Warm Welcome

WIRTGEN GROUP

BUILDING INFRASTRUCTURE - BUILDING THE NATION

Conference on Soil & Slope Stablization For High Rain Fall Areas.

MODERN (SPECIALISED) EQUIPMENT FOR SOIL STABLIZATION

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Sanjay Bajaj, Wirtgen India.
July 26,2016-NHIDCL

Wirtgen group Concept

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CRUSH → MIX → PAVE → COMPACT → MILL → RECYCLE

Load Transfer to subgrade.

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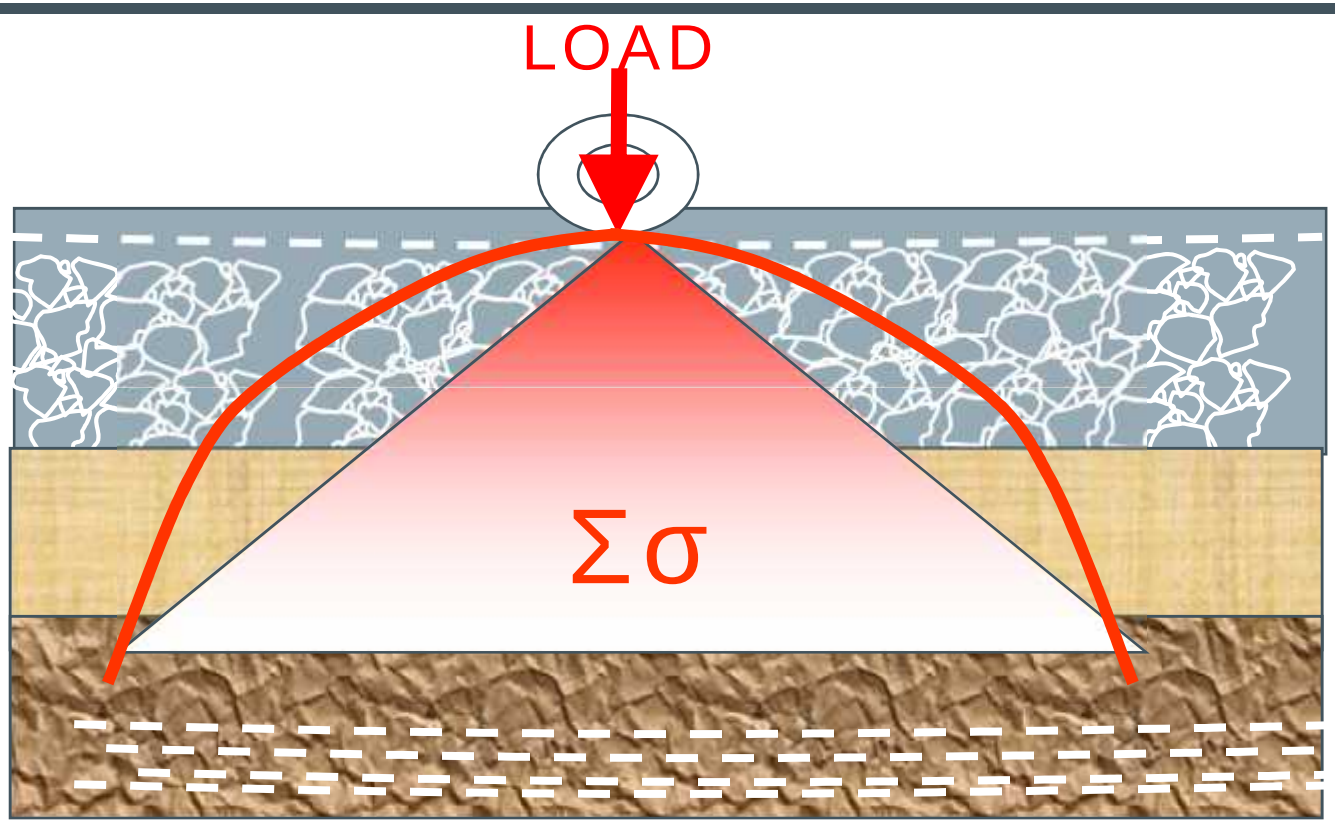

Few Pictures....soil

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Soil Stabilization

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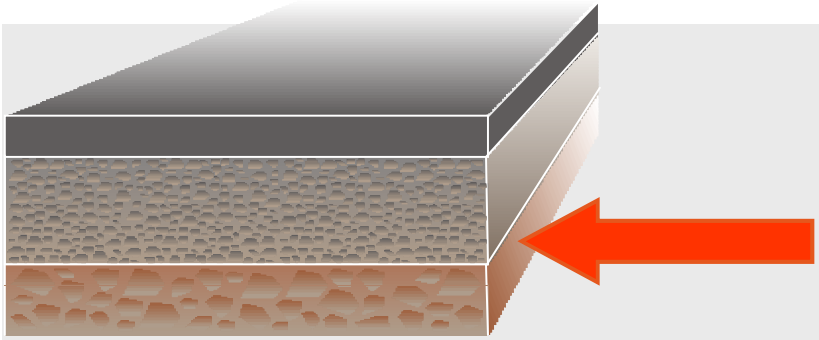

Stabilizing the Subgrade and / or Sub soil.

1-Stablise to improve CBR.
2-Stablise to reduce Swell Pressure(BC).
3-Improve ph, Grain distribution, reduce porosity.

