Building Stronger & Longer Lasting Plantation Roads.

BY

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TAN CHIOW WAH (RONNIE)

Managing Director & Founder

CONCEPT ENGINEERING SDN BHD

CMS WASTE MANAGEMENT SDN BHD.

QUALIFICATION

Bachelor Degree in (Chemical & Material) Engineering,

Auckland University, New Zealand 1977

EXPERIENCES

- A member of the Marketing Institute of Malaysia since 1983
- The Founder and the Managing Director of Concept Engineering Sdn Bhd (CESB)1986.
- Appointed as the Regional Application Engineer from 1979 to 1983 in the regional office in Singapore for Goulds Pump Inc of the USA.
- In 1983, he was appointed as Sales/ Market Development Manager by Mecomb Malaysia Sdn Bhd, a company under the Sime Darby Group, to market the industrial products to the Asian market
- Has more than 15 years proven track record in the filtration field and 20 years in the Oil Palm Industry
- Obtain a grant of RM 1.6 million from the Ministry of Science and Technology in year 2000 to do research " into finding solutions to the environmental problems of the Palm Oil Mills and converting the waste into useful by products".

ACHIEVEMENTS

- Anugerah Perekacipta Negara – 1999 (Kementerian Sains dan Teknologi dan Alam Sekitar)
- Perandingan Rekacipta Antarabangsa Geneva – 1999 (“Zero Discharge”) - Pingat Gangsa
- Invention and Design Competition – 1999 (“Zero Effluent/ Discharge Technology for Palm Oil Mill”) – Gold
- Invention and Design Competition – 1999 (A Process for Clarifying Crude Palm Oil Slurry by Filtration Method) - WIPO Gold by **United Nations.**
- Invention and Design Competition – 1999 (A Process for Clarifying Crude Palm Oil Slurry by Filtration Method) – Gold

COLLABRATION WITH MPOB (SINCE 1994)

- Presented an environmental solution paper on “ Zero Waste / Zero Discharge System for Palm Oil Mill (PIPOC 2002)
- Presented a new technology paper on “ New Oilsep Recovery System for Palm Oil Mill (PIPOC 2009)”
- Presented an economic paper on “Economic Study on Zero Waste/ Zero Discharge System”(PIPOC 2011}
- Presented an environmental paper on “ Tertiary Polish Plant for achieve BOD < 20 ppm for POME before discharging into rivers” (POMREQ 2013)
- Study on Soil Stabilization Method for Estate Roads and Ganoderma problem in Oil Palm Estates. (From 2012).

SUMMARY

1.) Road is the Life Line to all Oil Palm Plantation.

2) Road is Destroyed every year by heavy rainfall in the Estates.

3) Good Long Lasting Road and Low Maintenance is the Key in reduction Plantation Overall Cost.

4) The Plantation Group are always on a look out for Better Lower Cost Road Building System in long run.


KEADAAN JALAN RAYA DI KEBUN


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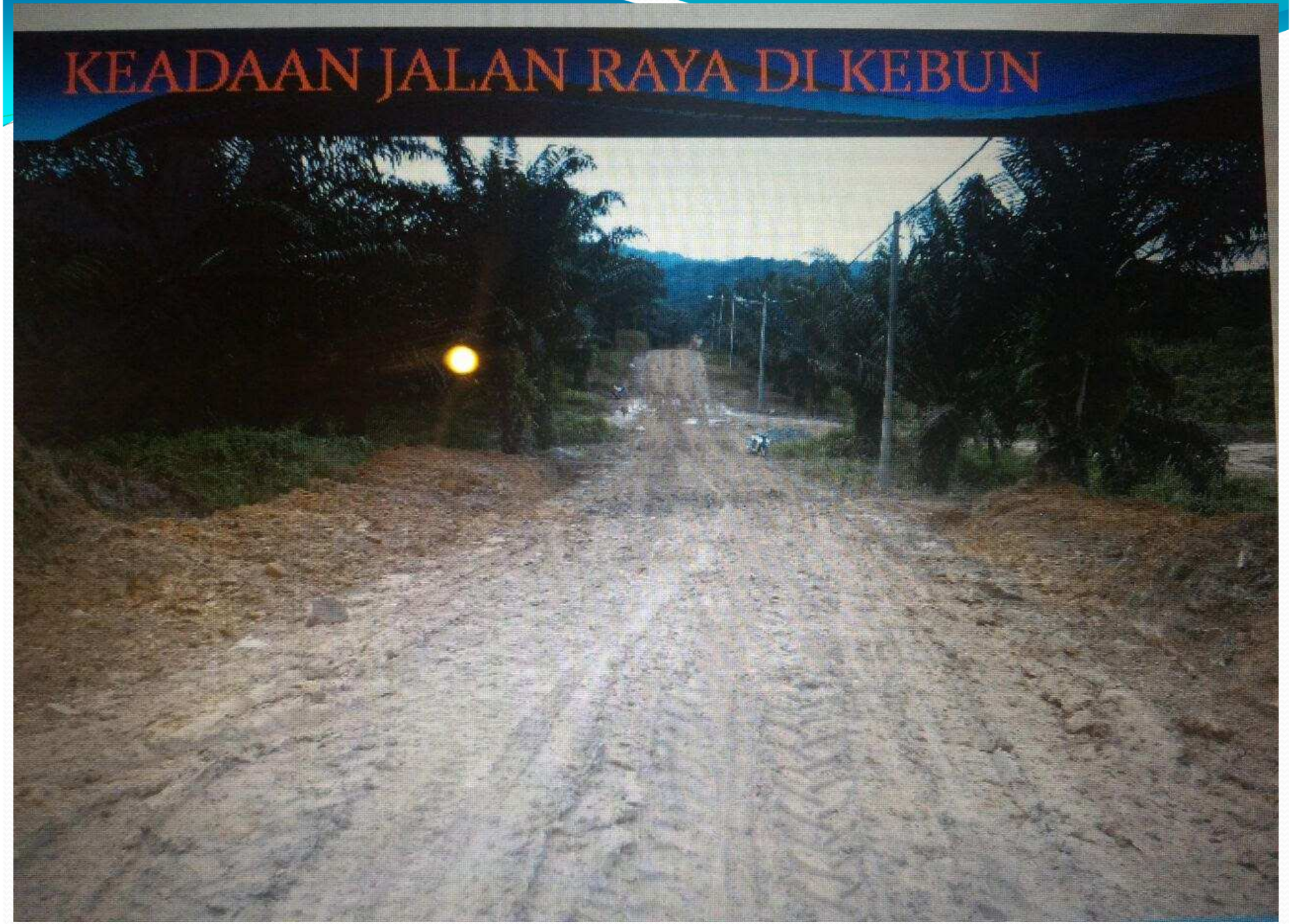


HOW TO BUILD BETTER AND LONGER LASTING ROAD ?

