



jags

INNOVATIVE PRODUCTS
İNŞAAT SANAYİ VE TİCARET
LİMİTED ŞİRKETİ



NovoCrete®

Innovative solution for infrastructure!

In-situ Soil Improvement Technology with Using Native Soil



***TCDD BOD 28,88 km (315.452 m²) **NovoCrete®** Application Project for Weak Soil

On-Site Ground Improvement Technology With Available Material on the Ground

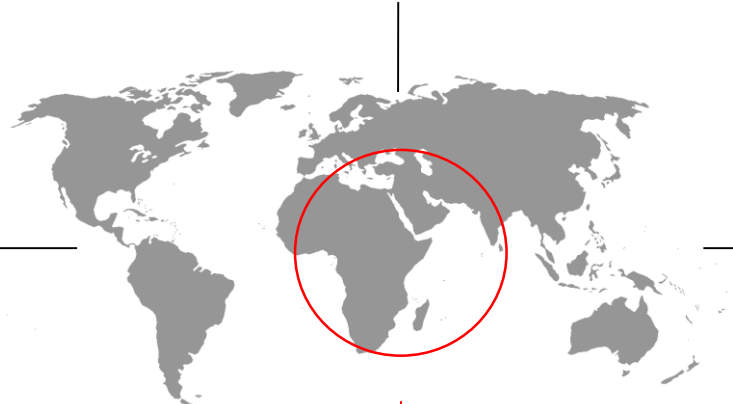


In Turkey and across 32 countries

Germany, Switzerland, Italy
Croatia, Netherlands, Sweden
Finland, Poland, Bulgaria



Canada
USA
Panama
Brazil
Chile
Argentina



Russia
China
India
Malaysia
Sri Lanka
Vietnam
Indonesia



TÜRKİYE ve BÖLGE ÜLKELER
Kazakhstan, Turkmenistan,
Middle East, Ghana, Ivory, Gabon
Ethiopia, Angola, Namibia
Dubai, United Arab Emirates, Saudi
Arabia, Qatar



NovoCrete® Innovative solution for infrastructure;
is an innovative direct solution Product and
Application technique which provides on-site
recycling with the existing materials for
**Weak base layer improvement, Lime & Cement
stabilization, Asphalt, and Surface Treated
Roads.** To Achieve its target **NovoCrete®**
Technology uses asphalt and trimmed
asphalt, without using bitumen, or excess heating
or energy, and is 100%
recyclable.



Support to Development

Growth of the economy is directly dependent on the logistical transaction volumes. Therefore the ease and quality of the transportation infrastructure is directly proportional to the development level of the country. Transporting goods manufactured in a province in the country to a different geographical location in a rapid and economical way, supplying the connections via motorways, railways, harbors and airways without problems are the basics of a high quality infrastructure.

With the infrastructure technology that it developed, **NovoCrete®** has the ability to achieve the targeted investments goals in one procedure that would not require regular maintenance or repetition.

NovoCrete® is offering a durable, environmentally friendly, long lasting and economic soil stabilization system.

What is NovoCrete®

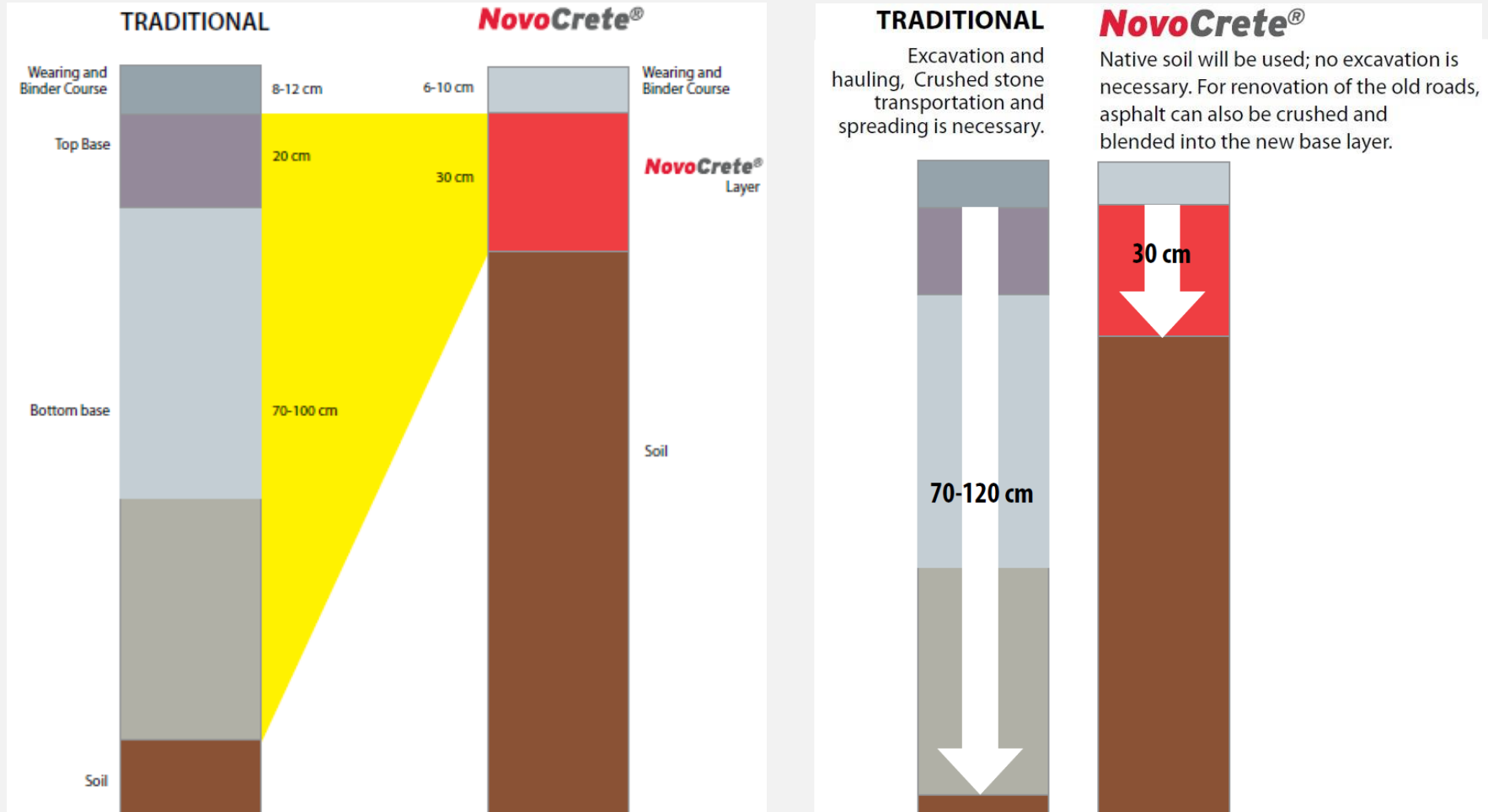
Ground improvement and soil stabilization raw material that has 100% mineral content, formed by alkali and soil alkali structural elements, contains the natural oxides, chlorides, sulphates and carbonate minerals, used by mixing with the powder cement for on-site recycling.

