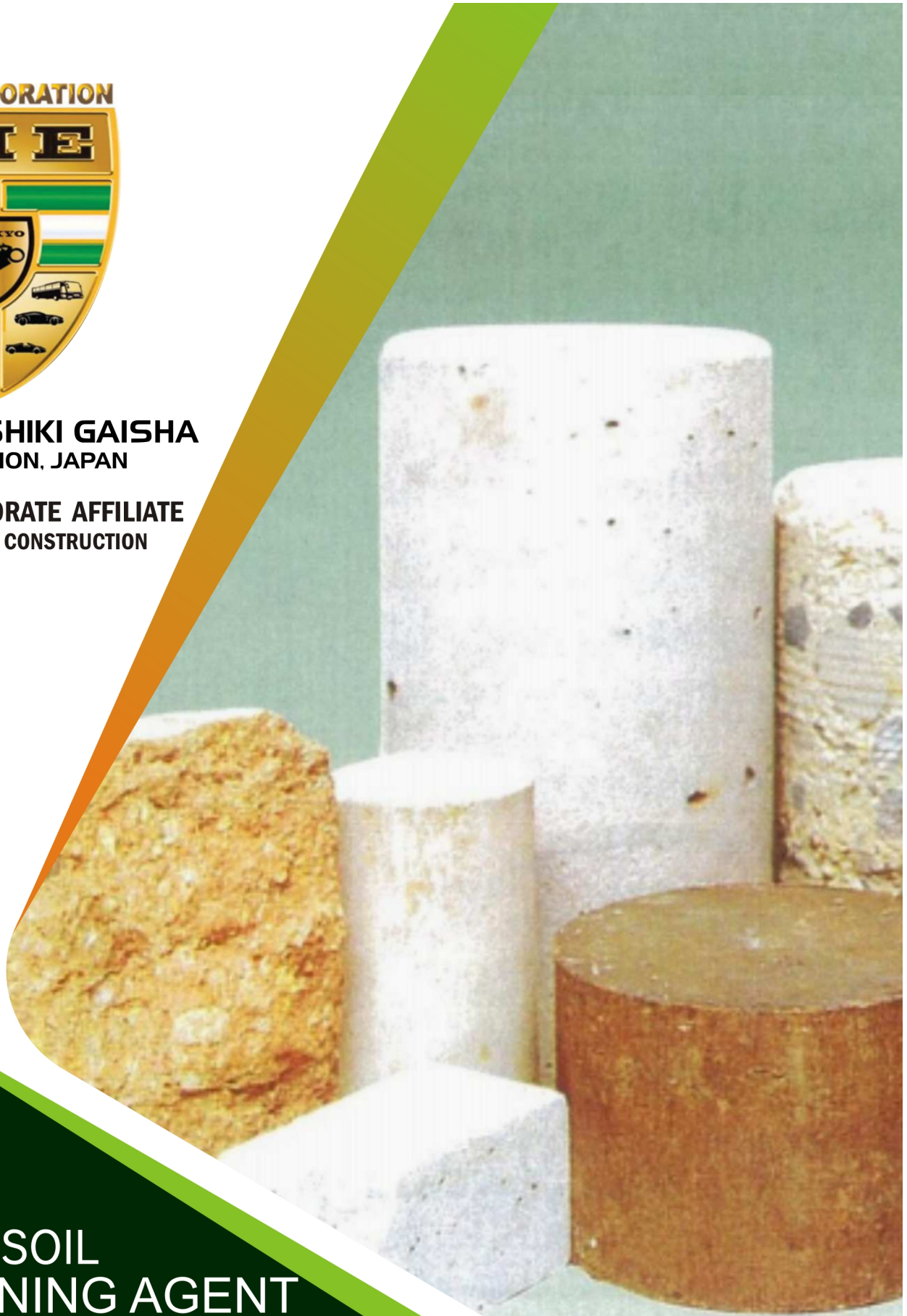
BIE CORPORATION

BIE KABUSHIKI GAISHA
BIE CORPORATION, JAPAN

NIGERIA CORPORATE AFFILIATE
STEIN MAGIC SAND CONSTRUCTION
NIGERIA LIMITED



UNIQUE SOIL HARDENING AGENT

STEIN

E-BROCHURE

CONTENTS

INNOVATION

MISSION

CUSTOMERS

Our Vision

To provide quality services that exceeds the expectations of our esteemed customers and provide Exceptional customer services by pursuing business through innovation, advanced technology and civil engineering.