1) Proper Design : Weight and Frequency of Vehicles.

2) Soil Testing: Of the roads to be Built.

3) Good Drainage System : To Prevent Flooding.

4) Good Strong Sub Strate Layer : With CBR > 80.

5) To find Good Soil Additive for Compacting & Stabilizing Graded Road.

6) Must have proper housekeeping of grass cutting around road drainage system.

POWER MIX SOIL STABILISER ROAD

1) Full scale road works as a compaction aid soil stabilizer.
(due to its ability to 'densify' the soil forming a "denser compacted soil matrix" and more impermeable layer.)

2) Lower-cost road construction.
(reduces importing of foreign road construction materials by improving the quality of local materials)

3) Reduces dust generated on gravel roads.
(thereby reducing negative impact on livestock and agriculture.)

4) Reduces maintenance requirements of gravel roads.
(but a scheduled maintenance programme is still required.)

5) Helps to upgrade available materials.
(in substandard road pavements)

Application Procedure.

a) For a 20 cm thick road, we need soil, cement, power mix and water.

b) Mixed uniformly with the material to aid compaction.

c) Sprayed in controlled amount with water bowser over soil / cement/ Power Mix.

d) No special equipment required.

Road Material Calculation

a) Road to be build 6M (W) x 0.2M(T) x 1000 M

b) Soil needed: 1,200 tons / Km.

c) Cement Needed: 144 tons to 180 tons / km

d) Water Needed: 168 to 300 tons / km.

e) More clay particles = higher dosage of Power Mix.
At typical laboratory recommendation, required for the type of soil and truck loading.

Features & Benefits.

a) 80-100% improvement in load bearing strength after compaction.

b) Strength increases above 300% have been recorded.

c) Clay particles become hydrophobic when combined with Power Mix Soil Stabiliser®.

d)Material retains its strength in wet conditions.

e) High compaction density obtained with less compactive effort and cost for non-clay bearing soils.

**f) Free Repair Maintenance for 3 years..

What is Power Mix Soil Stabilized Road????

DOOSUNG CHEMICAL

Concept Engineering Sdn Bhd

1.0. COMPANY OVERVIEW

Established in 1999 based on civil engineering and construction technology, Doosung Chemical has developed, produced and sold soil stabilizer, and cohesive agent essential for sewage and waste water treatment.

In 2010, Doosung acquired a patent for an environment friendly firming agent for civil engineering and construction works using soil, and since then, has been producing and selling this product POWERMIX PSC-63/

POWERMIX PSC-63 developed with the patented firming agent as a main component.

- **Doosung Chemical has been developed technology for**
  - **Environment protection**
  - **Improvement of overall economical and work efficiency through easy acquirement of main construction materials and shortening of construction period.**

What is SOIL STABILIZATION?

- **The definition of Soil Stabilization is**

“ the treatment of soil to maintain the soil structure stable condition for long time.”

The Soil Stabilization is achieved by the addition of proper percentages of additives such as cement, lime, fly ash , bitumen or combination of these to the soil.

In civil Engineering, Soil Stabilization can replace rubble and sand layers (in AASHTO Method of construction) - it is used for base course , sub-base course and selective course.

3. SOIL CEMENT

3-1. HISTORY OF SOIL CEMENT STUDY & APPLICATION

1917	Phd. T. H Amies got the first patent of Soil Cement in U.S.A
1935	The first road construction had been conducted by Soil Cement in the state of South Carolina U.S.A
1954	Phd. Baker had reported thesis to show the relationship between contents of cement and strength of soil cement.
1963	Phd. Lilley had researched time–strength relation of soil cement Established Korea Standard for Soil Cement KS F 2327~2332 (Soil Cement test Standard)
1983	Phd. Robert had tested the quality of road which is constructed by soil cement in 1938 (45 Years Old) – Proved effects of soil cement
1980 ~2012	Many studies have been conducted for additives to increase the efficiency of Soil Cement

3-2. WEAK POINT OF SOIL CEMENT

ORGANIC MATERIALS & SULFATE IN SOIL

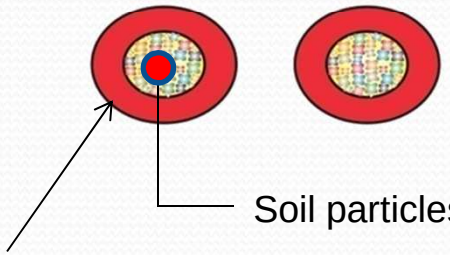
PREVENT CHEMICAL REACTION OF CEMENT

LOW COMPRESSIVE STRENGTH

That is why POWERMIX is needed.

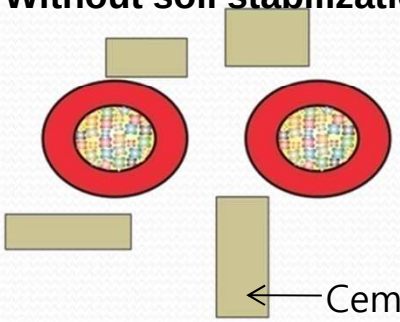
3. POWERMIX Operations Between Soil & Cement

1. Soil particles



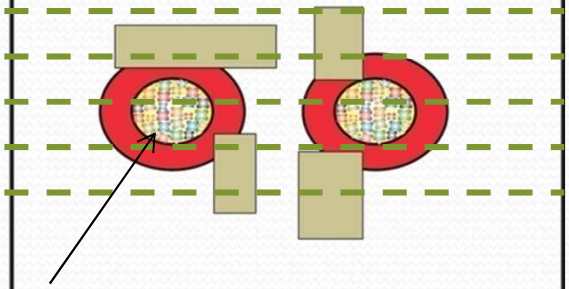
Humin acid that contains strong electronic power dissolves in the water molecule attached to the surface of soil particle.

2. Without soil stabilization



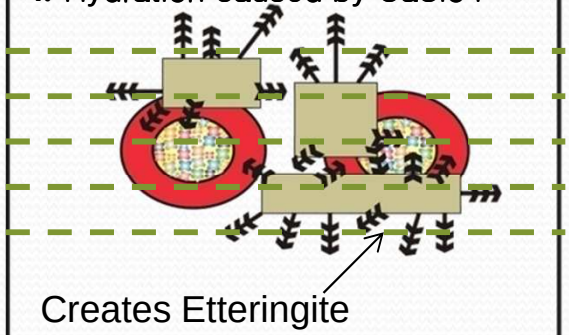
The Humin acid in the water molecule hinders cement's hydration.