NovoCrete® is easy and fast to install, durable, economic, has a long life, impermeable, frost-proof, unbreakable, nonsettleable, non-rigid, with high rock strength and meanwhile it is flexible and improves performance.

Product Information

Composition	<p>%100 mineral content.</p> <p>Consist of alkaline and Earth alkaline structure. It contains natural oxides, chlorides, sulfates and carbonate minerals.</p>
Description	Mineral Powder of White colored, non-toxic, non detrimental for the health and environmentally friendly.
Origin	Made in Germany
Application	Soil stabilization and soil compaction of almost all kinds of soils including clay, sand, shale, even oil shale, salty soils, soils which are containing organic materials and even-according to previously made analysis- contaminated soils.
Mechanism	Will be added into the standard cement in the ratio of 2% and mixed with soil. NovoCrete® neutralizes the existing acids and supports the hydration process by allowing for longer crystals.
Features of NovoCrete® stabilized soils	<p>It can transform almost all kinds of soils or bases into a very strong, typical 150 MN/m² foundation layer without replacing the existing soil in the field (for a 30 cm thick stabilized surface).</p> <p>The stabilized surface does not allow the penetration of the water or ice. Therefore it significantly increases the physical life of the stabilized layer and does not need maintenance costs for a long time.</p> <p>Stabilized surface is resistant against oil, salt, acids and chemicals.</p>
Application Areas	Any type of roads, railways, storage and industrial surfaces, mines, rural roads, garbage dumping areas, airports, etc.

Comparing NovoCrete® with the Traditional Infrastructure Method

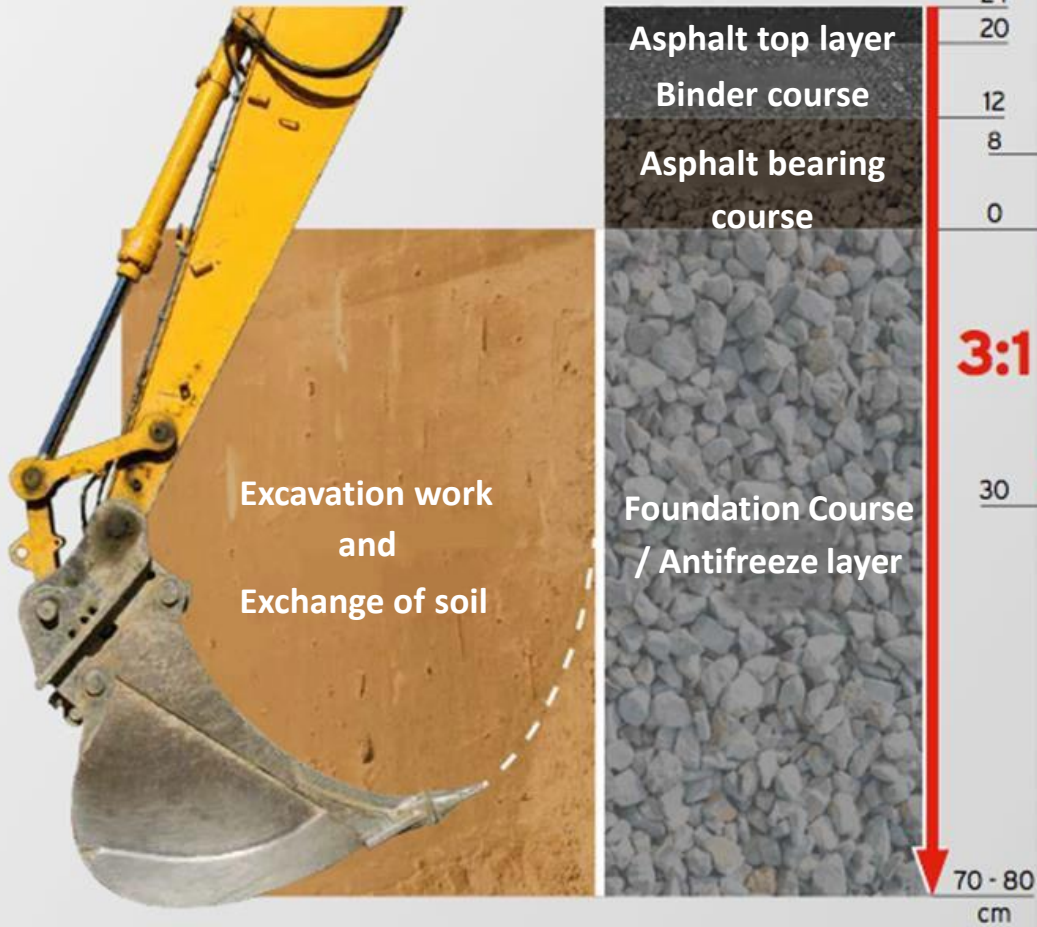


Comparing **NovoCrete®** with the traditional infrastructure method on road construction layers.

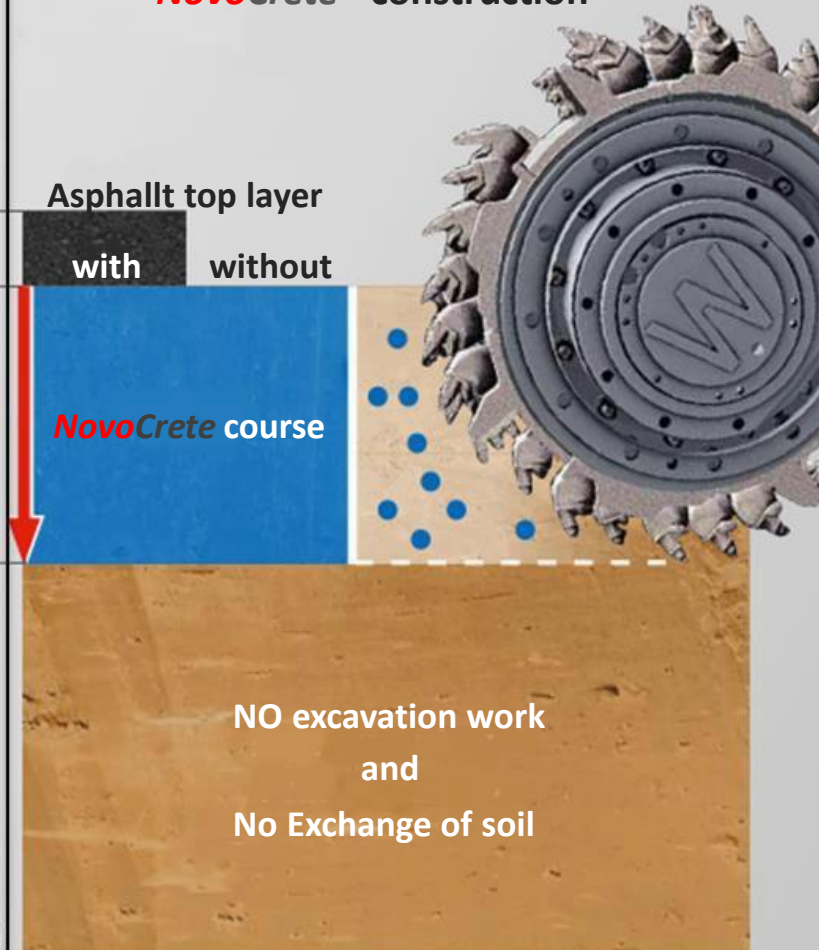
Comparing **NovoCrete®** with the traditional method on road excavation works

