Soil Stabilization Technology for Road Construction in High Rainfall Areas USA & International Experience

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Challenges of High Rainfall Areas in India

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Preparation for High Rainfall Areas

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Challenges of High Rainfall Areas with NO Availability of Aggregates in India

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A superior soil stabilization technique / stabilizer:

1. Environment friendly : Non-toxic, non-corrosive, non-allergenic, non-flammable, and should not pollute ground water
2. Saves construction time by
   a) Eliminating need of aggregates
   b) Work with in-situ soil all types, fat expansive clay to sand
   c) No milling required to remove old asphalt
   d) Ease of application to achieve 1 Km/day
3. Saves initial cost of road construction & low life cycle maintenance cost

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A superior soil stabilization technique / stabiiizer:

4. Make roads impervious to water to eliminate pot holes and for Higher Riding Quality, sustain High Rainfalls, Floods, and Hurricanes
5. Cause minimal traffic disruption
6. Provides several options for dry additives Fly Ash / Lime Kiln Dust / Cement Kiln Dust / Lime / Cement
7. Provides several options for wearing course : Chip & Seal, HMA, Concrete, Seal coating, BC, etc.

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CREDENTIALS:

1. Approvals by
   a) the Bureau of Solid and Hazardous Waste Management
   b) Department of Health & Environmental Control
   c) the Office of Environmental Protection
   d) FEMA – Federal Emergency Management Agency, USA

2. Should meet ASTM D 4609 : Evaluating Effectiveness of Chemicals for Soil Stabilization

May 2014 Flooding, Destin Florida

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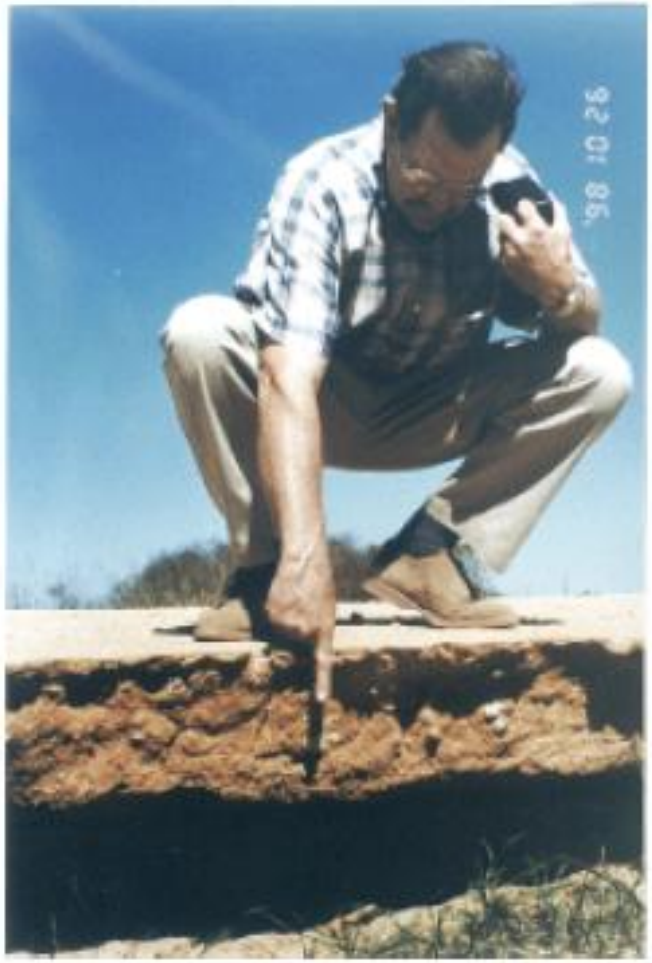
Longevity

Bases that do not get affected by washout even under heavy flooding.

Thin wearing surface layers do not get affected by water damage.

Walton County Florida, when Hurricane George slammed into the panhandle coast. **On September 27, 1998,** the Hurricane hit and made its way through the county, bringing 27 inches (686 mm) of rainfall in a 36 hour period. The flood waters washed out several roads and caused major damage



Road which remained solid after 23" flood waters from Hurricane George washed out two feet of earth from under the BASE-SEAL BS-100 and lime stabilized base.