3. Add soil stabilizer



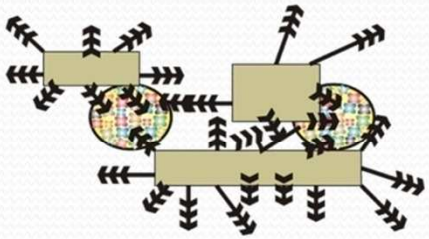
The base metals and Humin acid creates ION exchange reaction and separtes them causing reaction to speed up.

4. Hydration caused by CaSio4



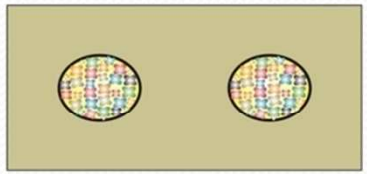
Hydration accelerates formation of Etteringite
※ Etteringite : acicular structure

5. Rapid formation of Etteringite



Rapid expansion of Etterngite fixes the soil particle within the Etteringite structure.

6. Soil stabilization(solidify)



Pozzolan reaction forms structure.

4. INTRODUCTION OF POWERMIX

4.1 WHAT IS POWERMIX ?

POWERMIX is the additive used for Soil Cement.
(Soil Cement Stabilization)

- Soil Stabilization has been used for road base construction for long time.
- For Soil Stabilization, several supplement are added such as Lime, Portland cement, Fly ash, Bitumen, Pine resin, Palm oil Liquid polymer..etc
  But Soil Cement is widely used for Soil Stabilization because Portland Cement can be used almost all kinds of soil and good quality.
- POWERMIX is additive to improve Soil Cement quality and widen applicable soil range.

Seoul City National University's Research Report(2012)

POWERMIX

- Improves the hardness (Compressive strength)
  max. 2.75 times of simple soil cement
- Increase bearing power
- Increases frost damage prevention effect
  2 times of simple soil cement
- Widens applicable soil kinds
  (Applicable for almost all kinds of soil)
- Makes Only One Layer can cover two layers(Base course and Sub-base Course) of conventional construction method
- Makes No Environmental Pollution.

1. Introduction to POWERMIX Technology

1-1. Characteristics of Powermix PSC-63

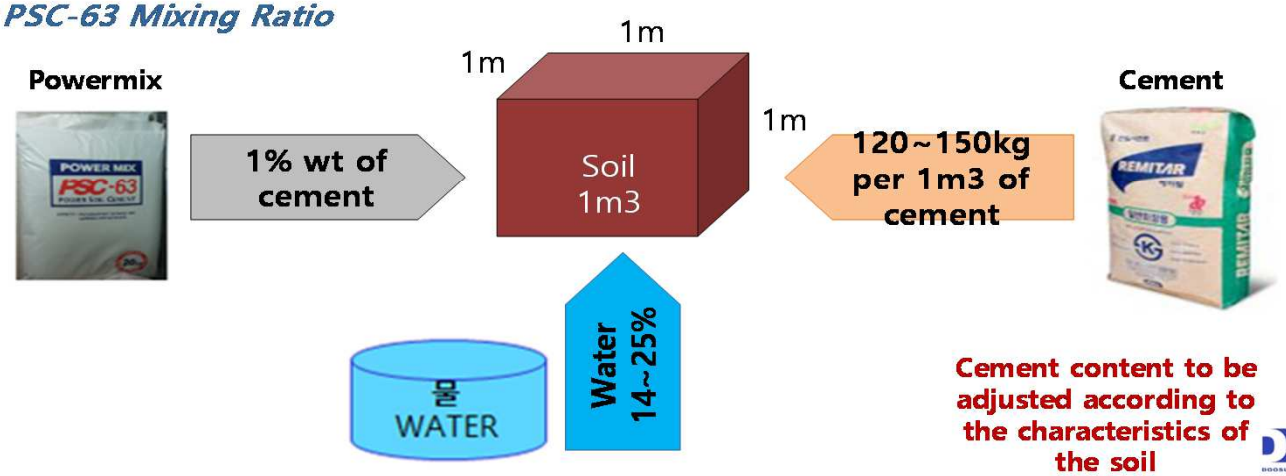
Econo mical — Over 30% reduction in construction cost and large savings in maintenance costs.

Ease of Constru ction — One half to a third reduction in construction time, since there is no need for aggregates.

Durability — Highly resistant to temperature fluctuations, acid and alkali changes, it also has 20 to 40% higher compressive strength as compared to the existing road construction methods. Powermix also increases bonding of cement to the soil, thereby increasing the compressive strengths as time goes by.

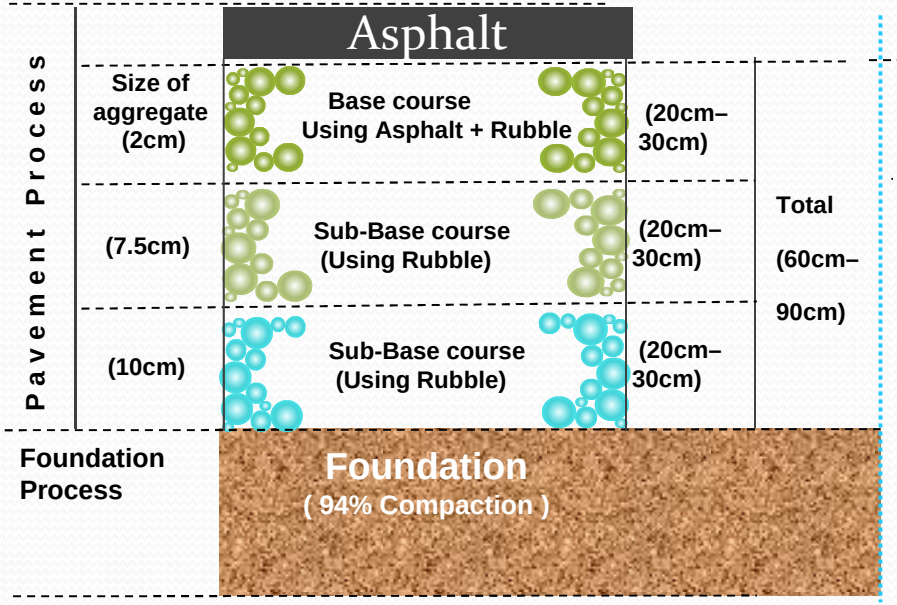
Environ mental — No need for creating stone quarry since no aggregates are needed; Less cement are required (only about 8% is required as compared with 15% in regular concrete); pH balance of 7.6; No heavy metals present.