NovoCrete® vs. Conventional Construction

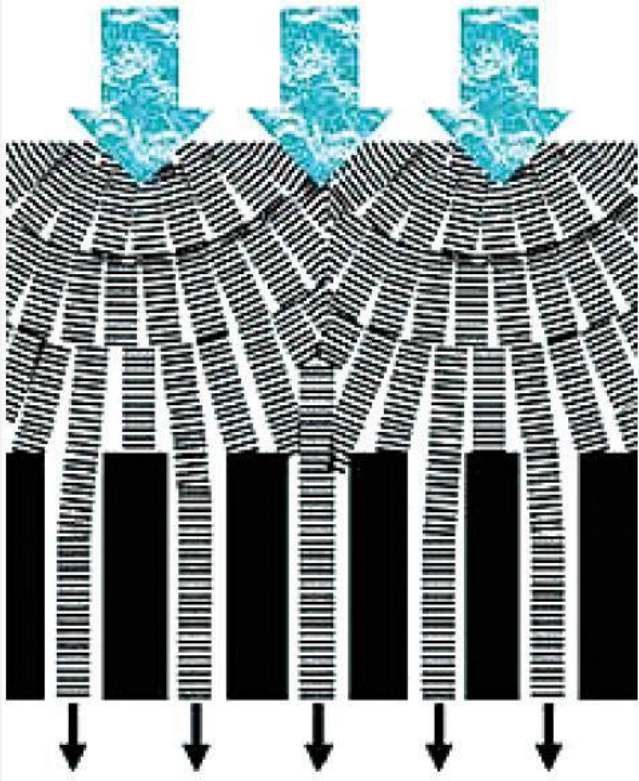
Conventional Construction



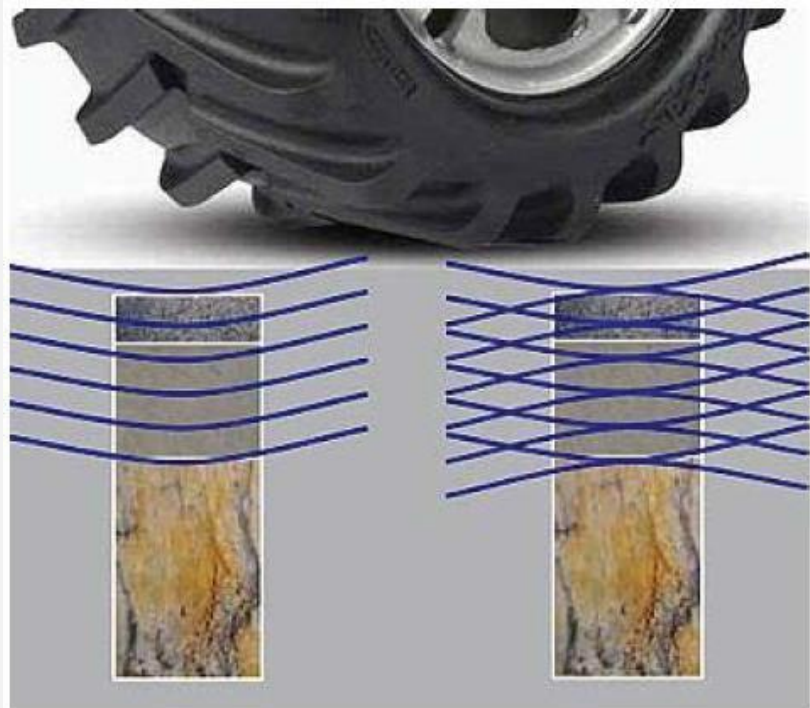
NovoCrete® construction



Heavy Load Capacity



The stabilized layers have a very high load bearing capacity due to the long needle like crystals (vertical dive) that form during the hydration process.



The stabilized layers generated are very high in tensile strength which allows for the absorption of vibration from heavy trucks and equipment. These layers achieve a flexibility that allows for the vibratory movement

NovoCrete® Methodology

NovoCrete®, affects the hydration process of the cement. During the water adding process, it increases the crystal-formation and it creates significantly much longer crystals horizontally and vertically and creates higher **PSI** (pound per square inch) and **Laterally** distributes the load.

Therefore it gives a higher compression resistance, higher flexibility and an impermeable structure on the existing ground which prevents the penetration of water molecules, the water cannot penetrate into the ground, hence the ground will not freeze, and as there will be no expansion because of the frost, no deformation will occur in the ground.

NovoCrete® generates a very high tensile strength by absorbing the vibration created by the heavy trucks. These layers achieve a flexibility that allows **vibratory movements**.

NovoCrete®, enters into **Pozzolanic** reaction, it prevents the dissolution in water and provides 100% connection of all incongruous materials.

NovoCrete® Methodology

NovoCrete®, fills even the smallest pores on the applied ground and covers all the gaps with its homogeneous mixture, and it creates higher acid resistance, at the same time it prevents all the negative factors like breakage, shrinkage and cracks. Better filling of small gaps and therefore blocking the pores provides a positive effect on water impermeability. Impermeability 10^{-9} m/s.

NovoCrete® shows a very fast performance increase on the applied ground, therefore it forms a single piece of flexible and non-breakable apron that has a strength of a horizontal beam equal to the whole ground area. It never creates a grout gap or grout space.