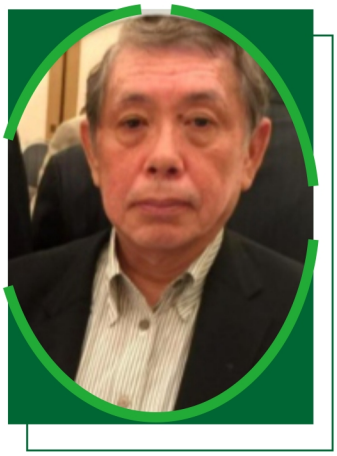
Mission Statement

Providing professional consulting services related to civil engineering and construction works, including planning, research, scheduling, design, and project management.

MESSAGE FROM BIE CORPORATION

JAPAN Management Team

We design and build progressive engineering and technology solutions for people and planet. We have years of experience in carrying out projects successfully for reputable corporate bodies and individuals in most of the countries. Our Company is made up of a team that inspires confidence with a good track record of experience, passion and commitment. This approach commits all relationships to our management philosophy of contributing to the development of society through technology. We work alongside customers, stakeholders and fellow employees to deliver outcomes that positively affect the world and its inhabitants.



MR. TAKAKI HARUO
Chairman

At our core, we are people who apply forward thinking to find lasting solutions to the toughest problems. Our Innovation involves the use of the latest technologies, the implementation of latest generation manufacturing processes and the use of cutting-edge IT tools and practices. Providing engineering consultancy services for international projects related to infrastructure development and social environment development including research, planning (flood control, water resources management, urban drainage, water supply and sewage, road, transportation, bridges, waste disposal, water quality improvement), design (rivers, dams, roads, bridges), construction supervision, project management and social development. One of the great example is our UNIQUE SOIL HARDENING AGENT (STEIN).

The characteristics of the soil hardening agent " STEIN "

1. Choosing STEIN will solidify the soil except for extreme organic soil and cohesive soil that cannot be crushed physically.
   STEIN is a material to mix the soil and make it harden.
   Construction is cheap and construction time is shorter
   Most construction is possible if there is soil hardening agent STEIN.

The effective reuse of the site soil
↓
Economical construction and cost effective.

2. Reduced construction thickness with high load dispersion effects by STEIN
   The official test result indicate that hardened base courses by STEIN have high numerical values not only at the uniaxial compressive strength but at the bending strength and the shear modulus, thus demonstrating high load dispersion effects. Therefore, the construction thickness of road substructures can be reduced to certain extent.
   In the case of the road on which the supporting capability of subgrades had been enhanced by long term traffics, additional 20cm base course construction on the subgrades could sustain high load heavy traffics.

Simplification of the construction process
↓
Shortening of the construction period

3. Low crack growth rate with low contraction and expansion nature.
   As the hardened soil by STEIN can be hardly affected by air and earth temperature, the crack development on construed objects is extremely low.

Frost heavy damages prevention effect
↓
Unnecessary repair of the structure

4. Extremely low permeability and heat conductivity.
   As STEIN hardens on-the site soil and uses no carried-in aggregate materials such as gravels and sand, the STEIN construction keep extremely low permeability and heat conductivity, thus STEIN construction cut off heal transfer and water log generated between the above and the under constructions.

Construction and expansion is small
↓
Unnecessary repair of the structure

5. Excellent acid resistance.
   The hardened soil by STEIN has higher acid resistance nature as compared with products made by using ordinary Portland cement. Therefore, STEIN is ideal for construing base floors of live sock hutches, paddocks,
   Barnyard manure reservoirs which are susceptible to acid discharged by livestock excreta.

Excellent aced resistance
↓
Unnecessary repair of the structure

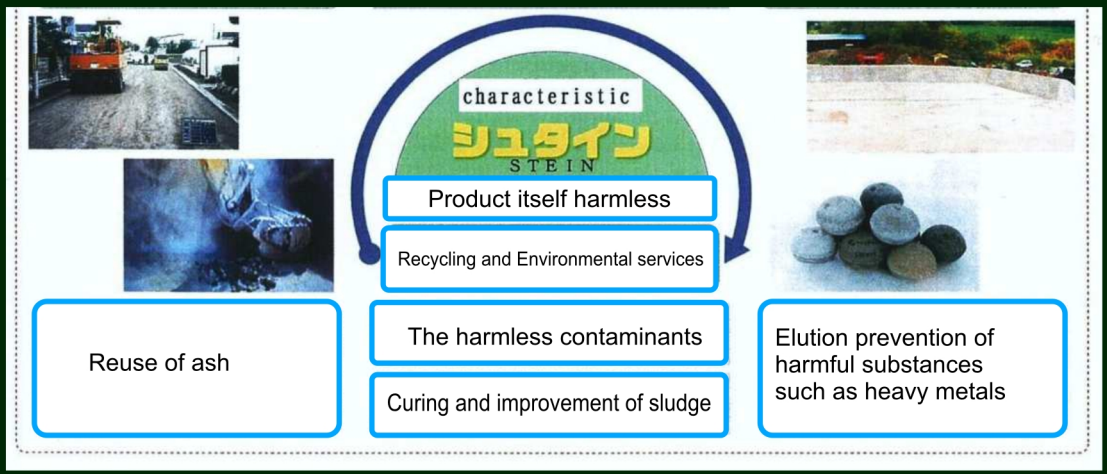
6. High evaluation in the point of environmental protection.
   The projects using STEIN are natural in color and soft in feeling as the are made up of soils in place adapt themselves easily to the neighboring circumstance.
   In such environmental protection areas as the public parks and templ-shrine areas. STEIN is utilized widely in the construction works of promenades, squares, cycling roads, and jogging courses.