1-2. Powermix PSC-63 Mixing Ratio

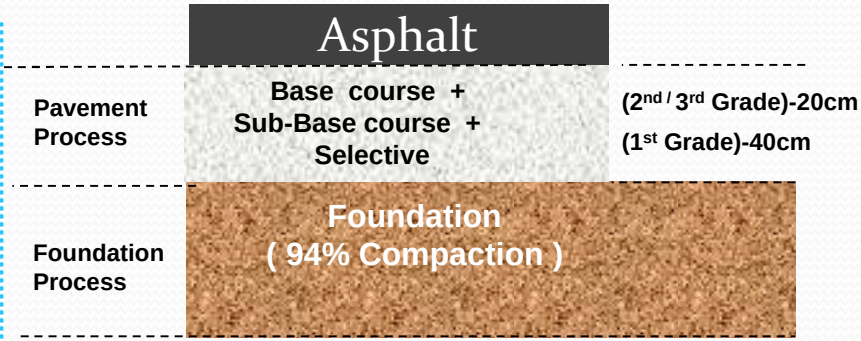


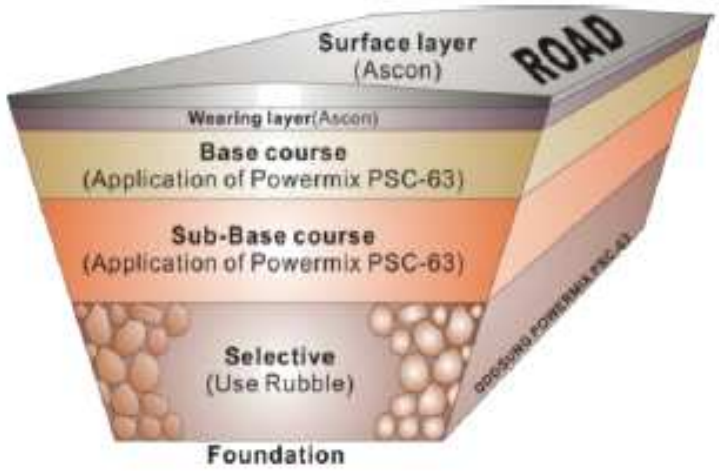
4-2. ROAD STRUCTURE COMPARISON

Traditional Method



Powermix Method





4-7. Construction Works Applied POWERMIX Method

- **Indonesia**

Date	QTY(ton)	Construction Area	Length (Km)	Buyer
2003. 2.	10	Merauke Muting	10	PT. Papua Amakane
2003. 9.	10	Merauke Gententiri	10	PT. Papua Amakane
2004. 5.	10	Merauke Tanah Merah	10	PT. Papua Amakane
2004. 5.	10	Merauke Tanah Merah Kota	10	PT. Papua Amakane
2004. 12	20	Maapi Kota	20	PT. Papua Amakane
2006. 5.	10	Sorong Makbon	10	PT. Papua Amakane
2006. 9.	20	Sorong Makbon Kota	20	CV. Victory
2006. 11	20	Nabire Moanamani	20	CV. Victory
2007. 2.	20	Sorong Ayamaru	20	CV. Victory
2007. 5.	10	Kaimana Tanggaromi	10	PT. Papua Amakane
2008. 1.	13	Kaimana Tanggaromi Kota	13	PT Karaeng jaya Abadi
2008. 3.	10	Sorong Selatan	10	PT. Papua Amakane
2008. 7	15	Sorong Selatan	15	PT. Aquanto Mas
2008. 8.	10		10	PT Karaeng jaya Abadi
2009. 5.	10	Mutin Tanah Merah	10	PT Karaeng jaya Abadi
2009. 9.	30	Arso Kuai	30	PT Karaeng jaya Abadi
2010. 3	30	Sarmi Arso	30	PT Karaeng jaya Abadi
2011. 8.	20	Arso Kuai	20	CV. Victory
2013. 4	15	Merauke Jaga Bok	15	CV. Victory
TOTAL	**293**		**293**	

4-8. Perhitungan Biaya Pembangunan / Km

INDONESIA

Konstruksi Konvensional

No.	Uraian	Satuan	Volume	Hs	Jumlah Harga
1.	Lapis Pondasi Agrr. Kiss A	M3	750,0	735.000,0	551.250.000,0
2.	Lapis Pondasi Agrr. Kiss B	M3	1.000,0	525.000,0	525.000.000,0
3.	Penyiapan Badan Jalan	M2	5.000,0	4.500,0	22.500.000,0
	Jumlah Biaya / Km				**1.098.750.000,0**

Konstruksi dengan Soil Cemen + Powermix

No. .	Uraian	Satuan	Volume	Hs	Jumlah Harga
1.	Urugan Biasa	M3	1.000,0	175.000,0	175.000.000,0
2.	Semen	Sak	3.000,0	85.000,0	255.000.000,0
3.	Power Mix	Kg	1.000,0	230.000,0	230.000.000,0
4.	Penyiapan Badan Jalan	M2	5.000,0	4.500,0	22.500.000,0
	Jumlah Biava / Km				**660.000.000,0**

Penghematan **39,9 %**

Bandingan Perhitungan Biaya Pembangunan / KM
(Untuk Tanah Gambut)

Konstruksi dengan Soil Cemen (Conventional Road) untuk Tanah Gambut.

No	Uraian	Satuan	Volume	Hs	Jumlah
1.0	Lapis Pondasi Agrr. Kiss A	M3	750.0	175,000.0	551,250,000.0
2.0	Lapis Pondasi Agrr. Kiss B	M3	1,000.0	525,000.0	552,000,000.0
3.0	G.I. Wire Mesh (2"x6") Size (1.8m x 2.4 m)	Pcs.	1390.0	528,000.0	733,920,000.0
4.0	Penyaipan Badan Jalan	M2	5,000.0	4,500.0	22,500,000.0
	Jumlah Biaya / Km.				**1,859,670,000.0**

Konstruksi dengan Soil Cemen + Power Mix untuk Tanah Gambut.

No.	Urian	Satuan	Volume	Hs	Jumlah
1.0	Urugan Biasa	M3	1,200.0	175,000.0	210,000,000.0
2.0	Cemen	Sak	3,600.0	85,000.0	306,000,000.0
3.0	Power Mix	Kg	1,500.0	460,000.0	552,000,000.0
4.0	Penyaipan Badan Jalan	M2	5,000.0	4,500.0	22,500,000.0
	Jumlah Biaya / Km				**1,090,500,000.0**

Penghematan **41.36%**

4-6. APPLICATION OF POWERMIX

- Weak Ground Improvement
  - Soil amendment of swampy grounds, weak ground improvement, surface solidifications of soft soils, slope stabilization of roads, dams, land reclamations areas, etc.

- Various road pavements
  - Road amendment constructions (sub-base, street improvement construction), pavement of temporary work roads, pavement of school grounds, parks, various athletic facilities and floors

- Various Foundation Constructions
  - Land fill stabilization, flooring foundation work, foundation work for buildings and civil engineering works

- Others
  - Prevention against freezing, water stopping works, erosion construction, waterway amendment work such as farm waterway and reservoir

♣ INDONESIA

DSC DOOSUNG CHEMICAL Doo Sung Chem.