But Why To Stabilise (Modify) soil/Gravel.

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- Desired Soil is not available in vicinity of Project.(NE)
- Available soil does no match the required properties.
- Getting Borrow area ???
- In North East, its clay soil mostly.
- In Meghalaya,Tripura,Assam, sikkim –soil quality???
- Aggregate Price in Tripura(3500/CBM),Assam,Sikkim,Meghalaya is similar.
- Aggregate Pricing in Andaman(Rs 9000/Cbm) .
- Hilly Terrain and exisiting road condition a big challenge in soil +aggregate supply .
- Cement/Cement additives Material easily avaialble.

Stablization -Applications

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Embankment	SUBGRADE	GRAVEL-Subbase-GSB+CEMENT
•Low CBR+ High PI Soil •Improvement by adding 3% cement. •Insitu Stablization upto 30-40 in single layer. Compaction with 20 tonne roller. •Higher daily out put of 8000-10000 sq mt /3000 cubic mt. •Use of existing soil Modified. •1km/day. •12 tonnes required Daily. •IRC 37 2012 Design.	•Subgrade Soil •Low CBR •Improvement by adding 3% cement. •Insitu Stablization upto 30-40 in single layer. Compaction with 20 tonne roller. •Higher daily out put of 8000-10000 sq mt /3000 cubic mt. •Use of existing soil -Modified. •1km/day. •12 tonnes required Daily •IRC 37 2012 Design.	•Stabilised Subbase-Insitu with cement. •Cement Treated foundation base. •Upper Bitumen Layer thickness are reduced •Aggregates Reduction by 20%. •Cost savings . •Cement/binders-3-5% by weight . •Modern equipment leads to daily output of 5000sqmt/1000 cubic mt stabilised base road. •25-30CM Layer thickness can be compacted by using 20 tonne roller. •IRC 37 2012 Design.

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Role Of Modern(Specialised)Equipment for Insitu soil/Gravel Stablization/Modification.

I. Mobile Truck mounted Cement Spreader-Precise Dosing of Cement(Binder).
II. Self Propelled 4 wheeled Stablizer equipment-Pulverise, mix cement soil and Add Precise water.-Working depth 300mm
III. Create Homogeneous Mix-Increase CBR.
IV. 20 tonne class Compaction Equipment-400/500mm loose(soil +Gravel-300 mm)
V. Performance-8000 Sq mt/Day.(soil) & 5000 sq mt (CTSB)
VI. 1 Km Day(soil).

The Soil stabilization Process.

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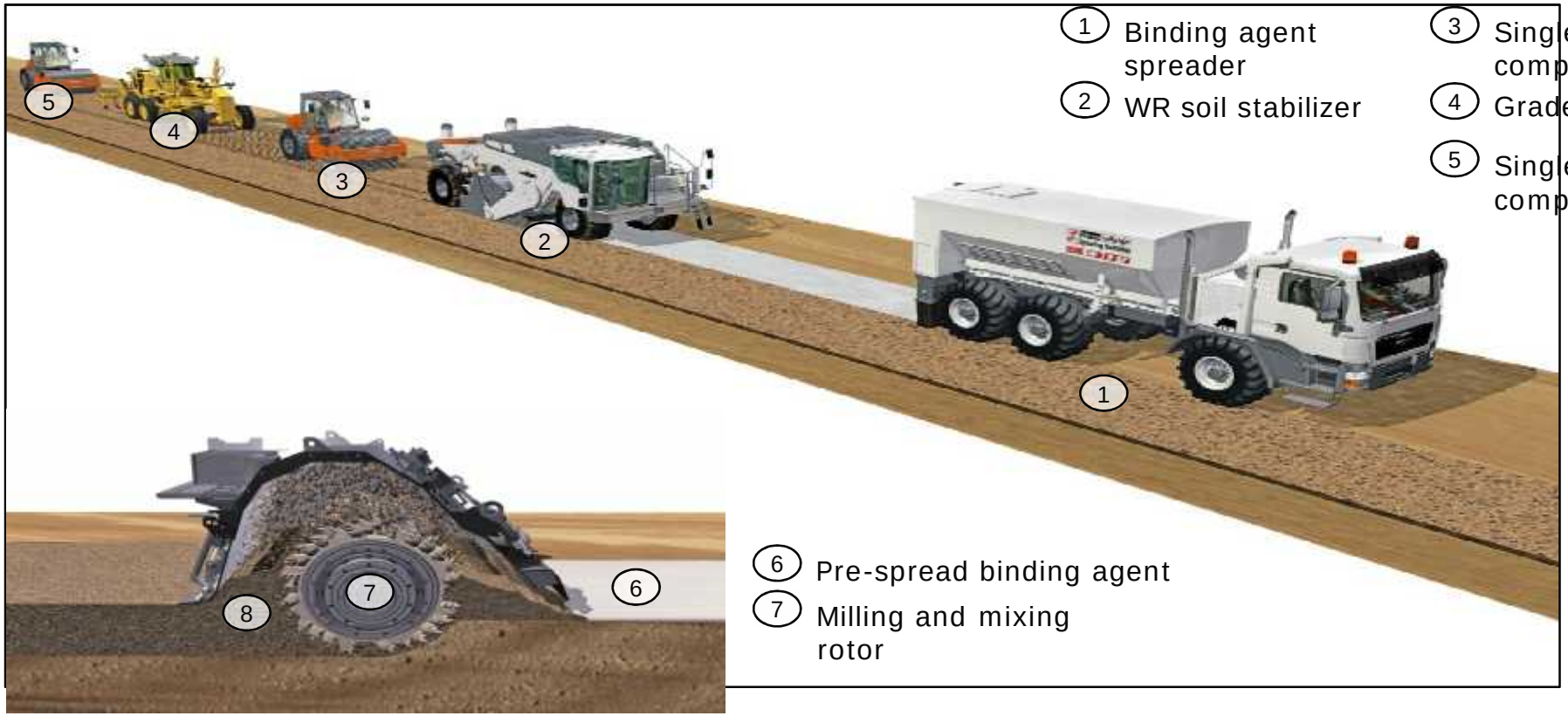