TOP-SHIELD TS-100 was used to seal the surface of this road. It remained smooth and un-damaged, and ready or asphalt surfacing, which was later applied.

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Heavy Rains during Construction

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Borrowed material installed and compacted

Additional borrow material to elevate road for drainage

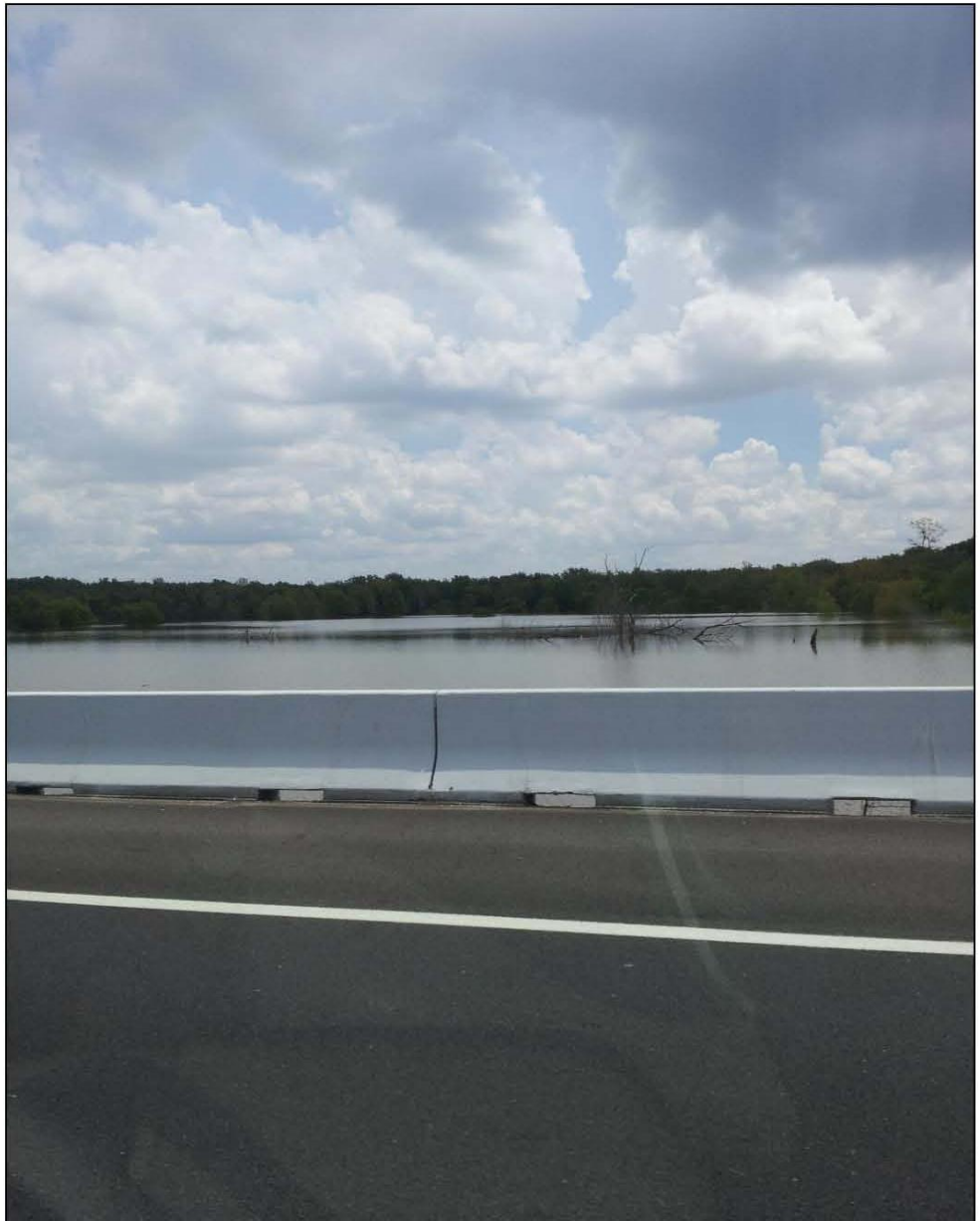
Finishing with a vibratory steel-wheeled rollerl

BEAR CREEK PARK, FLOOD ZONE HOUSTON, TEXAS

Harris County Precinct Three park receives the extra flood waters from the City of Houston that rain brings every season. Some areas stay flooded between two and five months in rainy years.

