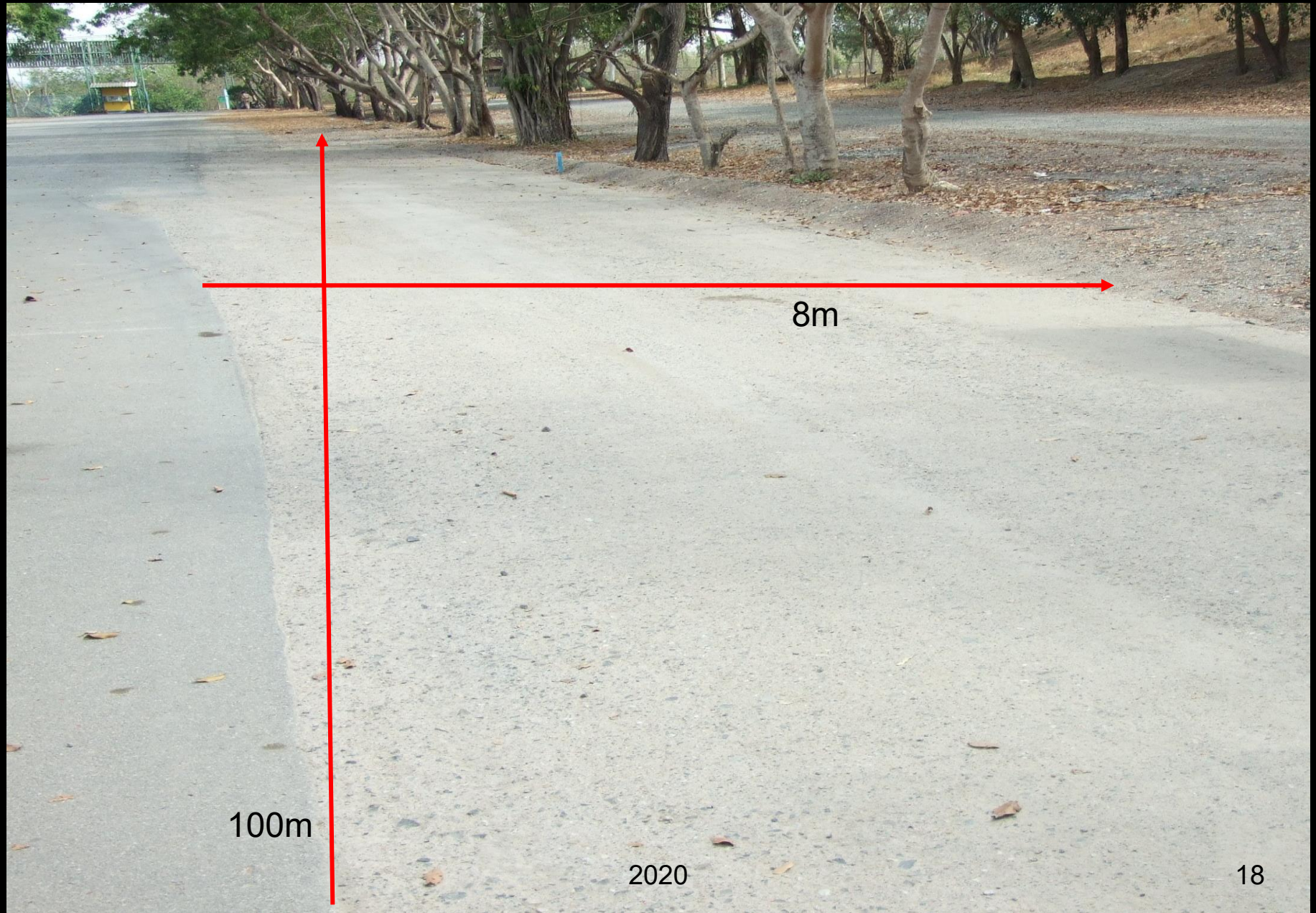
Step 8 (b) Final roll pattern



Result after 4 hours



Result after 12 hours, 800m² ready for traffic



Conclusions

- The introduction of ecoProactive powders dramatically reduce the requirement of importing materials thus saving between 50-70% of the total road build cost.
- Construction time is reduced by up to 70% compared to concrete applications and 50% compared to traditional asphalt applications.
- A variety of running courses can be applied from an in-situ granular finish and 'spray and chip' application.
- ecoProactive can also be used for adobe bricks and low cost housing applications.

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**Caledonia Investment
Company Ltd.**

Commodity Procurement Agents



**ecoProactive™ is a wholly owned product of
Caledonia Investment Co Ltd (HK).**

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Further information can be sourced at *www.ecoproactive.com*