Mobile Cement Spreader Equipment

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1 Precise Spreading of binder.
2-Very Quick and dust free operation.
3-Spreads 8 tonnes/hr.
4-Quick refilling.

Mobile Cement Spreader.

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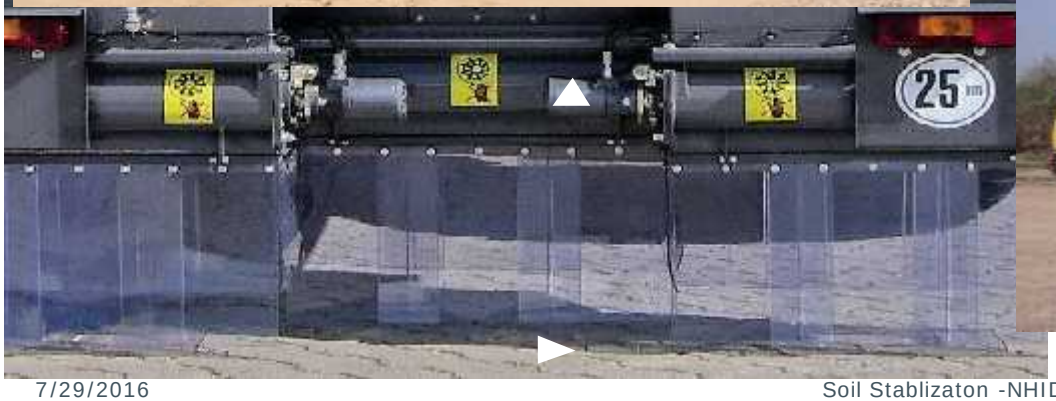

Main Equipment- Most Modern Soil Stabilizer

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Three State of Art Equipments.

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The compact option WR 200.

Working width:	2,000 mm
Working depth:	0 - 500 mm
Maximum engine power WR 200: Maximum engine power WR 200i:	315 kW / 428 PS 320 kW / 435 PS
Operating weight, CE:	23,900 kg

The all-rounder WR 240 .

Working width:	2,400 mm
Working depth:	0 - 510 mm
Maximum engine power WR 240: Maximum engine power WR 240i:	455 kW / 619 PS 447 kW / 608 PS
Operating weight, CE:	29,400 kg

The top performer WR 250

Working width:	2,400 mm
Working depth:	0 - 560 mm
Maximum engine power	571 kW / 777 PS
Operating weight, CE:	31,000 kg

High milling and mixing performance

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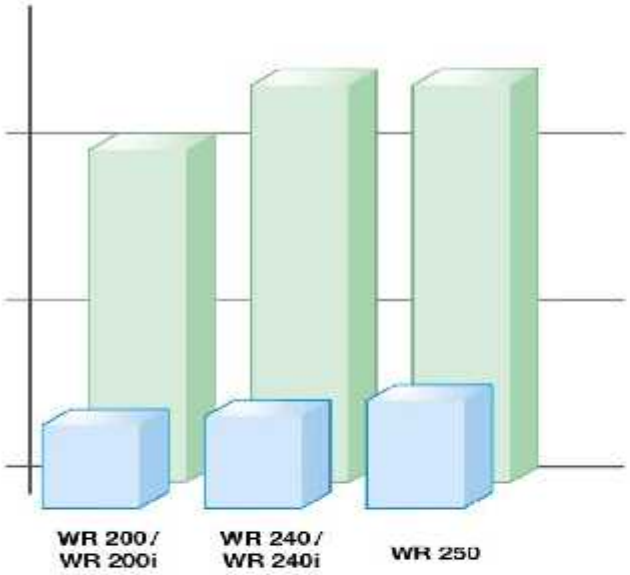
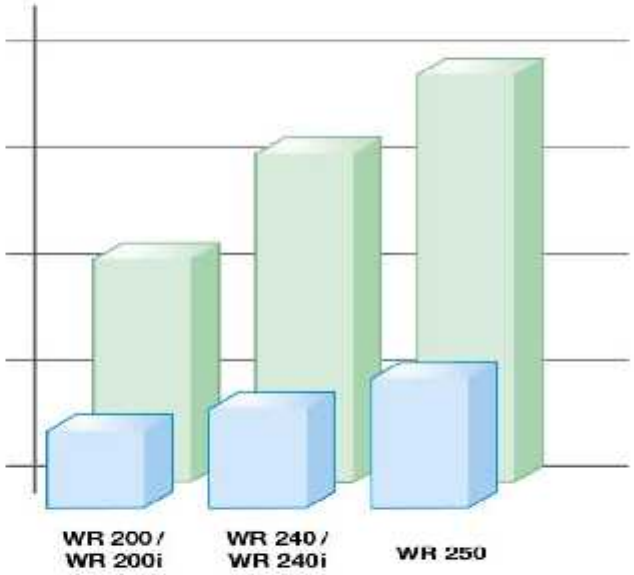
Comparison of working width and working depth