In the late 1990's roads and civic parking lots of Bear Creek Park were assigned to Base-Seal International to test their products.

It was 21 years ago and we are proud to show them today, so people can see that roads built with our environmental friendly products really last longer, even under such harsh conditions.



21 years and going on, no maintenance made ever

First flood, December 1991

Latest flood July 2012


Dominican Republic


Dominican Republic

Dominican Republic

Cubarral , Meta, Colombia

Cubarral , Meta, Colombia

BASE-SEAL

China

Road connecting
Vietnam to China (at the border)

Mauritania Africa

Road project of 50 KM between capital city of Nouakchott and the city of Boutilimit using Base-Seal


Mauritania Africa


Mauritania Africa

Black Cotton Soil Nigeria 2001

BASE-SEAL

Black Cotton Soil Nigeria 2001

A Section of the Maiduguri-Dikwa-Gamboru Road in Borno State, Nigeria which was stabilized with Base-Seal in 2001. The shoulder was not stabilized and as a result was washed away.

A Section NOT stabilized

Binding of River Sand

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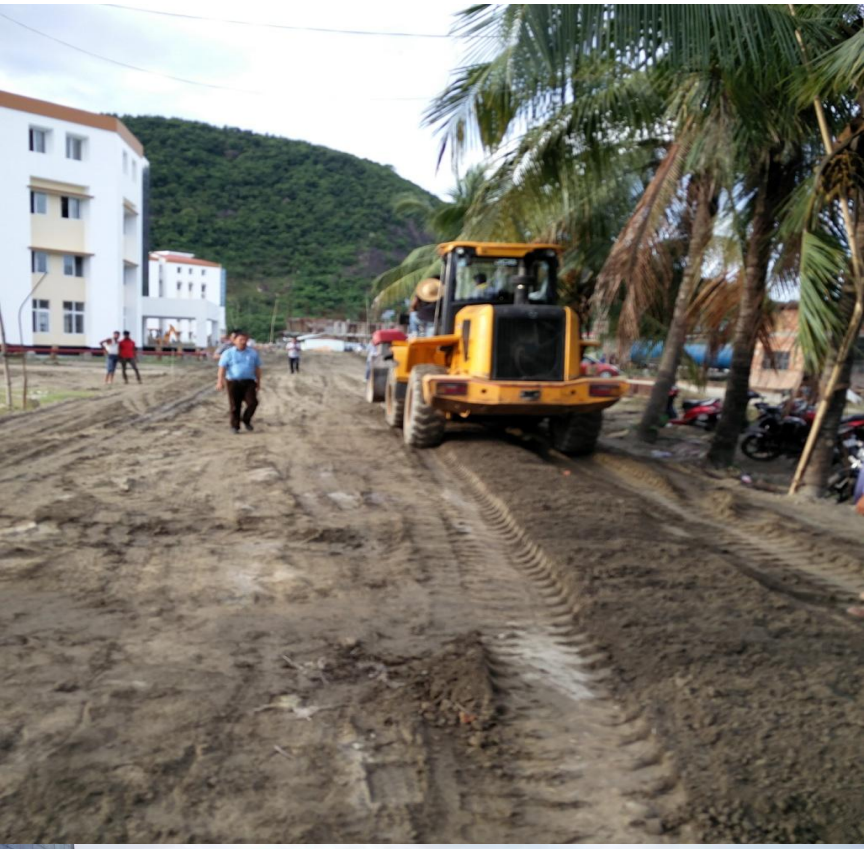
Assam India – Heavy Rainfall Area

Before use of Base-Seal
13th July 2016

Assam India – Heavy Rainfall Area

Before use of Base-Seal
13th July 2016

Assam India – Heavy Rainfall Area



Processing with Base-Seal
No use of any aggregates

Assam India – Heavy Rainfall Area

As on 15th July 2016

Base ready with Base-Seal for wearing course application

Withstood heavy rains on 14th July 2016 afternoon

Assam India – Heavy Rainfall Area

BASE-SEAL

Before use of Base-Seal
14th July 2016
Heavy Sky in background

Assam India – Heavy Rainfall Area

Processing with Base-Seal 16th July 2016 morning

BASE-SEAL

No use of any aggregates

Base ready with Base-Seal 16th July 2016 4:00 PM
Withstood heavy rains on 16th July 2016 7:00 PM
causing landslide at site