The effective reused of the soil
↓
Landscape protection

Constructions of base courses and sub base courses of roads.

- The hardening of the soil site without choosing the aggregate
- Frost have damaged prevention effect
- Structure thickness can be reduced by the load dispersion effect
- excellent acid resistance

Construction compost board paddock, e.t.c



The standard STEIN Blending ratio (Standard SBR)

STEIN-R … in the case of building subgrades, 8to12%to the maximum dry density weight of the soil STEIN is blended with.

In the case of building basecourses, 4to10% to the maximum dry density weight of the soil STEIN is blended with.

One experimental case performed by blending
STEIN-R with 1.895Kg maximum dry density weight decomposed granite soil shows the diversity of the CBR rating depending on the SBR.
The SBR rating of that decomposed granite soils is 0.4% without STEIN . 7.6% with 5%SBR, 12.0%with 7.0%SBR, 25.1%with10.0%SBRand 39.0%with 14.0%SBR.

A. STIN-N … The SBR 8.0 to 30.0%in the same construction cases as STEIN-R
B. STEIN-MH… The SBR 4.0 to 8.0% to the moist density weight of the natural water content soil.

The process in determining the SBR
The determination of the SBR is the most important matter to be considered prior to the actual construction. And it's process is as follows.
At first, the objective construction strength must be established. Considering various constructions site Condition such as temperature, earth nature water level soil nature and so on.
Secondly, conduct the room experimentation in order to figure out and determine the standard SBR using a soil samples extracted from the planned construction site.
Finally, determine the SBR applying the in-place modification index calculated taking the anticipated change index caused by the actual construction works, strength reduction caused by the difficulty of the water content management and different ways of blending methods into consideration.

Necessary considerations to effectively use STEIN in the construction works.

1, When the rainfall is expected during the construction period, cover the construction spot with water proof sheets to prevent water content of the soil from getting excess content.
2, When the water content of the soil is not suitable to mix with STEIN, spray water to the soil prior to or after mixing STEIN and well mix the soil with water to attain the optimum water content of the soil.
3 Pay attention to maintain the appropriate water content throughout the construction work.
Excess water content causes rubber tired rollers and other construction machines unable to do effectively operate to Get necessary rolling compaction.
Even if rolling compaction level is achieved, the surface of the construction might not be smooth enough because of adhering and sticking soil to the machines.
4. During the winter period or cold districts in which the minimum temperature of the day is under 5 degree celsius, hardening effects of STEIN is not expected. Therefore, avoid construction works with STEIN.
5, Even in the construction of public park promenades and stabilization works of athletic fields which soft and natural soil color feelings are more important than high construction strength and abrasion resistance property are, and in the construction of temporary roads for another main construction projects and temporary parking lots which base courses are not paved and exposed, determination of the SBR is the most important matter, because depending on the soil nature, growth of surface wears and cracks are apt to happen during their use.

The various construction examples STEIN is available.

1. The construction of upper and lower layers of the general roads which are traditionally constructed by asphalt concrete or cement concrete.
2. The contraction of basecauses of roads or trails such as agricultural. Forestry and temporary construction roads. The surface asphalt concrete layers are necessary to be placed when certain level of abrasion resistance property is required.
3. The light pavement constructions such as public parks, Promenade roads in parks, public playgrounds, jogging courses, cycling roads and walking passes or parking lots of the shrine-

1. The construction of the underbase of tennis courts and volleyball courts. Also the construction of gate-ball fields and athletic courses.
2. The construction of walking paths on the school campus. The prevention works of dust clouds and muddiness in public playground.
3. The construction of live stock hutch floors. Paddocks, barn manure reservoirs, store house floors. Agricultural workshops, and so on .
4. The construction of fish breeding ponds, water reservoirs, drainage ditches, and the solidification works of water ditch bases.
5. The solidification treatment of muddy sewage dredged up from rivers and oceans.
6. The stabilization treatment of soft ground and subgrades.

The types of STEIN products, their usages and specifications.