INDONESIA








CHINA






MACAADEM ROLLER

CHINA

CHINA






TURKEY

Bangladesh



EXCAVATOR BACK HOE

Philippines



6. CONSTRUCTION PICTURES

KOREA Sample Road Paving Plan

@Addendum 4. Road Paving method

◈ AASHTO(American Association of State Highway and Transportation Officials)

AASHTO method is an American design standard that has been adopted by the international community including Korea, in which a road is constructed by compacting various aggregates of different sizes, comprising of selective course, sub-base course and a base course, on top of which the pavement can be installed.

◈ DBST(Double Bituminous Surface Treatment)

DBST method is widely used in areas where aggregates are rare and construction budget is limited. Used primarily in various countries in South East Asia and developing nations, it is cheaper than the AASHTO method, but has to be constantly repaired every 6 month to a year due to constant damages.

◈ Soil Cement

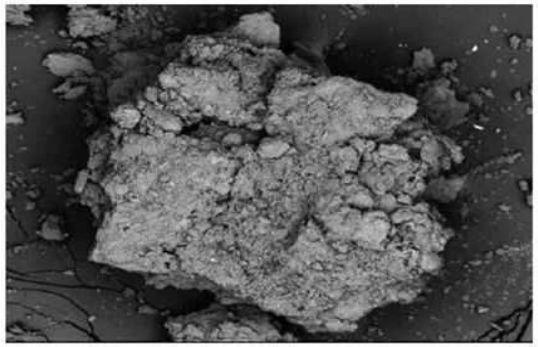
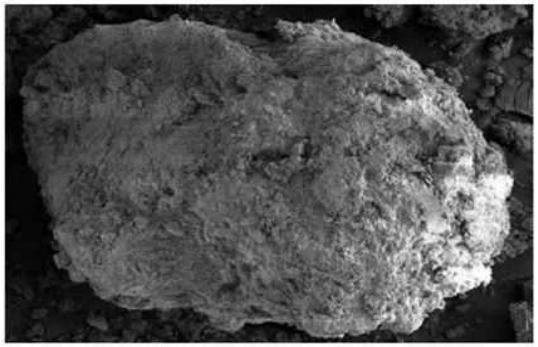
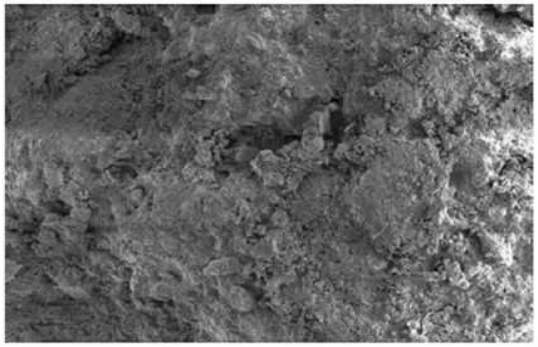
First developed in 1935 in the US as a method of creating temporary aircraft runways during the second world war in which the regular soil is mixed with cement and consequently in 1945 was termed as Soil Cement method and began to be used widely. Powermix PSC-63 is a form of Soil Cement additive.

◈ POWERMIX Method (Soil Stabilizer Method)

Powermix PSC-63 is added to the Soil Cement to replace sub-base and base courses and asphalt is used to pave the road on top.
The thickness of the base courses are calculated according to the design conditions, and the Powermix powder can be mixed with water according to the required water content and added to the soil cement.

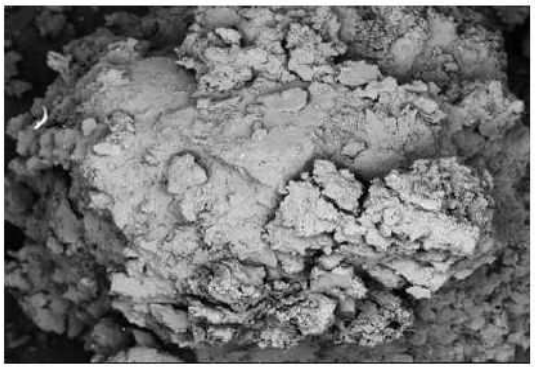
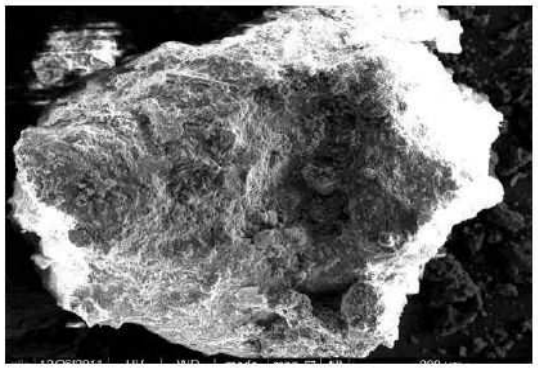




×200		
	PMX (0%)	**PMX (3%)**
×500		
	PMX (0%)	**PMX (3%)**

SEM Photos (7 day results)

SEM

×200		
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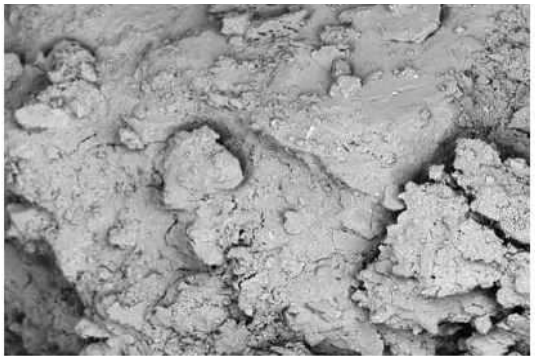
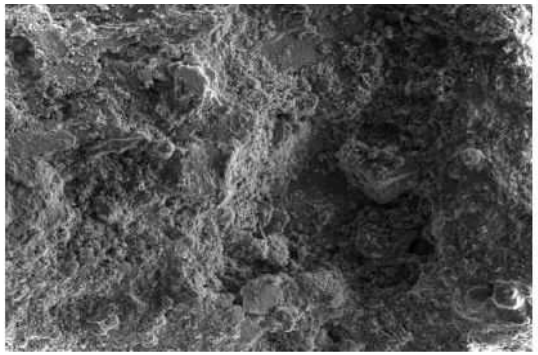
×500		
	PMX (0%)	PMX (3%)

SEM Photos (28 day results)