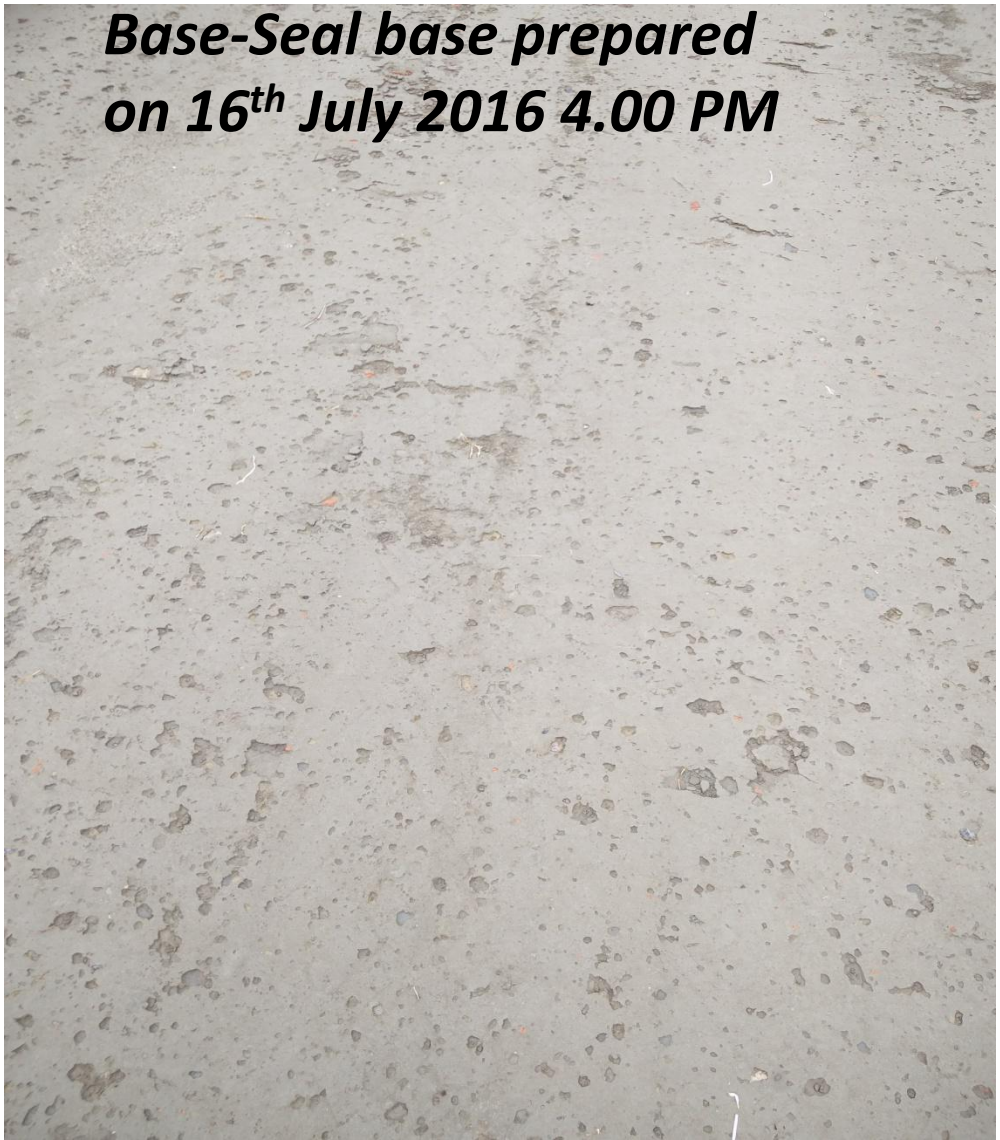
16th July 2016 7:00 PM onwards heavy rains causing landslide at site on 17th July 2016

BASE-SEAL

16th July 2016 7:00 PM onwards heavy rains causing landslide at site

BASE-SEAL

Only superficial impact to Base-Seal base prepared on 16th July 2016 4.00 PM



No impact on Base-Seal Base prepared on 14th July 2016

Thank You

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