NovoCrete® Technology is the most important feature of this innovative method that transforms all kinds of grounds into the concrete-strength, to make on-site recycling without replacing the existing soil in the field, without making excavation works and without the need to bring any additional materials, and it is a **100% environmental recycling product**, consisting of 100% soil alkaline with natural mineral contents.

NovoCrete® Sampling Procedure Steps

Preparation Phase;

The first stage of working with the **NovoCrete®** system is doing some native soil tests. Test pits should be opened in native soil for taking samples from considered depths (50 cm, 100 cm, 150 cm and 200 cm) and can be made below natural soil tests (Depends on the soil situations, sampling depth of 250 cm can be added).

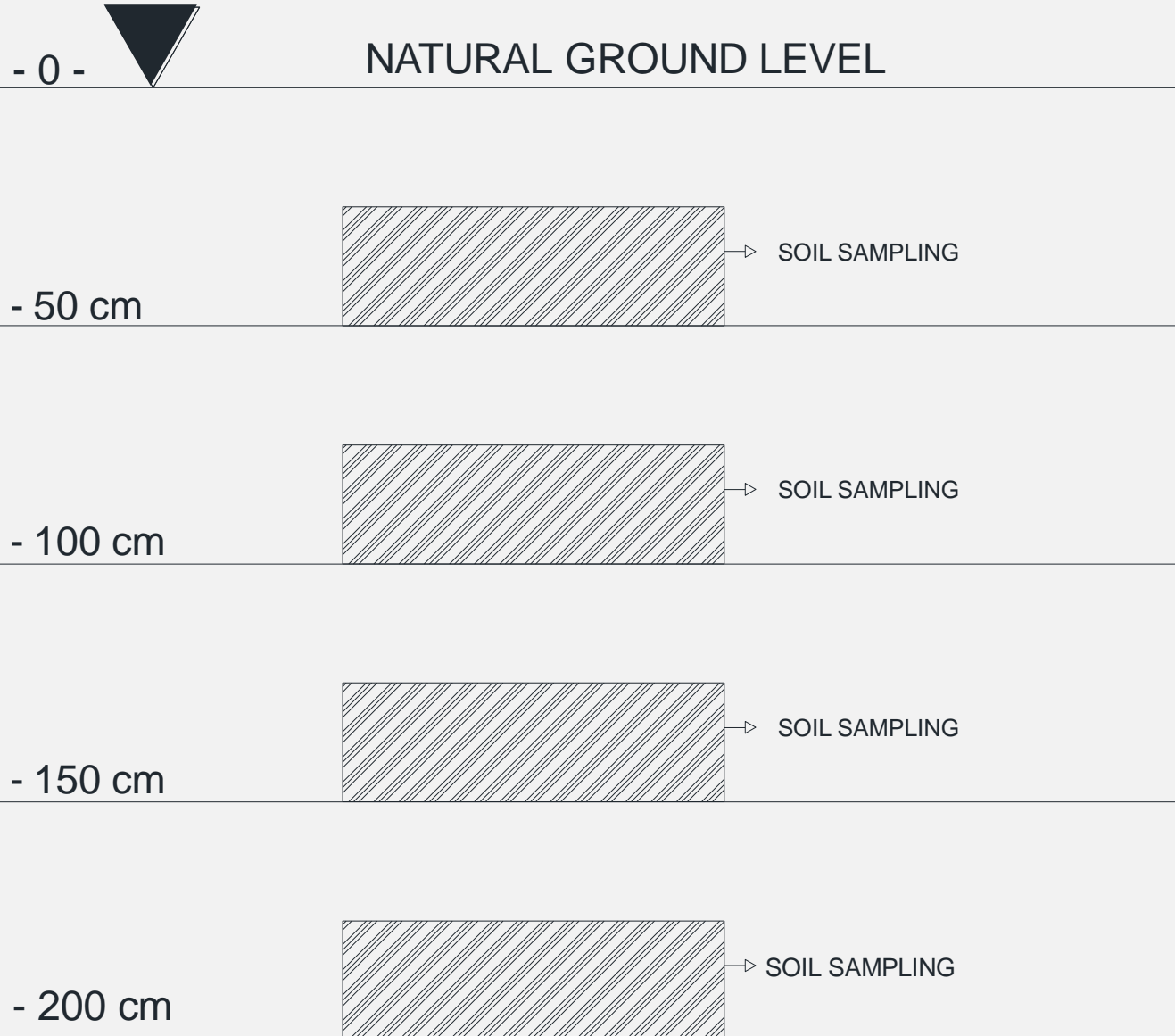
All these tests should be made according to Geological Reports and Soil Classifications along the worksite in necessary depths.

Natural soil test results are specific to each soil sample tested. The results directly effect the costs can be change because of the soil situations therefore the results can be increase or decrease.

Therefore, the cost can be change (+/-). Technical Conditions Before the Application;

- Natural water content
- Sieve Analysis - Hydrometer analysis
- Atterberg Limits (Liquid Limits (LL), Plastic Limits (PL), Plasticity Index(PI))
- Proctor Tests (Optimum water content, Max. Dry unit weight)
- CBR (California Bearing Ratio)

- Organic substance control



Preparation of the Calculation Module

On the application area, the previously prepared geological report, hydrogeological situation and drilling results are checked and the test reports requested by us for the existing natural ground are prepared.

With the same soil samples, **NovoCrete®**+Cement additive analyses are made in the laboratory.

By taking the expected load volume in the Project (Axle load weight?) and volume of traffic (repeated number of loads?) and the required MPa, kNa, EWD-EWD2 values into the consideration,

Finally **NovoCrete®**+Cement quantity and type which will be used in 1 m² area is determined, milling excavating depth will be calculated and application module is prepared.