Equipment for Core Testing

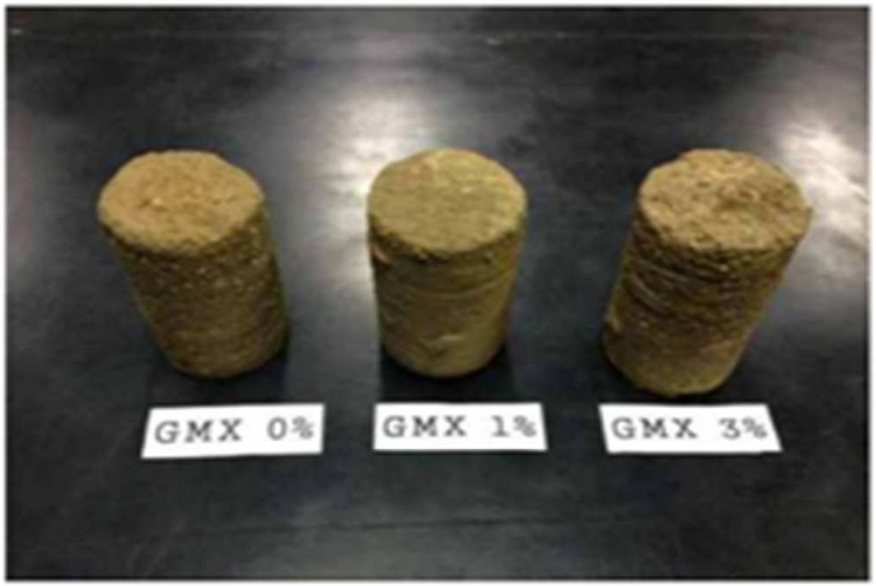


Plate Loading Test

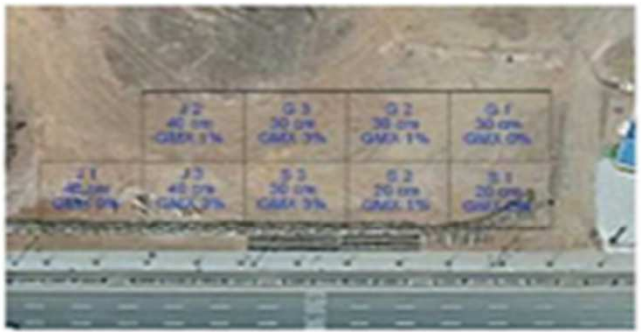
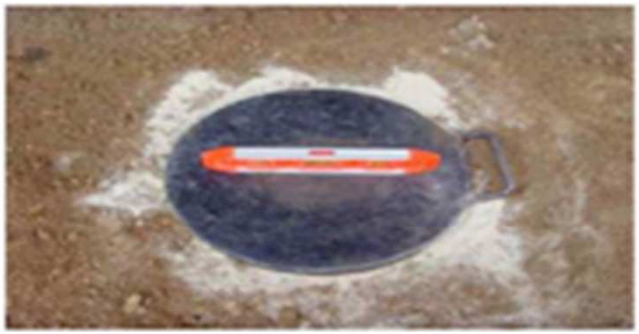


Plate Bearing Test



Circular Weight Plate (Φ=30cm)

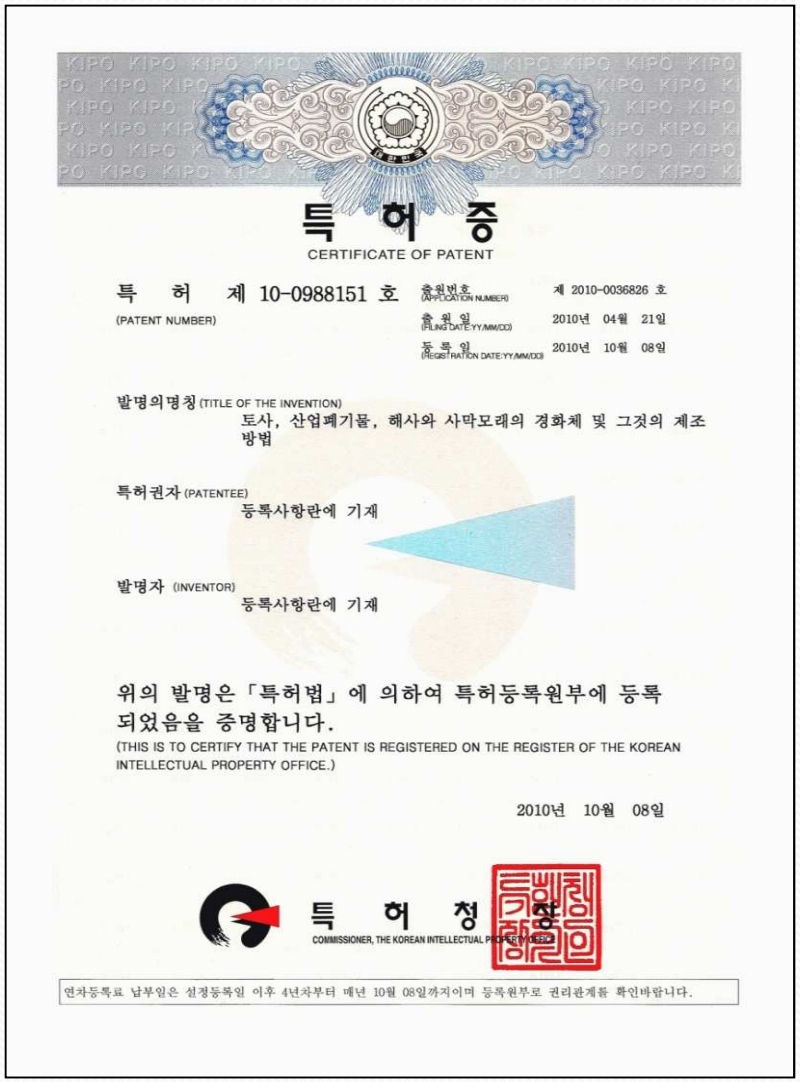
Equipment Installation

Actual Testing

PMX Plate Bearing Testing Method

5. CERTIFICATES AND PATENTS

5-1. Patent of Korea



특 허 증

CERTIFICATE OF PATENT

특 허 제 10-0988151 호 (PATENT NUMBER)

출원번호 (APPLICATION NUMBER) 제 2010-0036826 호

출 원 일 (FILING DATE:YY/MM/DD) 2010년 04월 21일

등 록 일 (REGISTRATION DATE:YY/MM/DD) 2010년 10월 08일

발명의명칭 (TITLE OF THE INVENTION)

토사, 산업폐기물, 해사와 사막모래의 경화체 및 그것의 제조 방법

특허권자 (PATENTEE)

등록사항란에 기재

발명자 (INVENTOR)

등록사항란에 기재

위의 발명은「특허법」에 의하여 특허등록원부에 등록 되었음을 증명합니다.

(THIS IS TO CERTIFY THAT THE PATENT IS REGISTERED ON THE REGISTER OF THE KOREAN INTELLECTUAL PROPERTY OFFICE.)