	WR 200 / WR 200i	WR 240 / WR 240i	WR 250
Working width	2,000 mm	2,400 mm	2,400 mm
Working depth	0–500 mm	0–510 mm	0–560 mm

Comparison of engine power and cutting power



	WR 200 / WR 200i	WR 240 / WR 240i	WR 250
Maximum power	315 kW 320 kW	455 kW 447 kW	571 kW
Cutting power	1.6 kW/cm	1.9 kW/cm	2.4 kW/cm

Made For India -Perfect soil stabilizer

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WR240	Out Put(Sq mt/day)	Out Put(KM Lane)
Soil Stablization	8000-1000 SQ MT/DAY	3
CTSB(Gravel +cement)	5000	1.5

Wirtgen soil Stablizer WR240– Multi.Application

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Powerfull Stablization Equipment(455kw engine self propelled)

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All-wheel drive guarantees ideal traction properties

Steering system built to field requirements

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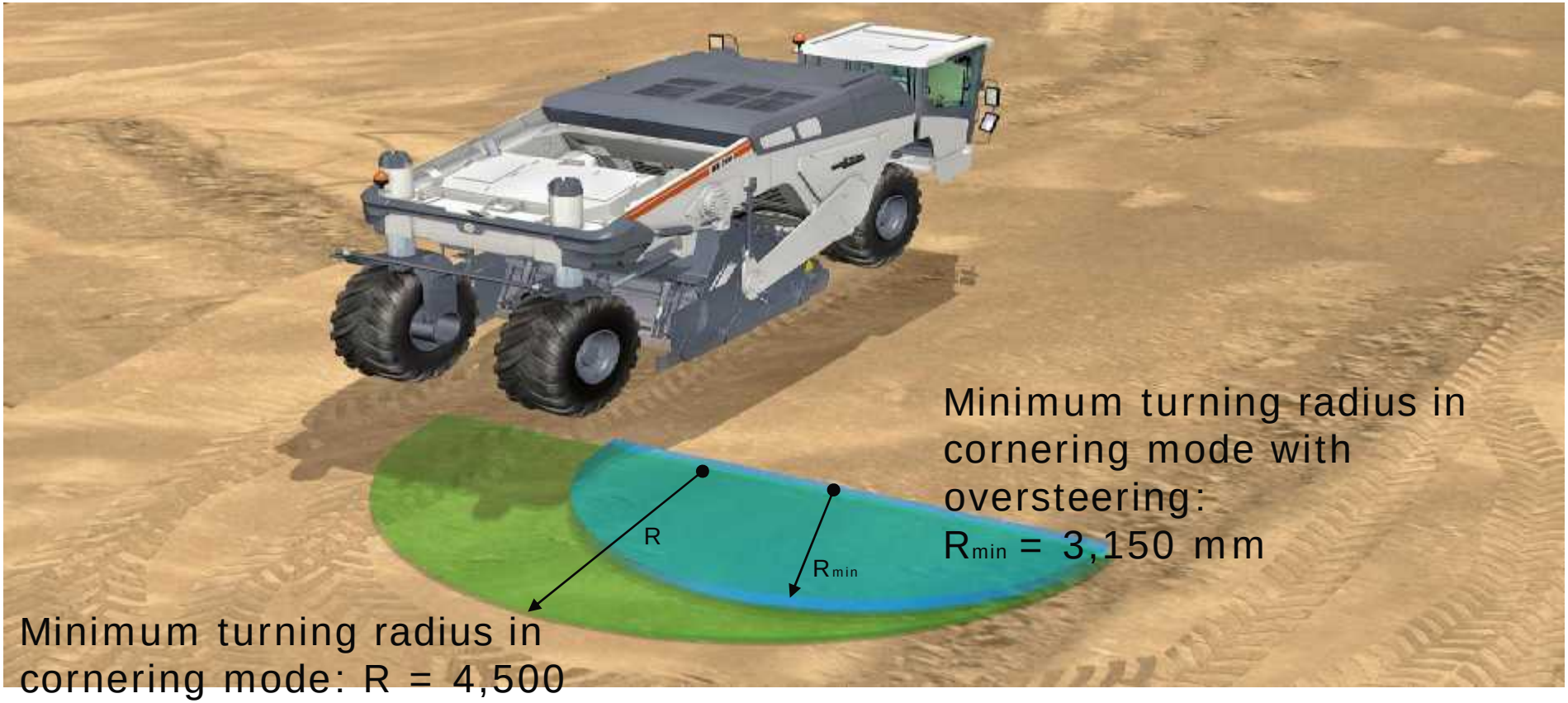