1. STEIN-R

   STEIN-R is standerd type of STEIN products and mainly used for the construction works of basecourses and subgrades of roads in " the mixing in-place soil method" or the mixing carried-in soil method.

   In the mixing in-place soil method, STEIN-R is placed and spread equally on the designed road surfaces and blended with soils in there by construction machines such as stabilizers.

   In the mixing carried-in soil method. Soil are carried in massively from remote areas to the nearby workshops from roads and blended with STEIN-R.

   Then those mixed soils are carried again and laid on the roads surfaces. The former method is suitable in such conditions which soils existing on the planned roads are suitable for blending with STEIN.

   Is soils on the roads lines are not good in quality to blend with STEIN, the latter method is adapted.

   Selection of the method should be done taking other various factors on the construction sites into considerations.

   In either method, soils must be compacted firmly at the optimum water content state and completed with the final watering works.

2. STEIN-M

   STEIN-M is employed as the mortar system in such areas as the construction sites are on a steep slope or a muddy soft ground and rolling compaction is not available, or the obstacles hinder

   The construction machines to advance to the site, STEIN-M is blended with soils and used as a workable paste.

   This is also utilized to solidify burned refusal ashes And industrial waste material.

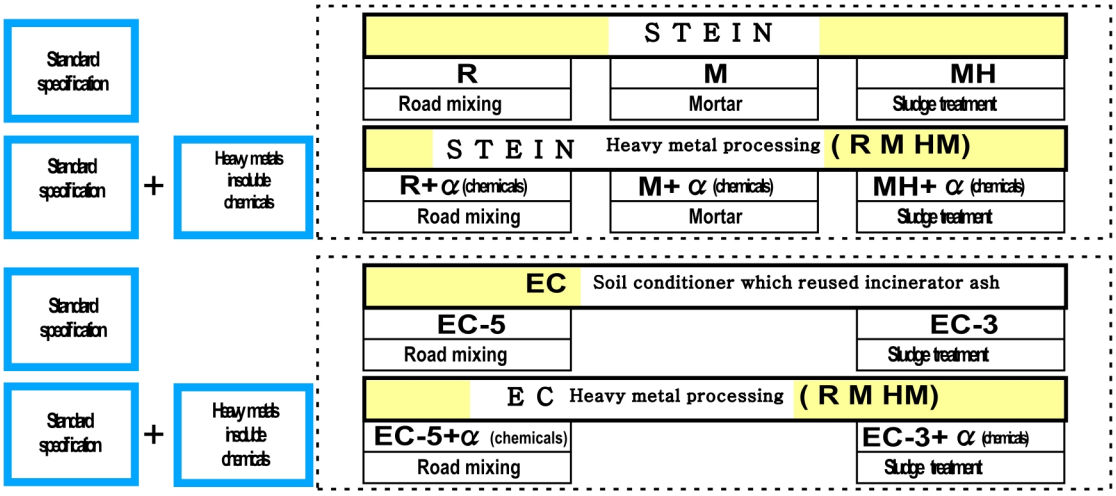
3. STEIN-MH

   STEIN-MH is used to solidify dredged muddy sewage and organic soft soils .

   STEIN-MH is able to gel high water content sewage materials and organic soft soils in relatively

4. EC-type

STEIN-EC is produced by utilizing burned refusal ashes and used for the soil improvement agent .



The STEIN construction system at the mixing In-place soil method (work flow)