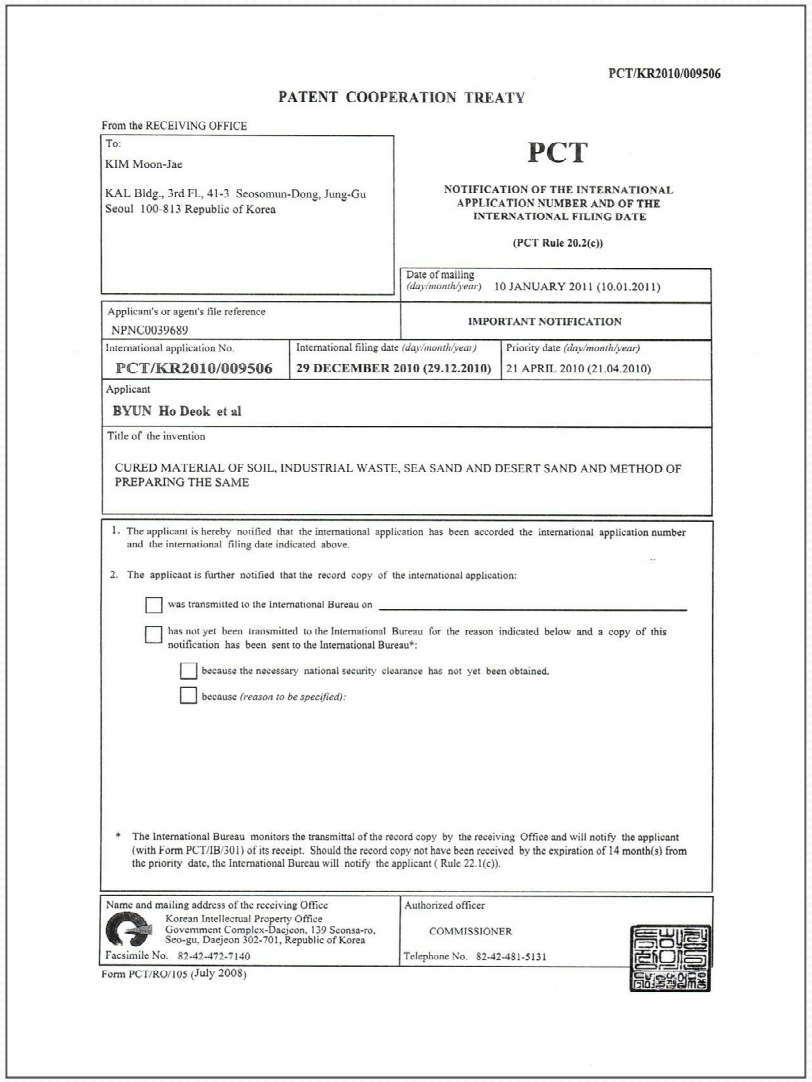
2010년 10월 08일

특 허 청 장

COMMISSIONER, THE KOREAN INTELLECTUAL PROPERTY OFFICE

연차등록료 납부일은 설정등록일 이후 4년차부터 매년 10월 08일까지이며 등록원부로 권리관계를 확인바랍니다.

5-2. PCT



PCT/KR2010/009506

PATENT COOPERATION TREATY

From the RECEIVING OFFICE

To:
KIM Moon-Jae

KAL Bldg., 3rd Fl., 41-3 Seosomun-Dong, Jung-Gu
Seoul 100-813 Republic of Korea

PCT

NOTIFICATION OF THE INTERNATIONAL APPLICATION NUMBER AND OF THE INTERNATIONAL FILING DATE

(PCT Rule 20.2(c))

Date of mailing (day/month/year) 10 JANUARY 2011 (10.01.2011)

Applicant's or agent's file reference: NPNC0039689

IMPORTANT NOTIFICATION

International application No.	International filing date (day/month/year)	Priority date (day/month/year)
PCT/KR2010/009506	29 DECEMBER 2010 (29.12.2010)	21 APRIL 2010 (21.04.2010)

Applicant: BYUN Ho Deok et al

Title of the invention: CURED MATERIAL OF SOIL, INDUSTRIAL WASTE, SEA SAND AND DESERT SAND AND METHOD OF PREPARING THE SAME

1. The applicant is hereby notified that the international application has been accorded the international application number and the international filing date indicated above.

2. The applicant is further notified that the record copy of the international application:

☐ was transmitted to the International Bureau on _____

☐ has not yet been transmitted to the International Bureau for the reason indicated below and a copy of this notification has been sent to the International Bureau*:

☐ because the necessary national security clearance has not yet been obtained.

☐ because *(reason to be specified)*:

* The International Bureau monitors the transmittal of the record copy by the receiving Office and will notify the applicant (with Form PCT/IB/301) of its receipt. Should the record copy not have been received by the expiration of 14 month(s) from the priority date, the International Bureau will notify the applicant (Rule 22.1(c)).

Name and mailing address of the receiving Office: Korean Intellectual Property Office, Government Complex-Daejeon, 139 Seonsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea

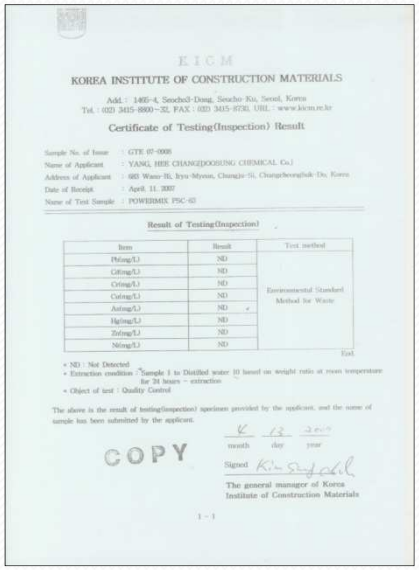
Facsimile No. 82-42-472-7140

Authorized officer: COMMISSIONER

Telephone No. 82-42-481-5131

Form PCT/RO/105 (July 2008)

5-3. Test Certificate of Korea



KOREA INSTITUTE OF CONSTRUCTION MATERIALS

Certificate of Testing(Inspection) Result

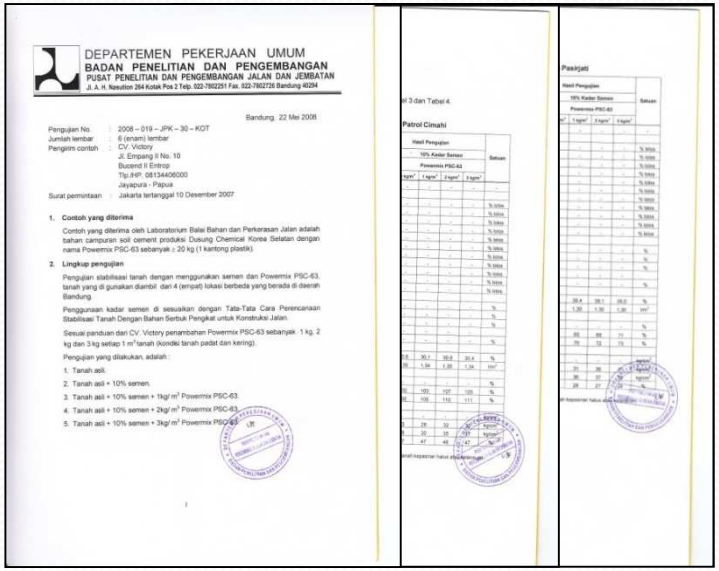
Result of Testing(Inspection)