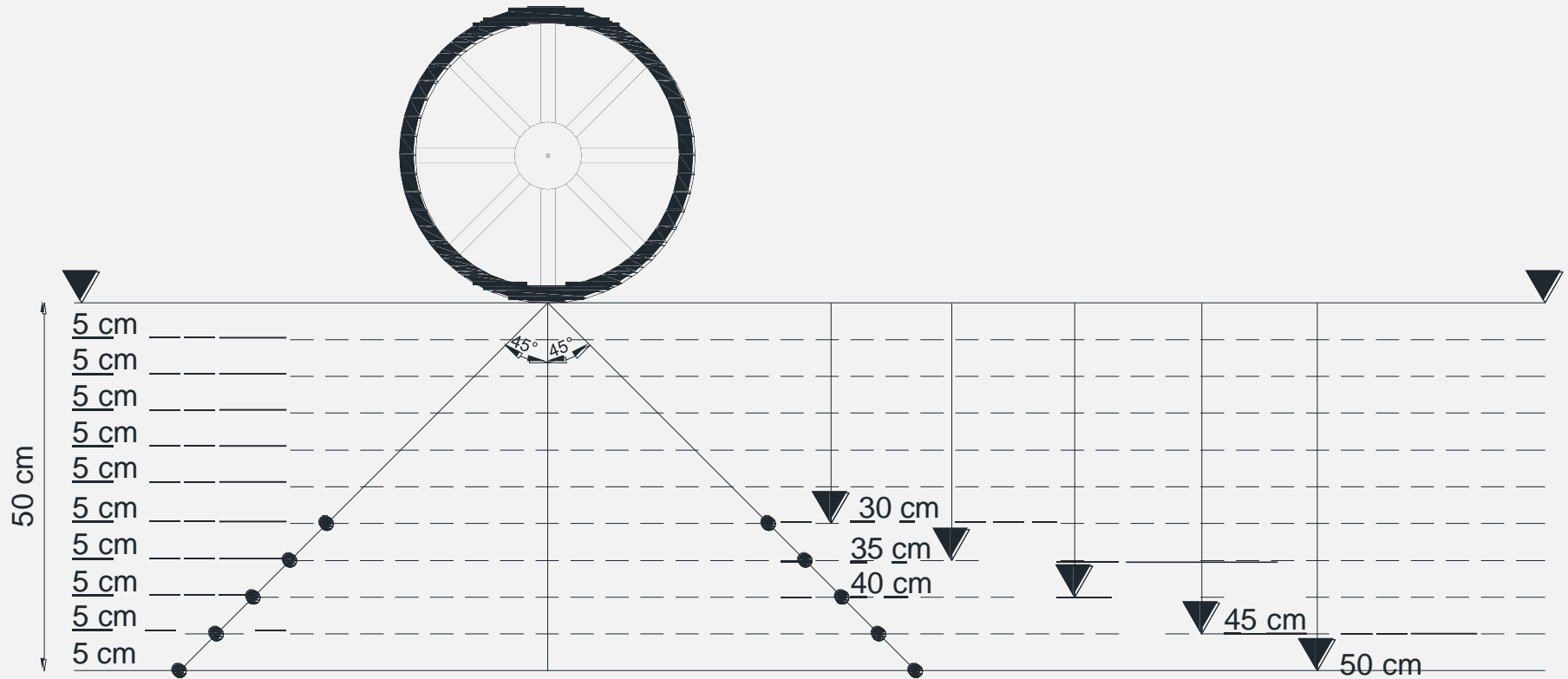
Preparation of the Calculation Module

According to the calculated natural soil results, analyses are made with the same soil samples and with **NovoCrete® + Cement** additives.

By taking the expected load volume in the Project (Axle load weight?) and volume of traffic (repeated number of loads?) and the required MPa, kN, kPa, EWD-EWD2 values into the consideration,

NovoCrete® + Cement quantity and type which will be used in 1 m² area is determined, milling excavating depth will be calculated and application module is prepared.

LOAD DISTRIBUTION:



Minimum Bearing Capacity to Achieve (according to the project)

Heavy load areas

Cycle paths

Motorways

Airports



PCN xx/A-D/W-Z/R+F

Min. 120 MN/m²

Min. 140 MN/m²

Min. 40 MN/m²

Min. 160 MN/m²

Road Category			Approximate values* for the assessment of the thickness of asphalt track bed, asphalt binder and asphalt top coating			
			*The recommended values are only conducted for the initial estimate for the thickness of the several asphalt layers, based on experienced datas of operated projects and digresses to the german RStO . These datas are only valid in conjunction with the novocrete solidificated layers . Before execution of the construction work / project these recommended values must be verified in detail in consideration of the soil conditions, underground soil situation, geotechnical parameters of the solidificated layers, climate conditions etc., the congestion (traffic volume / axle loads) in the future and the results of the conducted feasibility labtests.			
road category	amount traffic lane	width traffic lane (m)	thickness of the frost resistant Novocrete layer ** (cm)	asphalt track bed (cm)	asphalt binder (cm)	asphalt top coating (cm)
highway (equates german RStO road class: SV and I)	4 and more	3,75	0,35 - 0,60	6 to 8	4	4
freeway (equates german RStO road class: I and II)	4 and more	3,75	0,30 - 0,60	8 to 10	none	4
road with low speed range (equates german RStO road class: III, IV and V)	2	3,5 and more	0,25 - 0,50	6	none	4
road with low speed range (equates german RStO road class: IV, V und VI)	1	up to 4	0,25 - 0,50	6	none	4
				alternatively: a single layer of a combined track bed / top coating layer with a thickness between 6 cm to 8 cm		

** = layer thickness depends on the results of the feasibility test, project datas and underground and soil conditions

ROAD CATEGORIES			Approximate values for determining the binder additive quantities* and compression depth*							
			*Determined values are calculated by taking the beginning approximate "binder additive quantity" and "compression depth" parameters as basis. These proposed values must be validated before starting to the construction works/project by taking the details like surface soil conditions, underground soil conditions, geotechnical parameters of stabilized layers, weather conditions, etc. and future traffic density (volume of traffic/axle loads) and results of the realized feasibility laboratory tests into the consideration.							
Road Category	Number of Traffic Lanes	Traffic Lane Width (m)	Soil Type	Soil Class (DIN 18300)	Necessities of the Soil or Recycling Materials	Axle Load (t)	Total Binder Additive Quantity (kg/m ³)	Compression Depth (m)	Coating	Coating Type
Highway (German RStO road classification equivalent: SV and I)	4 or more	3,75	Sand	3	broken big pieces in <0,45 mm dimension, small granule content in <0,063 mm dimensions minimum 25%	unclassified	160 - 180	0.35 - 0.50	necessary	access and load-bearing road
			Sand-Gravel-Mix	3/3-5/6			100 - 180	0.35 - 0.50		
			Sandy mud	3-4 / 4			170 - 190	0.35 - 0.60		
			Alluvium	4 / 4-5			180 - 200	0.35 - 0.60		
			Clay	4/4-5/6			180 - 200	0.35 - 0.60		
			Recycling(including	3-7			100 - 160	0.35 - 0.60		
Highway (German RStO road classification equivalent: I and II)	4 or more	3,75	Sand	3	broken big pieces in <0,45 mm dimension, small granule content in <0,063 mm dimensions minimum 25%	unclassified	160 - 180	0.35 - 0.50	necessary	access and load-bearing road
			Sand-Gravel-Mix	3/3-5/6			100 - 180	0.35 - 0.50		
			Sandy mud	3-4 / 4			170 - 190	0.35 - 0.60		
			Alluvium	4 / 4-5			180 - 200	0.35 - 0.60		
			Clay	4/4-5/6			180 - 200	0.35 - 0.60		
			Recycling(including	3-7			100 - 160	0.35 - 0.50		
Slow-Speed road (German RStO road classification equivalent: III, IV and V)	2	3,5 or more	Sand	3	broken big pieces in <0,45 mm dimension, small granule content in <0,063 mm dimensions minimum 25%	up to 15 tons	160 - 180	0.25 - 0.50	according to the project necessities	access and load-bearing road or bituminous thin coating or asphalt over aggregate
			Sand-Gravel-Mix	3/3-5/6			100 - 180	0.25 - 0.50		
			Sandy mud	3-4 / 4			170 - 190	0.35 - 0.50		
			Alluvium	4 / 4-5			180 - 200	0.35 - 0.50		
			Clay	4/4-5/6			180 - 200	0.35 - 0.50		
			Recycling(including	3-7			100 - 160	0.25 - 0.50		
Slow-Speed road (German RStO road classification equivalent: IV, V and VI)	1	up to 4	Sand	3	broken big pieces in <0,45 mm dimension, small granule content in <0,063 mm dimensions minimum 25%	up to 10 tons	160 - 180	0.25 - 0.50	according to the project necessities	access and load-bearing road or bituminous thin coating or asphalt over aggregate
			Sand-Gravel-Mix	3/3-5/6			100 - 180	0.25 - 0.50		
			Sandy mud	3-4 / 4			170 - 190	0.35 - 0.50		
			Alluvium	4 / 4-5			180 - 200	0.35 - 0.50		
			Clay	4 / 4-5 / 6			180 - 200	0.35 - 0.50		
			Recycling(including	3-7			100 - 160	0.25 - 0.50		