	WORK CONTENTS	EMPLOYING CONSTRUCTION MACHINES	TEST AND CHECK	PRECAUTION
Step 1 The in-place soil investigative tests	Determine the designed road strength at the Uniaxial compressive strength and the road thickness.		The test to figure out the optimum compassion water content of the soil, the test on the particle size distribution of the soil, the certification of the designed road strength value at the uniaxial compressive strength.	
Step 2 preparation works	a)Rake out subgrades and basecourses and level off those surfaces to the designed height. b) Pick up and remove completely stones, debris and organic matters such as tree toots which are likely to hinder soils from mixing up to the construction thickness. c) Compact soils averagely to the extent that every portion of the road can hold the same compaction strength . d)Set up adhoc wooden measuring scales at every 15meter distance to check the designed height and thickness of the road against the ongoing features .	Bulldozers. Motor graders, Macadam loader, Rubber tired rollers.	Measure the in-place soils water content , the compaction density and the bearing capacity .	a)The bearing capacity of subgrades and basecourses must be the same at every portion. b)When the compaction density is 75% (bearing capacity K30 is under 6.35) the different construction method might be taken into considerations. c)The double layers construction technique should be adopted if the part of the road appeared to be too weak in strength.
Step 3 Raking and leveling works	a)Rake out fully to the bottom of designed depth of the road c)level off the surfaces of crushed soil . d)Dry and adjust the water content of soil if necessary. By raking soil upside down when other aggregate materials are needed to be mingled. Spread out them on the surface evenly before missing them up and then mix them thoroughly.	Bulldozers, Motor grader Stabilizers, rotor	Measure the water content. Check the particle Size of crushed soils to make it sure it is suitable level.	After crushing soil. Execute the adjustment of the Optimum water content of soil to rolling compaction and then mix them up completely .
Step 4 Spreading STEIN and mixing up with soil	a)Place designed amounts of STEIN per square meters over the construction site and spread it evenly. For instance, using wooden rakers. b)Mix up STEIN with soil so that STEIN can be thoroughly and equally mingle among soil. c)Level off the soil surfaces mixed up with STEIN.	Bulldozers (rotor), Stabilizers, M263 (soil load mixers)	a)Taking advantage of formally put up ad-hoc scales, check and make it sure, that STEIN is mixed enough to the extent of designed construction depth. b)Make test pieces for the compressive strength test	Mixing until so that the soil and STEIN has uniform color throughout .
Step 5 Rolling compaction	a)Execute the rolling compaction coverage averagely at 16 items or more. While pushing down stones which may appear out onto surfaces during the work. b)Shape road surfaces along the longitudinal direction and the transverse direction to adjust the road figures to the designed dimension, taking advantages of formerly put up ad-hoc measuring wooden scales. c)Correct ruggedness employing hand rakes. d)Employ rollers 3to4 times as the finish-up rolling compactions.	Macadam loaders, rubber tired rollers, bulldozers, Motor graders.	a)Taking advantages of ad-hoc scales set up formerly measure the road figures and check them if shaping works could be done properly. b)Measure Density solid-tightening.	a)Depending on subgrades states, choose the ways of rolling compaction with increased gradually b)the rolling compaction should be completed within 4 hours after the STEIN is spread and mixed up c)Avoid abrupt and sudden changes of directions in roller operation.
Step 6 Curing	a)Water the constructed roads at the ratio of 0.3 litters of water to 1Kg of STEIN. B)Cover the roads by sheeting materials to prevent from freezing when the temperature goes down under 5 degree Celsius.			a)Check the construction thickness and the uniaxial compressive strength by taking up core samples of the constructed roads. b)K30 Measure the bearing capacity.

THE WORK FLOW OF THE MIXING IN-PLACE SOIL METHOD

Step1

Ranking-Out of soil and eveling-off (bulldozers, rake dozers)

Step2

Equal placement of the STEIN-R on the leveled soils.

Step3

Spreading-out of the STEIN-R equally on the sites out of packages.

Step4

Mixing-up of the STEIN-R with the in-place soil to the bottom of the designed construction thickness

Step5

Leveling -off of the road surface.

Step6

Rolling compaction. Rolling should be executed as soon as the leveling-off work is finished.

Step7

Leveling-off after rolling compaction

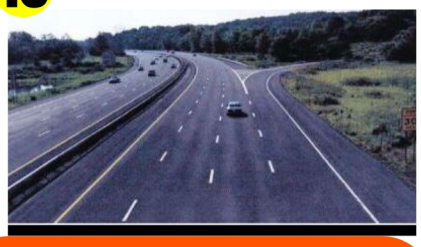
Step8

Watering. Water the road to be extent that water goes down to the bottom of the designed road thickness.

Step9

Completion

Step10



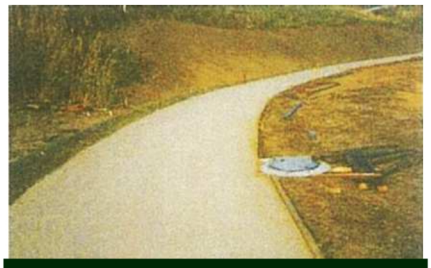
completion with asphalt surface face

1. Shaping -up the construction base.	Human power Bulldozers. rubber tired rollers.	Level-off and shape -up the designed construction base by bulldozers and human workers. • Execute the rolling compression by rubber tired rollers, impact rollers or handy wood embarkment slope compacter as required.
2. Mixing -up STEIN with soil to make the STEIN mortar.	Mortar mixer	• On the basis of the strength test by field soil, to determine the combination of soil and STEIN. To make each of the catch basins to be weighed each material come out. And mixed in a mixer various materials were weighed in catch basins. (Slump around 15cm)
3. Placting the STEINmortar onto The construction base.	Unicycle other.	• It is important to note design thickness, width and length, e.t.c. Hitting Set on top of the soil, moisture must be adjusted. Surface finish is required curing and watering.
4. Finishing	Trowel	• Put finishing touches on the surfaces of the construction by using wooden trowels and metal trowels.
5. Curing	Straw mat. Other	• Curing by the air curing is a general rule, but when the road is put under the direct sunlight cover it with sheets to shut the sunbeam. Water over the road as necessary.