Minimum turning radius in cornering mode with oversteering:
R_{min} = 3,150 mm

Minimum turning radius in cornering mode: R = 4,500 mm

High milling and mixing performance

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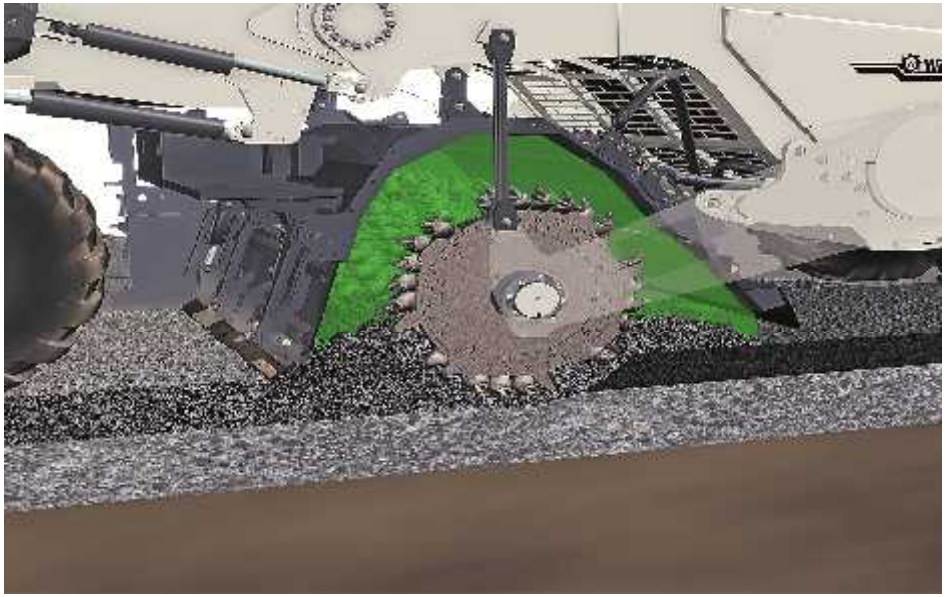

- Small mixing chamber at shallow working depths
- Large mixing chamber at large working depths

Precise metering system for binding agents

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- All at a glance: Important parameters are continuously displayed in the bottom menu bar of the metering menu

- Parameters such as spraying width and spraying quantities are set intuitively

Precise metering system for binding agents

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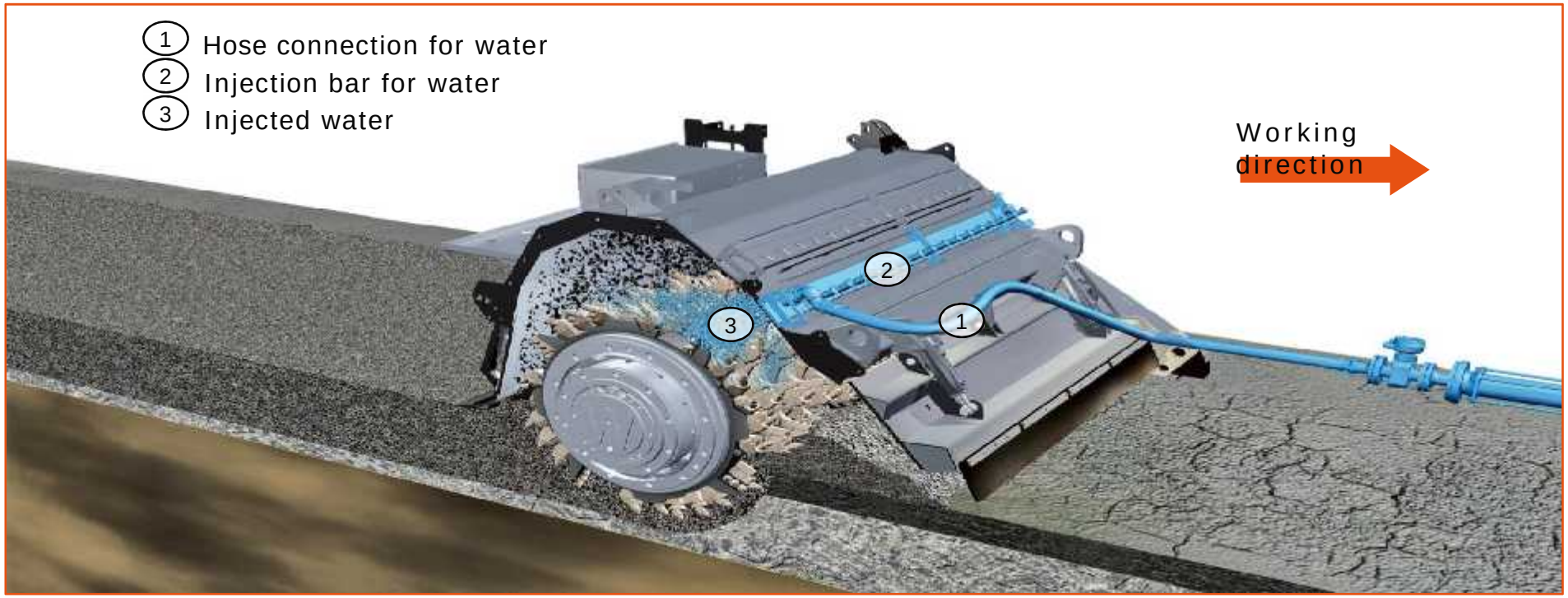

Injecting water

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Stablization Principle

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Stabilization of Existing Road using WR2400 with Cement, NH-181 Tanda-Raebareli road in the state of UP.