* 7 days after the stabilization or in following 28 days the values may differ according to the original soil type and used binder additive amount.

* Novocrete content 2%, laboratory results are taken as basis (for example burning loss amount). Novocrete content may be increased up to 3% or 4%.

In this application, the Formula will be changed according to the Soil Class and Type, Soil Analysis, Road Load Bearing Capacity and Repeated Number of Loads.

100	110	120	130	140	150	160	170	180	190	200
cement	cement	cement	cement	cement	cement	cement	cement	cement	cement	cement

d=25	1 m ²	25 kg	27,50 kg	30 kg	32,5 kg	35 kg	0	0	0	0	0	0
	NovoCrete	0,500 kg	0,550 kg	0,600 kg	0,650 kg	0,700 kg	0	0	0	0	0	0
d=30	1 m ²	30 kg	33 kg	36 kg	39 kg	42 kg	45 kg	48 kg	51 kg	54 kg	57 kg	60 kg
	NovoCrete	0,600 kg	0,660 kg	0,720 kg	0,780 kg	0,840 kg	0,900 kg	0,960 kg	1,020 kg	1,080 kg	1,140 kg	1,20 kg
d=35	1 m ²	35 kg	38,5 kg	42 kg	45,5 kg	49 kg	52,5 kg	56 kg	59,5 kg	63 kg	66,5 kg	70 kg
	NovoCrete	0,700 kg	0,770 kg	0,840 kg	0,910 kg	0,980 kg	1.05 kg	1,12 kg	1,19 kg	1,26 kg	1,33 kg	1,40 kg
d=40	1 m ²	0	0	48 kg	52 kg	56 kg	60 kg	64 kg	68 kg	72 kg	76 kg	80 kg
	NovoCrete	0	0	0,960 kg	1,04 kg	1,12 kg	1,20 kg	1,28 kg	1,36 kg	1,44 kg	1,52 kg	1,60 kg
d=45	1 m ²	0	0	54 kg	58,5 kg	63 kg	67,5 kg	72 kg	76,5 kg	81 kg	85,5 kg	90 kg
	NovoCrete	0	0	1,08 kg	1,17 kg	1,26 kg	1,35 kg	1,44 kg	1,53 kg	1,62 kg	1,71 kg	1,80 kg
d=50	1 m ²	0	0	60 kg	65 kg	70 kg	75 kg	80 kg	85 kg	90 kg	95 kg	100 kg
	NovoCrete	0	0	1,20 kg	1,30 kg	1,40 kg	1,50 kg	1,60 kg	1,70 kg	1,80 kg	1,90 kg	2,00 kg

CBR Results with NovoCrete®+Cement Additives of A-4 Class Soils (Silt Grounds) According to the Highways Classification System (AASHTO) With Various Water Contents

For determining the effects of the **NovoCrete®** additive in relationship with the enhancement of soil features, a clay sample is taken by Yıldız Technical University Faculty of Civil Engineering-Civil Engineering department, and the natural status of this sample and its situation after the addition of the **NovoCrete®** additive and cement is analyzed through laboratory tests.

CBR tests are made by taking ASTM D1883 standard into consideration and experiments were made with optimum water content, 2% less than optimum water content and with 2% more than optimum water content. The prepared samples have been kept in water for 96 hours, then the loading operation is started.

CBR results of natural soil and natural soil + cement + **NovoCrete®** are shown in the following table.

Yıldız Technical University Report – Doç. Dr. Mehîet BERİLGEN

Natural Soil			Natural Soil+Cement+NovoCrete			Explanation
w (%)	CBR (%)	Review	w (%)	CBR (%)	Review	
17	8	Medium	17	100	Strong	W _{opt}
19	2	Very Weak	18	63	Strong	W _{opt} + 2%
14	7	Weak	14	78	Strong	W _{opt} - 2%
17	6	Weak	17	95	Strong	W _{opt}
20	2	Very Weak	19	74	Strong	W _{opt} + 2%
16	7	Weak	15	65	Strong	W _{opt} - 2%

It is evident that the CBR values of the mixture prepared **NovoCrete®** + Cement are substantially better in comparison with the natural soil.

**CBR Results of the Tests made by using Cement +
NovoCrete® Weak Ground Stabilizator On A-7-6 Class Soils
According to the Highways Classification System**

T.R. Ministry of Transportation, Maritime and Communications and the General Directorate of Highways made sieve analysis, Atterberg limits, standard or modified proctor according to the grain size, wet CBR and hydrometer tests by using the natural soil material and cement + **NovoCrete®** stabilized material for weak grounds.

Results of the above mentioned tests are given below.