The Construction Examples With Which Stein Is Employed

Constructions of base courses and sub base courses of road.

Constructions of forestry roads.



Constructions of promenade roads.

Constructions of barnyard manure reservoirs.

Backfilling of plumbing works.

Electric prop areal root hardening constructions.

River bottom repair construction.

Soft ground improvement construction.

Sludge treatments.

Hardening of cover soils and embarkments.

Solidification of incinerated ashes and burned ashes.

Safety disposal of heavy metals

The test data on the harmlessness of the STEIN products

An outward appearance of the STIEN products is quite similar to that of Portland cements .

The test data on the harmlessness of the STEIN products

The STEIN differ in grade among products Depending on the manufacturing processes and are entirely free from toxic substances.

SiO2	CaO	Al2O3	Fe2O3	SO3	MgO			
23.0%	60.0%	5.0%	2.0%	2.2%	2.0%	0.3%	4.5%	1.0%

SiO2 rate: $\frac{23}{5+2.0} \fallingdotseq 3.3$

Alumina iron rate: $\frac{5}{2.0} \fallingdotseq 2.5$

Hydraulic rate: $\frac{60}{23+5+2.0} \fallingdotseq 2.0$

The test data on the harmlessness of the STEIN products

Solubility test conducted by the Hokkaido environmental science technology center in September 2004)

The test was conducted by producing hardened samples of 1Kg STEIN-M mixed with 300cc demineralized water and by the way of solution directed by the environmental agency notice No. 46.

Name of harmful substance	weight of harmful substance (mg) com out to 1 litter of water.	Critertion set by the Environmental agency
Cadmium	00.001 >	0.01 =
Total cyanogens	ND (0.1 >)	ND
Inorganic phosphorus	ND (0.1 >)	ND
Lead	0.009	0.01=
Hexavarentchoromium	0.04 >	0.05 =
Arsenic	0.005 >	0.01 =
Total mercury	0.0005 >	0.0005 =
Alkylaiting mercury	ND (0.0005 >)	ND
PCB	ND (0.0005 >)	ND
Selenium	0.002 >	0.8 =
Fluorine	0.4	0.8 =
Boron	0.02 >	1 =

The physical and dynamic property of STEIN

A. The physical property test (JIS R 5200)Nipoon University manufacturing technology department

Type of cement	Grade	Specific Gravity	Fineness	Setting		
				Water ratio (%)	Starting Time (H-M)	Finishing Time (H-M)
STEIN	R	3.08	5293	33.0	0 -16	2-20
	M	3.08	5253	33.0	0 -15	2-10
Porland Cement		3.17	3260	27.5	2-31	3-45
		3.13	4450	29.2	2-25	3-44
		3.11	6050	33.8	1-46	3-10

Data of Portland Cement ???? Cement association of Japan

1.Normal
2.High early strength Portland cement
3.Sper high carly strength Portland Cement

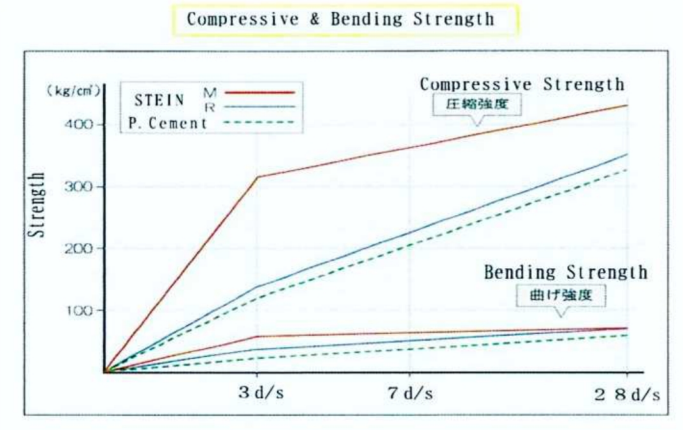
The particle size of STEIN is much smaller and the specific surface area is larger as compared with those of Portland cement Because of the special treatment given during the manufacturing processes. Therefore, STEIN can contain smaller particle of soil than Portland cement can.

STEIN begins to coagulate soon and end coagulation in much shorter period of time attaining necessary strength than Portland cement does.
All these mean the period of curing can be greatly shorten by the employment of STEIN.

B. The dynamic properties test (JIS R 5201)Nipoon university manufacturing technology department

Type of cement	Grade	Flow (mm)	Strength					
			Bending (Kg/cm2)			Compressive (Kg/cm2)		
			3d/s	7d/s	28d/s	3d/s	7d/s	28d/s
	R	209.5	34.3	49.3	62.5	123.7	211.6	331.0
	M	210.5	58.2	63.5	73.8	315.0	348.2	431.6
		206.0	35.7	52.0	72.7	147.0	219.0	358.5

Originally the test for STEIN-R should have been conducted under JIS-S1210, where the test pieces are required to be prepared by the compaction method. In this particular test however, the test pieces of STEIN-R were prepared by the usual mortar method similar to be the others, in consequence of which the true value of STEIN-R could not be exhibited to it's full potential.