COPY

품질시험 · 검사성적서

한 국 건 자 재 시 험 연 구 원 장

5-4. Indonesia



DEPARTEMEN PEKERJAAN UMUM

BADAN PENELITIAN DAN PENGEMBANGAN

PUSAT PENELITIAN DAN PENGEMBANGAN JALAN DAN JEMBATAN

Patrol Cimahi

5-5. China

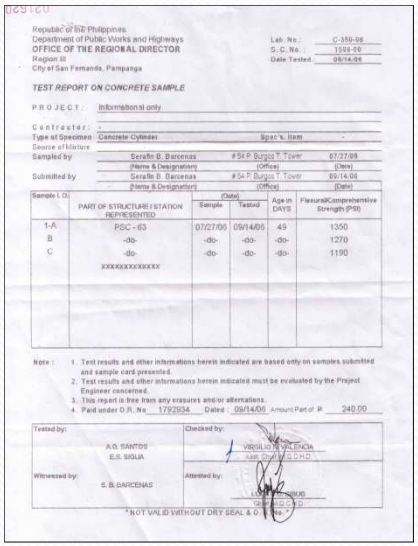
检 验 报 告

TEST REPORT

国 家 建 筑 材 料 测 试 中 心

National Research Center of Testing Techniques for Building Materials

5-6. Philippines



Republic of the Philippines

Department of Public Works and Highways

OFFICE OF THE REGIONAL DIRECTOR

TEST REPORT ON CONCRETE SAMPLE

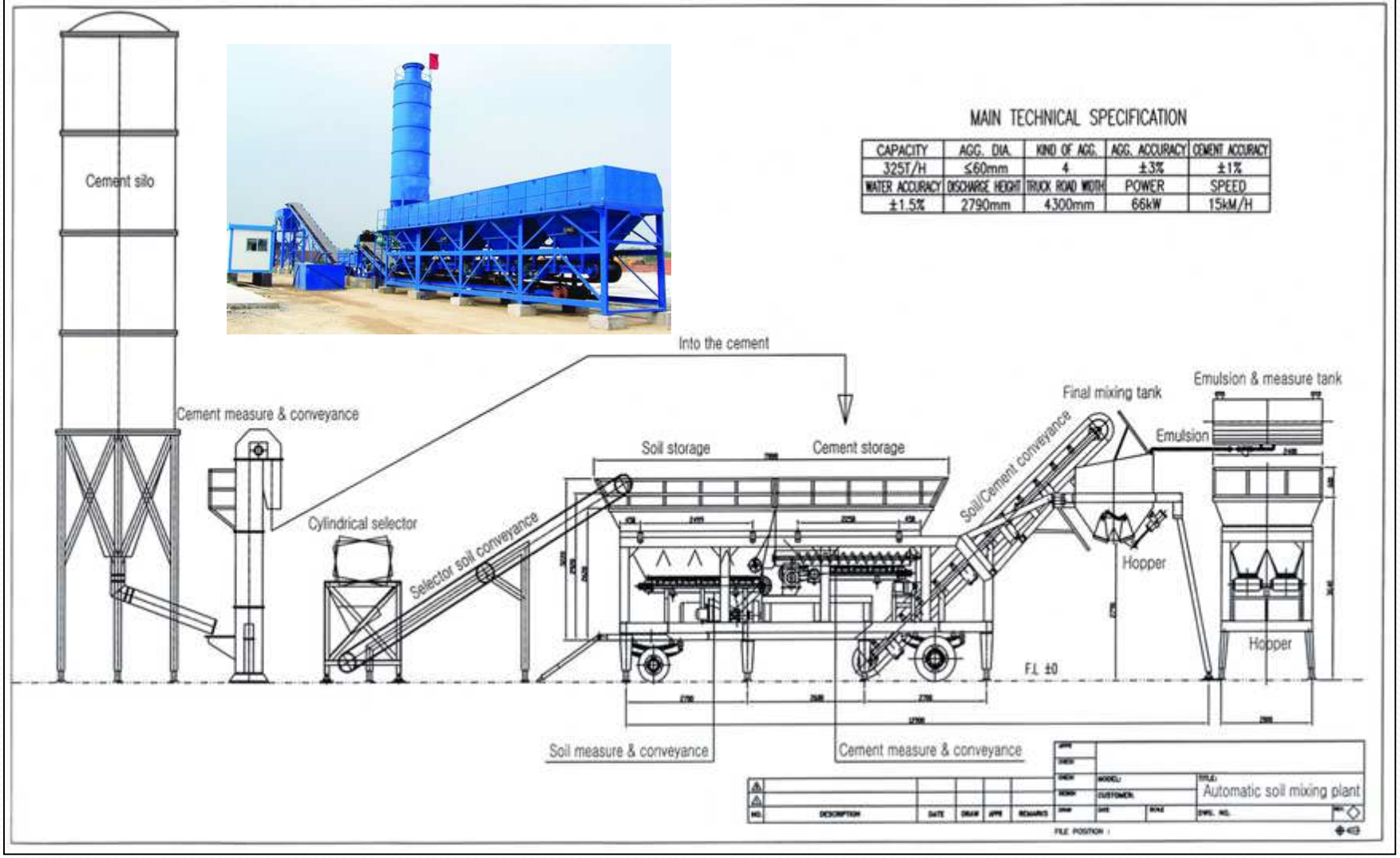
Technical Support

1) Experienced consultants and technicians are available to provide technical support on a reasonable cost-plus basis to:
2) Assist in road designs,
3) Assist in laboratory testing,
4) Provide support on-site during construction,
5) Product discipline for the entire application process.

4. Portable Soil Base Mixing Plant

MAIN TECHNICAL SPECIFICATION

CAPACITY	AGG. DIA.	KIND OF AGG.	AGG. ACCURACY	CEMENT ACCURACY
325T/H	≤60mm	4	±3%	±1%
WATER ACCURACY	DISCHARGE HEIGHT	TRUCK ROAD WIDTH	POWER	SPEED
±1.5%	2790mm	4300mm	66kW	15kM/H



THANK YOU !

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