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340.07-1148
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Karayolları Genel Müdürlüğü
Araştırma Geliştirme Dairesi Başkanlığı
İnönü Bulvarı 06100 Yücetepe / ANKARA

Deney Raporu
Test Report

Sayfa 1/9
Page 1 of 9

Müşterinin adı/adresi
Customer Name/Address
JAGS INNOVATIVE PRODUCTS İNŞAAT SANAYİ ve TİCARET LİMİTED ŞİRKETİ
Merkez Mahallesi Çavuşbaşı Caddesi İlhanlar İş-1 Kat:1 No:73/1 Çekmeköy/İSTANBUL

İstek Numarası
Order No.
08.06.2012 tarih, 012-03/2012 ve 13.06.2012 tarih, 012-04/2012 sayılı yazılarınuz

Numunenin adı ve tanımı
Name and identity of test item
Doğal Toprak, Çimento+NovoCrete zayıf zemin stabilizatörü ile stabilize edilmiş toprak deneyleri

Numunenin kabul tarihi
The date of receipt of test item
13.06.2012

Açıklamalar
Remarks

Deneyin yapıldığı tarih
Date of Test
26.06.2012-12.09.2012

Raporun Sayfa Sayısı
Number of pages of the Report
9 sayfa

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The Turkish Accreditation Agency (TÜRKAK) is signatory to the multilateral agreements of the European co-operation for the Accreditation (EA) and of the International Laboratory Accreditation (ILAC) for the Mutual recognition of test reports.

Deney ve/veya ölçüm sonuçları, genişletilmiş ölçüm belirsizlikleri (olması halinde) ve deney metodları bu sertifikanın tamamlayıcı kısmı olan takip eden sayfalarda verilmiştir.
The testing and/or measurement results, the uncertainties (if applicable) with confidence probability and test methods are given on the following pages which are part of this report.



Tarih
Date
23.11.2012

Deney Sorumlusu
Person in charge of test
Cihat AVŞAR

Laboratuvar Müdürü
Head of Testing Laboratory
Fatma ORHAN

** İşareti deneyler, akreditasyon kapsamındadır.
Bu rapor, laboratuvarın yazılı izni olmadan kısmen kopyalanıp çoğaltılamaz.
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Test Report

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TS.1/1
11-12

Sayfa 3/9
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TOPRAK DENEYLERİ RAPORU									
Numuneyi Gönderen (İşveren ve İşin Adı)		JAGS INNOVATIVE PRODUCTS İNŞAAT SANAYİ VE TİCARET LİMİTED ŞİRKETİ							
NUMUNENİN	Lab. No.	11							
	Arazi No.								
	Alındığı yer	Km							
	Derinlik								
Cinsi	Doğal Toprak	2,5 kg Doğal Toprak							
	Malzeme	+ 308,7 gr Çimento							
		+6,3 gr NovoCrete							
DENEY YÖNÜNE DAĞILIMI	Elekt. Analizi (%Geçen)	75mm (3")							
		50mm (2")	100,0						
		37,5mm (1 1/2")	99,9						
		25mm (1")	99,3						
		19mm (3/4")	98,6						
		9,5mm (3/8")	95,8						
		4,75mm (No.4)	93,2						
		2mm (No.10)	90,6						
	Hidrometre Analizi	425µm (No.40)	86,0						
		75µm (No.200)	80,0						
		%Cakil (>2mm)	9,4						
		%İri Kum (2mm-425µm)	4,3						
		%İnce Kum (425µm-75µm)	7,2						
		%Silt (75µm-2µm)	38,4						
		%Kil (2µm-1µm)	13,3						
		%Kolloid kil (<1µm)	27,4						
		75 mm üzerinde kalan							
Atterberg Limitleri	Likit limit % **	55,7	N.P.						AASHTO T 89
	Plastik limit % **	25,9	N.P.						AASHTO T 90
	Plastisite İndeksi %**	29,8	N.P.						AASHTO T 90
Zemin Sınıfı	AASHTO	A-7-6							
	UZS	CH							
Aşınma (Los Angeles) %									
Sağlamlık (MgSO ₄)									
Su Muhtevası									
Maksimum Kuru Birim Ağırlık	Standart**	1,587	1,542						AASHTO T 99
	Modifiye**								
Optimum Su İçeriği %	Standart**	24,4	24,0						AASHTO T 99
	Modifiye**								
CBR	Vibrasyonlu								
	Kuru Birim Ağırlık								
	Su İçeriği	3,00	122,00						
	Yağ %								
Şişme (Sürsarı) %		2,31	0,3						AASHTO T 193
Sartnameye uygunluk (.....)									

Ölçüm belirsizliği %95 güven aralığında k=2 'dir.

Toprak Lab. Teknisyeni	Toprak ve Stat. Müh.	Üstüplatı Geliştirme Şubesi Müh. Yrd.	
Adı Soyadı	Necati ARDAĞ	Tugba OZTURK	Cihat AVŞAR
İmzası			

** İşareti deneyler, akreditasyon kapsamındadır.

Deney sonuçları, sadece deney tabii tutulan numunelerin için geçerlidir.

Laboratuvarlarımız tarafından numune alma işlemi gerçekleştirilmemiş, deney tabii tutulan numunelerin temsil özelliğinden laboratuvarlarımız sorumlu değildir.

Araştırma ve Geliştirme Dairesi Başkanlığı
9001 standardına uygun olarak belgelenmiştir.
ARGE.KP.01.FR-05 Rev.00


TS EN ISO


Bu rapor, laboratuvarın yazılı izni olmadan kısmen kopyalanıp çoğaltılamaz.


İmzasız ve mühürlü raporlar geçersizdir


İletişim Bilgileri:
Tel: 0312 4158502
Fax: 0312 4158504


Step-by-Step NovoCrete®


-1- 
Taking the soil samples and making the necessary tests (sieve analysis, Atterberg consistency limits, CBR and proctor tests)


-2- 
Determining the NovoCrete layer thickness and quantity which will be used according to the test results


-3- 
Spreading NovoCrete over the ground with spreader


-4- 
Spreading the cement by using cement spreading truck with dosage


-5- 
Homogenous mixing of NovoCrete and cement mixture with water by using soil stabilizer

-6- 
Compressing the soil with vibratory pad foot roller

-7- 
Grading the field with grader

-8- 
Grading the surface with flat roller

-9- 
Irrigating the surface after the production

-10- 
Final situation of the ground which its bearing strength is increased and improved by NovoCrete



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Taking Soil Samples



Taking the soil sample and measuring the CBR



During the laboratory test



Determining the quantities of **NovoCrete®** + cement according to the CBR



Initial situation – Prepared rough level



Loading of Cement in the Spreader



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Spreading the exact amount of **NovoCrete®**



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Spreading of the exact amount of cement



Milling process of the cement and **NovoCrete®** mixture with water



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Milling process of the cement and **NovoCrete®** mixture with water



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Milling process of the cement and **NovoCrete®** mixture || 1th water



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After the milling process



Gears of the milling machine



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Dynamic compaction through Vibration