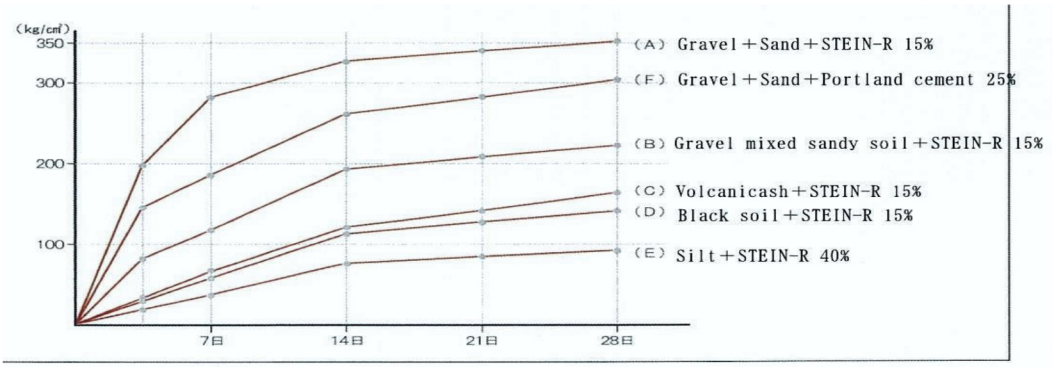
Graph in the figure above, which means that it is a special production (specific surface area is larger) so that fine particles
STEIN compared to Portland cement .
This special production. Is STEIN it is possible to wrap up the tine soil particles beginning and end of the condensation is very fast after setting. Compressive strength and bending is extremely high, mechanical properties and physical is excellent .
In addition STEIN R. for contraction is smaller than that of the Portland cement mortar, cracking after drying is also reduced.

<u>The compression test with various mixing soil specimens Stein R</u>

The test pieces were prepared at the respective mixing ratio, as given below , to attain their 7 days strength at 30Kg/cm and up it was a test at a high blending 30-40% from the practical point of view.The specimens were made by Stein R. with the exception of (E). By tamping method. Portland cement , (E) (sludge) was made by mortar system .

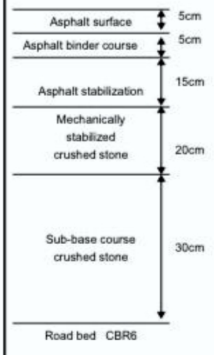
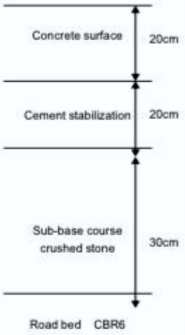
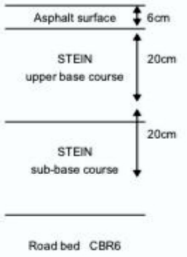
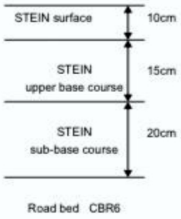
Test piece :

(A) Gravel + Sand + STEIN-R 15%
(B) Gravel mixed sandy soil + STEIN -R 15%
(C) Volcanicash + STEIN-R 15%
(D) Black soil + STEIN-R 15%
(E) Silt + STEIN-R 40%
(F) Grave + Sand + Portland cement 25%



(A) (Grave) + Sand + STEIN-R 15%) showed higher compressive strength than that of (F) (Grave l + Sand + P Cement 25 %). Especially in the early date strength, (A) is superior to (F) .Even (E) (Silt + STEIN-R 40%) achieved more than 100Kg/cmin 28 days strength. From which it is clear that STEIN can solidify any aggregate composition to an appreciable extent in strength. Also STEIN can attain the aimed strength in the early stage of coagulation. For these reasons, Stein found that choosing the aggregate depending on the formulation , to give a considerable strength . In fact, would not is is possible for a high such formulations using black soil and mud to be required to make as strong as this.