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I. NHAI EPC Project in State of Uttar Pradesh.
II. GKC Infra Pvt Ltd EPC Contractor.
III. 160 KM road project with stabilization of widening Portion from 7-10Mt(3 Mt Each Side).
IV. Total Area to Be Stabilized: 800,000.00 SqMt
V. Stabilization Depth:25CM.
VI. Binder :Cement 2-3%.
VII. Why Stabilise???: Increase CBR 5% to 48%.(Soil transport>200km)
VIII. Equipment For stabilization: Wirtgen WR2400.
IX. Work completed in 8 Months.
X. Subgrade CBR Increased from 3-28

Stabilization of Existing Road using WR2400 with Cement, Tanda-Raebareli road, in the state of UP.

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Preparation Of Sub Grade for Widening.

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Cement Spreading

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•Grid were made on the prepared sub-grade top to spread cement

Pre-Spread Cement.

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•Line marking was done at 2.4 meters from toe line for Operator's guidance

Insitu Mixing Cement & Soil-Improved Subgrade CBR

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WR2400 : Wirtgen stabilizer and recycler In process of mixing existing prepared sub-grade top with pre spread Cement .

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Cement Treated Finished surface .

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Stabilized In Situ Soil With Cement

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Soil Modified by Adding 2% Cement .CBR Improved to 25 From 3%.

Reduced upper BT Layers(155-115MM)

Savings In Transportation, Borrow area, Royalty & Faster Construction.(6000 sq mt/day-1250 cubic mt)

Reuse of Existing Resources.(100% exisiting soil is Re used)

Welcome to Tripura

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Situation-Tripura -Jhama Bricks .(Clay Soil)

Aggregate less state. Lead 250 km, Price/ cbm=3500

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Spreading Cement over the existing Road by Mobile Spreader.(3%) –IIT KGP.

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Wirtgen stabilizer WR 2400 (Mixing Soil ,Bricks & Cement)

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WR2400 Wirtgen stabilizer

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Pulverizing and Mixing .

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Rolling the stabilised soil.

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Stabilization-Tripura

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Site Video-Tripura

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Finished road after cement stabilization

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Meghalaya: Cement Based Stablization of soil.
5% Binder, No Aggregates.

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Meghalaya state Highway.

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Meghalaya-Soil Stablization.
5% Cement with soil

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Sealing the Stabilised Layer

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Assam-Meghalya-Border.State Highway-2013.
5% Cement as binder with soil.

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Stablization Of Black Cotton soil

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- Nagpur Circle (Near Nagpur)
- 1-Nagpur Byepass-2012 & Nagpur Bhandara Section NH-5,& Nagpur – Baitul Road section.
- Stablization of Black cotton soil In Embankment
- High Swell pressure, Low CBR(2%).
- Stablization using 17% Pond ash-Reduction od swell Press(70 to35).
- 1.6 Million Sq MT -Stablised

Nagpur Byepass-2010:Stablization of BC Soil With Pond ash. Subsoil-OSEPL

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Nagpur-Bhandara-Black Cotton soil with Pond ash-Subgrade-2013

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Nagpur –Bhandara-NH-6 Stablization with Pond Ash