Post profiling with grader



Dynamic compaction using a steel drum roller



Dynamic compaction using a steel drum roller



Stabilized **NovoCrete®** base course layer (before irrigation process)



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Irrigation of the base layer during stabilization and after compaction to avoid evaporation



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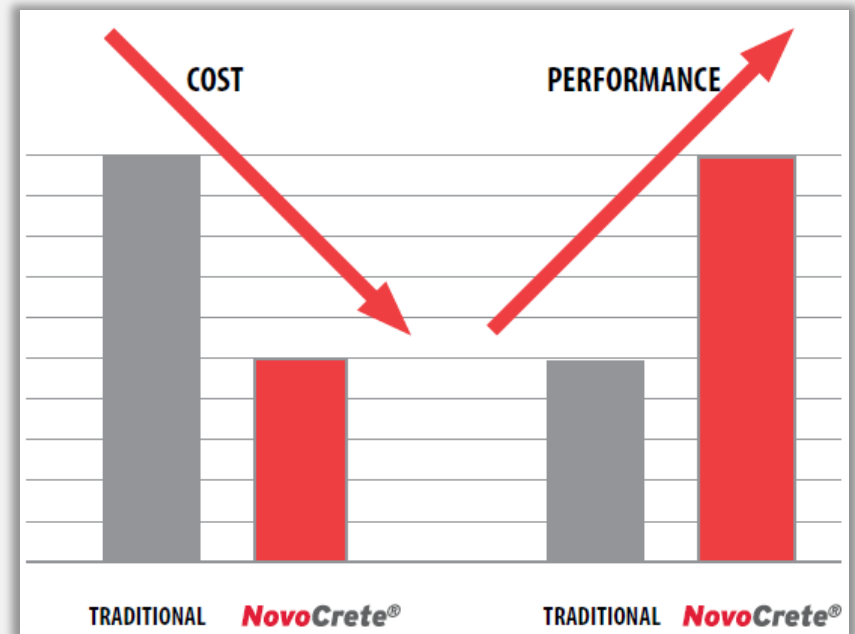
NovoCrete®



A different railway project of soil improvement with **NovoCrete®** technology

NovoCrete® Advantages of Economics

- **NovoCrete®** decreases the storage costs.
- Uses existing soil in construction of the foundation layer.
- No need for excavation.
- It eliminates the use of crushed mineral- aggregates for foundation layer or base.
- It slopes the sub-base to provide drainage of the construction area.
- It decrease the production time by **60%-70%**



NovoCrete® Economy and Advantages

- Reduction of costs and expenditure for earth excavation
- Reduction of transports needed to landfill sites
- Reduction of purchases of materials for base layer and anti-frost layer.
- Reduction of supplies of filling materials
- Reduction of top costs
- Reduction of costs for repair
- Reduction of maintenance costs
- No anti-capillary layers needed
- Reduction of required settlement periods
- Possibility of avoiding depth foundations (after prior static inspection and if foundation conditions are favorable)
- Immobilization of hazardous materials without disposal and landfill charges
- Stabilization and immobilization possible in one procedure

Durable and Economic all these reasons.

Beglaubigte Übersetzung / Onaylı Çeviri

CONSULTEST AG

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**Yapı Sektörü İçin Malzeme
İncelemesi, Danışmanlık ve Kalite
Güvenliği Enstitüsü**

CARO SBU AG
Herr Emanuel Jauslin
Schlottermilch 4a
Postfach
6210 Sursee

Ohningen, 29 Ekim 2014

Hidrolik Stabilizasyonun Kullanım Süresi (Hizmet Ömrü)

Sipariş-No. 1160-14-1

Pek Muhterem Bay Jauslin

Hidrolik olarak stabilize edilmiş bir tabakanın hizmet ömrü özellikle şunlara bağlıdır:

Metal teknik parametreler, bilhassa dayanıklılık parametreleri (bilhassa yorulma veya E-Modül), ile dona ve suya dayanıklılık.

Boyutlandırma, bilhassa tabaka kalınlığı ve alt yapının taşıma yeteneği (radye sayısı)

Trafik yükleri ve klimadan ortaya çıkan zorlama/aşındırma (dingil geçişleri, dingil yükü, don-erime-döngüleri).

Yüksek sağlamlık/dayanıklılık, büyük tabaka kalınlıkları ve alt yapının taşıma yeteneği, hizmet ömrü üzerinde olumlu etki gösterir.

İçeri giren yüzey suyu (Örneğin asfalt kaplamada derine inen çatlaklar oluşması durumunda) su ve don etkisiyle hizmet ömrünün azalmasına neden olan lokal dayanıklılık kayıplarına neden olur.

Sisteme uyarılanmış bir asfalt tabakaları konsepsiyonu ile gerilimi emen ara tabakalar sayesinde asfalt tabakalardaki çatlak oluşumları (bilhassa refleksiyon çatlak oluşumları) önlenabilir.

Beglaubigte Übersetzung / Onaylı Çeviri

Hidrolik olarak stabilize edilmiş tabakaların uzun yıllar yaşadığına dair pozitif tecrübeler İsviçre'de 70'li yıllardan beri yapılmaktadır. Pratiğe yönelik büyük deneylerden elde edilen esaslı teorik bilgi ve bulgular aynı şekilde 70'li yılların sonundan beri mevcuttur (ETH/EDI Çimento stabilizasyonun uzun yaşamına ilişkin araştırma görevi siparişleri, 11/79, 29/82, 8/83).

Bu teorik bilgilere binaen ve hidrolik stabilizasyon konusundaki bugünkü pratiğe yönelik uzun tecrübelerle dayanarak şundan hareket etmek mümkündür: Norma uygun bir durumdan ve olağan klima ve trafik yükünden hareketle (İsviçre Merkez Bölgesi için) 80 ile 100 sene arasında bir hizmet ömrü (kullanma süresi) beklemek tamamen gerçekçidir.

Yukarıdaki bilgileri hizmetinize sunmaktan ve olası başkaca bilgiler için emrinize amade olduğumuzu söylemekten memnuniyet duyarız.

Saygılarımızla
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Positive experiences which are shown that the hydraulically stabilized layers are living for long years are made in Switzerland since 70ies. Likewise the essential theoretical information and evidences which are gained from the large tests of practices are also available since the end of 70ies (Research duty orders related with the long life of ETH/EDI Cement stabilization, 11/79, 29/81, 8/83).

According to these theoretical information and based on the long experiences of hydraulic stabilization related with today's practice, therefore it is possible to say that: by taking the situation appropriate to the norms and ordinary climate and traffic load into the consideration, it is completely realistic to expect a service life (physical life) between 80 and 100 years (for Switzerland central region).



*Best Regards,
Jags Innovative Products
Adnan Aydın*