Structure design comparison　Structure design by TA

Design	Asphalt road construction	Concrete road construction	STEIN road（asphalt surface）	STEIN road construction
Construction design				
TA	36	36	36	36
Thickness	75cm	70cm	46cm	45cm

Conditions⇒　TA：36、Design CBR：6、Traffic volume：Heavy vehicles 3000／day、Design scale：W8m X L1000m

Process comparison　process chart

Process	Asphalt road construction	Concrete road construction	STEIN road（asphalt surface）	STEIN road construction
Process chart	Soil 75cm Digging	Soil 70cm Digging	Soil26cm Digging Temporary putting	Soil25cm Digging Temporary putting
	Soil 75cm Surplus soil Carrying out	Soil 70cm Surplus soil Carrying out	↓	↓
	Soil 75cm 残土均し	Soil 70cm 残土均し		
	Sub base30cmCrushedstone Purchasing	Sub base30cmCrushedstone Purchasing	Sub base 20cm STEIN Purchasing	Sub-base 20cm STEIN Purchasing
	Sub-base 30cm Construction	Sub-base 30cm Construction	Sub base 20cm Mixing	Sub base 20cm Mixing
			Sub base 20cm Construction	Sub base 20cm Construction
	Mechanically stabilized Crushed stone 20cm Purchasing	Cement stabilization 20cmPurchacing	Upper base20cm STEIN Purchasing	Upper base15cm STEIN Purchasing
	Mechanically stabilized Crushed stone 20cm Construction	Cement stabilization 20cm Mixing	Upper base20cm Mixing	Upper bae15cm Mixing
		Cement stabilization 20cm Construction	Upper base20cm Construction	Upper base15cm Construction
	Asphalt stabilization15cm Purchasing	↓	↓	↓
	Asphalt stabilization15cm Prime coat			
	Asphalt stabilization15cm Construction			
	Asphalt binder course 5cm Purchasing			
	Asphalt binder course5cm Prime coat			
	Asphalt binder course5cm Construction			
	Asphalt surface 5cm Purchasing	Concrete surface 20cm Purchasing	Asphalt surface 6cm Purchasing	STEIN surface10cm Purchasing
	Asphalt surface5cm Prime coat	Concrete surface20cm Forming	Asphalt surface6cm Prime coat	STEIN surface10cm Mixing
	Asphalt surface5cm Construction	Concrete surface20cm Curing 7days	Asphalt surface6cm Construction	STEIN surface10cm Construction
		Concrete surface20cm Joint		
		Concrete surface20cm Construction		

Cost comparison

	Asphalt road construction	Concrete road construction	STEIN road (asphalt surface)	STEIN road construction
Unit price JPN ¥／m2	¥ 9,097/m²	¥ 10,439/m²	¥ 5,355/m²	¥4,460/m²
Comparison (%)	100	118%	53%	43%
Materials	43,112,000	35,682,000	25,127,000	19,200,000
Labor	8,316,000	21,458,000	3,996,000	4,054,000
Machines	5,544,000	9,988,000	2,664,000	2,702,000
Transportation Surplus soil & etc	6,201,000	7,215,000	1,449,000	1,482,000
Total price (8000m2)	¥ 72,776,000	¥ 83,512,000	¥ 42,840,000	¥35,680,000

Conditions⇒　TA：36、Design CBR：6、Traffic volume：Heavy vehicles 3000／day、Design scale：W8m X L1000m

Remarks　⇒　Hachioji city, Tokyo / Calculation grounds

Recommended construction

対　象	Out Line	Remarks
Road Construction	Heavy vehicle road、Low cost pavement、etc	
Weak Foundation	Improve the weak foundation	
Face of Slope	斜面の崩壊防止	
Cold district	Frost heave (Ice Lenz, etc)	Kitami Institute of Technology
河川・ダム・灌漑	河川ライニング、農業水路・道路、海岸堤防	International Commission on Large Dams
Sports Court	Foot ball、Tennis、Running road、Cycling road	
緊急硬化	災害復旧工事の緊急路盤造成	The Self Defense Forces
Airport	滑走路などの強度構造物	

Examples of Application of Stein

- Road construction
  - Heavy vehicle, airport runways, low cost pavements, cold district(frost heave)
- Strengthen weak foundation
- Strengthen face of slope
- Line rivers, construct agricultural waterways/roads, banks
- Construct fields for sport (foot ball, tennis, cycling course etc)
- Instant construction of roads in face of emergency

STEIN

	Asphalt road construction	Concrete road construction	STEIN road (asphalt surface)	STEIN road construction	STEIN comment
Depth	75cm	70cm	46cm	45cm	Thin
Process	○	△	○	◎	No need for special equipment. Fast construction
Term	○	△	○	◎	
Appearance	◎	◎	◎	○	
Cost	100%	118%	53%	43%	cheap
Eco-friendliness	△	△	○	◎	
Applicability	△	○	△	◎	

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UNIQUE SOIL HARDENING AGENT STEIN

BIE KABUSHIKI GAISHA
BIE CORPORATION, JAPAN

NIGERIA CORPORATE
AFFILIATE STEIN MAGIC SAND
CONSTRUCTION NIGERIA LIMITED

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