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Cement Treated Sub Base

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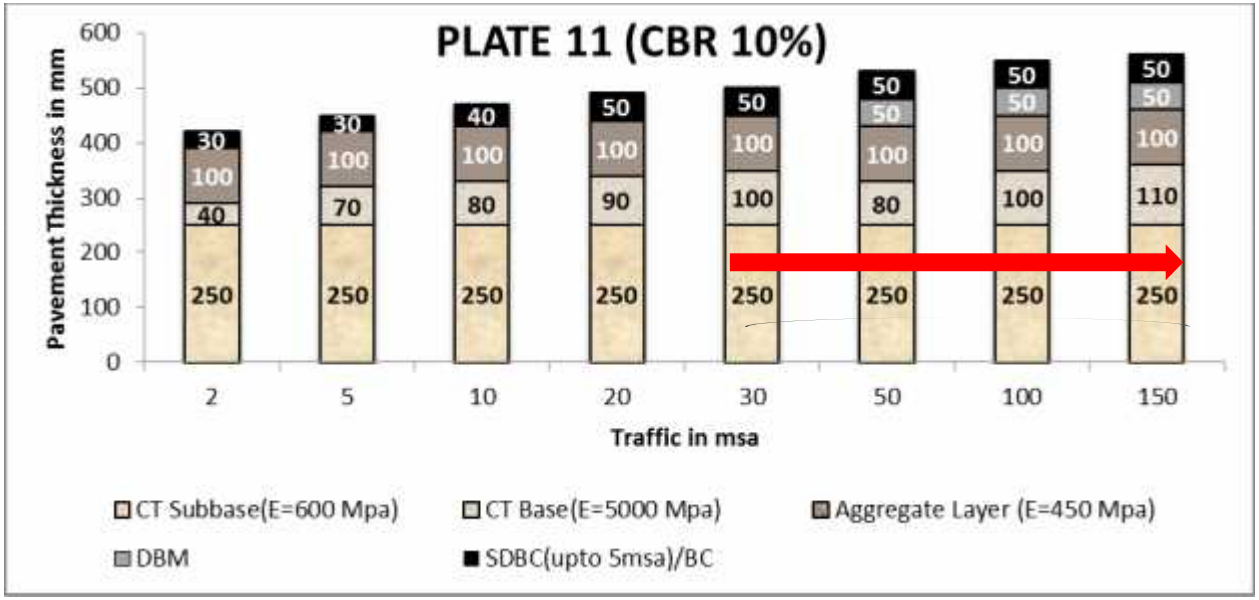
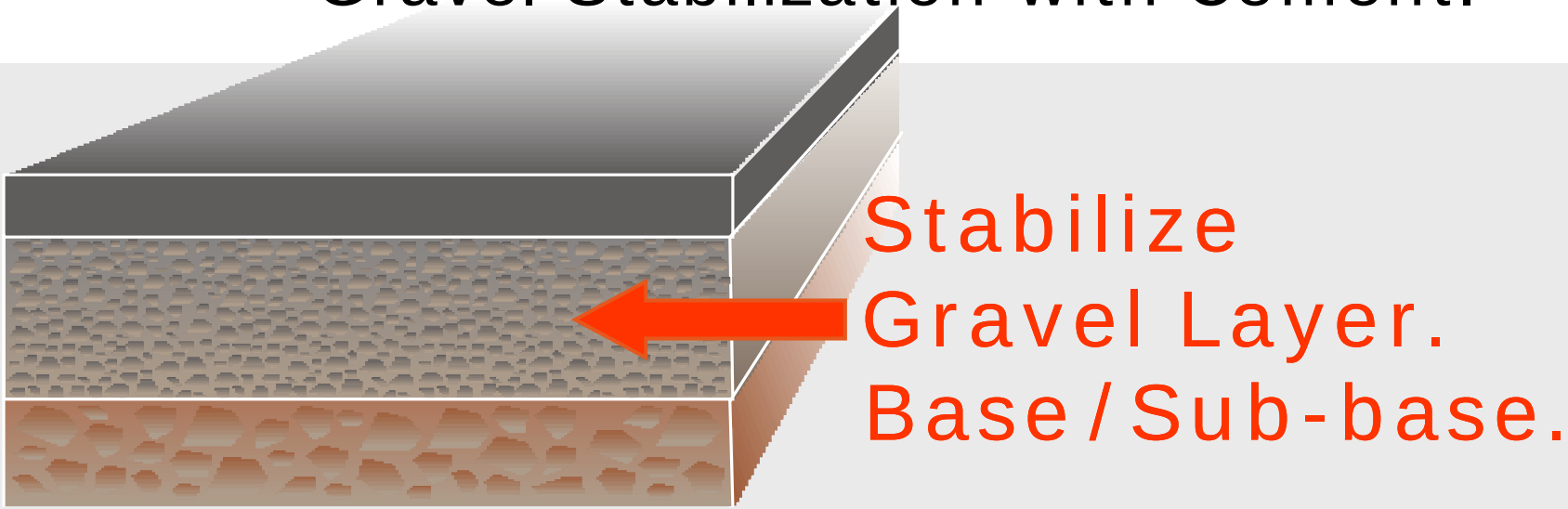
IRC 37 DESIGN Template :Cemented Bases.



Gravel Stabilization with Cement.



Adoption Of Cement treated Subbase at NH-2.

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GSB Treated with 4%Cement

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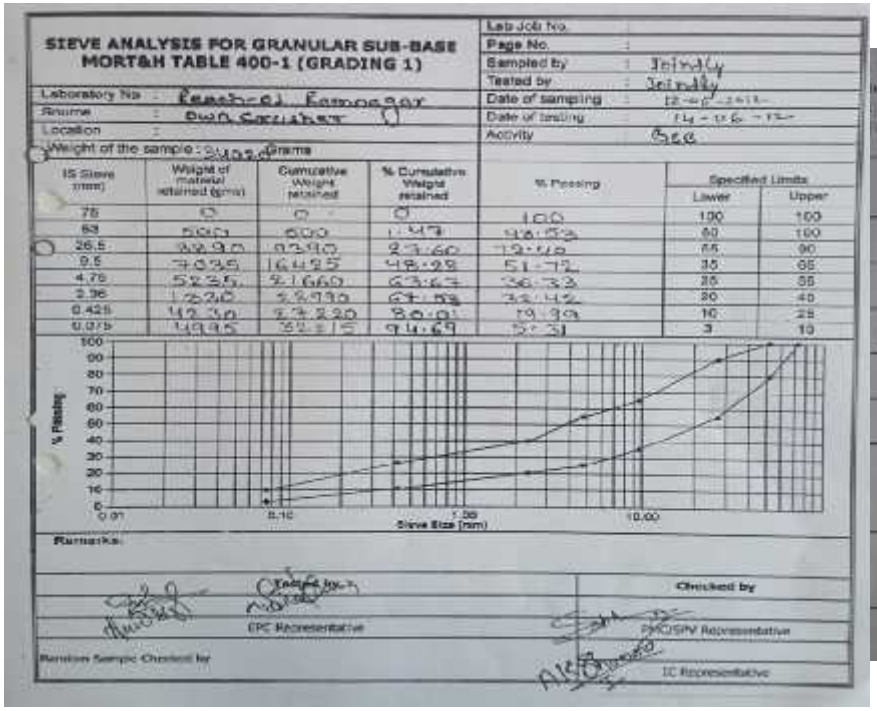
CTSB DESIGN : UCS value (With Various Combination of Cement%)



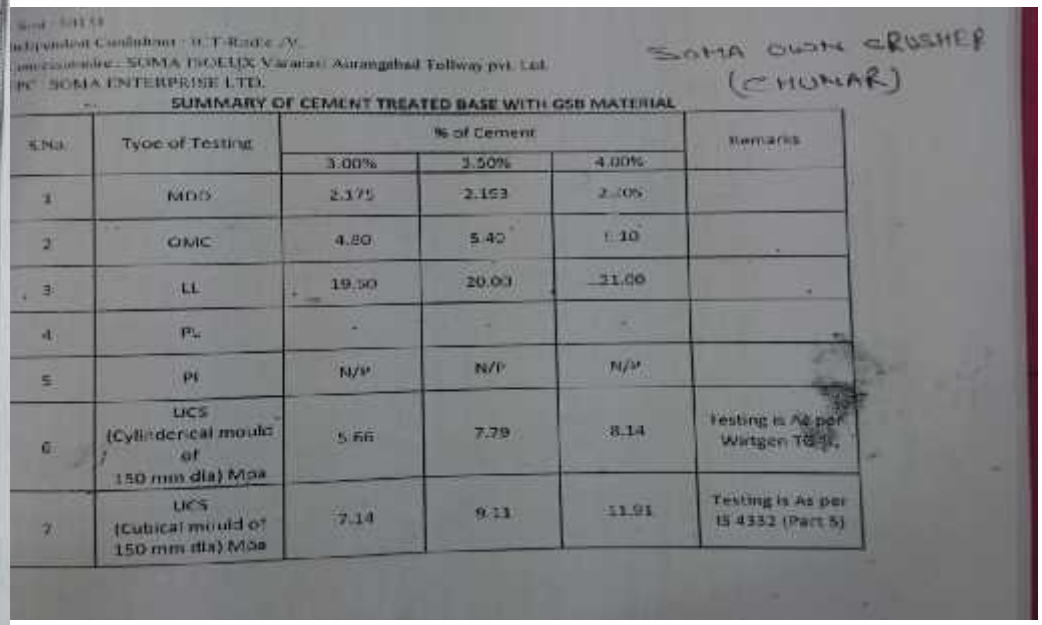
SIEVE ANALYSIS FOR GRANULAR SUB-BASE MORT&H TABLE 400-1 (GRADING 1)

Laboratory No	Ramchandi Ramnagar
Source	Own Crusher
Location	
Weight of the sample	21022 grams
Lab Job No.	
Page No.	
Sampled by	Jeindly
Tested by	Jeindly
Date of sampling	12-06-2016
Date of testing	14-06-2016
Activity	GSB

IS Sieve (mm)	Weight of material retained (gms)	Cumulative Weight retained	% Cumulative Weight retained	% Passing	Specified Limits Lower	Specified Limits Upper
75	0	0	0	100	100	100
63	500	500	1.47	98.53	90	100
26.5	8490	9390	27.60	72.40	65	90
9.5	7035	16425	48.28	51.72	35	65
4.75	5235	21660	63.67	36.33	25	55
2.36	1230	22890	67.28	32.72	20	40
0.425	4330	27220	80.01	19.99	10	25
0.075	4995	32215	94.69	5.31	3	10

Remarks:

EPC Representative | Checked by | PMC/SPV Representative | Random Sample Checked by | IC Representative



Independent Consultant : R.T.Rodre JV
Concessionaire : SOMA TOLLUX Varanasi Aurangabad Tollway pvt. Ltd.
EPC : SOMA ENTERPRISE LTD.

SOMA OWN CRUSHER (CHUNAR)

SUMMARY OF CEMENT TREATED BASE WITH GSB MATERIAL

S.No.	Type of Testing	% of Cement 3.00%	3.50%	4.00%	Remarks
1	MDD	2.175	2.153	2.[illegible]0%	
2	OMC	4.80	5.40	[illegible].10	
3	LL	19.50	20.00	21.00	
4	PL	-	-	-	
5	PI	N/P	N/P	N/P	
6	UCS (Cylindercical mould of 150 mm dia) Mpa	5.66	7.79	8.14	Testing is As per Wirtgen TS-[illegible]
7	UCS (Cubical mould of 150 mm dia) Mpa	7.14	9.11	11.91	Testing is As per IS 4332 (Part 5)

GSB Bed .

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GSB bed before Stabilization:

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Cement being Spread over GSB Using Spreader .

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Mixing Cement and aggregate & Water with Modern Stablizer .

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20 tonne Pad foot Roller Compaction

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Compacting <300mm ctsb layer.

Stablised Surface before drying

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Water Curing of the stabilized surface for 7 days

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Stablised Surface after Drying

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CTB Surface after Drying

Cemented Bases-Offer

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1-Cemented subbase/Bases Offer high modulus(5000),Strong Foundation.

2-Reduced Pavement crust(GSB, WMM+ Asphalt)=20% reduced crust.

3-Faster Construction- Daily Performance of 4000 sq mt.(300mt/daily)

4-reduced mining requirement.

5-Economical Pavements

Soil Stablization by Modern Equipment.

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I. Faster construction-8000-10000 sq mt/day.
II. Precise Binder spreader.
III. Heavy compaction equipment ensure 400mm depth.
IV. High Productivity.
V. Cost economical solutions.
VI. World class Equipment's Available.(15 Stablization equipment in India,Another 15 will be added this Year.
VII. Use the latest Equipment for high performanace .
VIII. Technology should not fail due to use of Outdated tractor towed,harrow,rotavator or disc Harrows .

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Thank You very Much