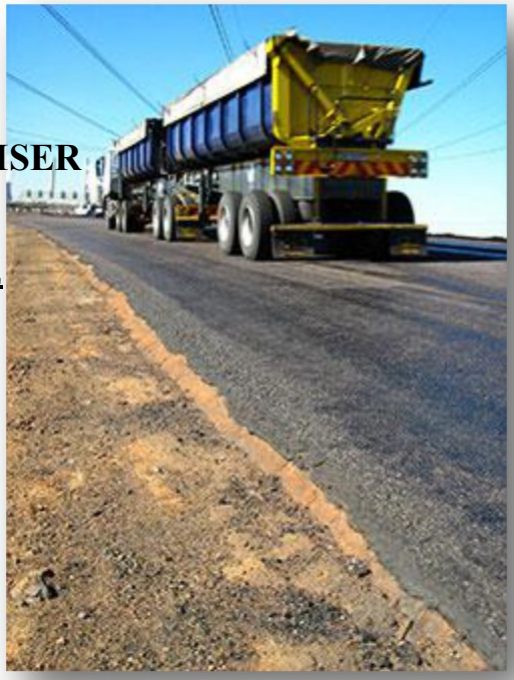
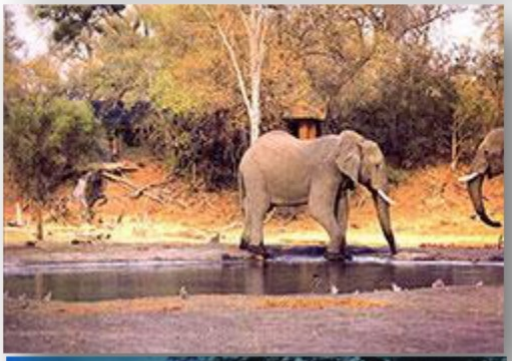
PROJECTS.





1 EXAMPLES OF PAST SOIL STABILISER PROJECTS

1. Black Top SOIL STABILISER Slab Road, Duvha, Witbank – 1996 – AA Loudon

A 100 mm thick 2% SOIL STABILISER base was constructed in 1996 on a G6 Sub Base (G7 & 8 selected layers) and surfaced with 6.7mm bitumen slurry seal, carried more than 3 million trucks (1000 per day) and 7 million other vehicles in the first 10 years.

A new 13mm bitumen single seal was added in the tenth year. The road is in excellent condition for the next 10 or 15 years with seal maintenance.

The first 12 years' maintenance included a rejuvenator spray, 1 pothole caused by steel belt caterpillar in year 6, replaced at approximately R5-00 material costs plus labour. The road was widened by 1 m in year 8 by adding a bitumen seal onto the SOIL STABILISER road shoulder. 27 million E80kN axle loads were carried by 2011 compared to 10 million E80kNs design life of a class V inverted pavement.

2. SOIL STABILISER Slab Pond Lining, Savuti, Botswana - 1996

150mm thick 3.5% SOIL STABILISER Slab pond lining constructed 1996 has been under water for 20 years with dozens of elephants, buffalo and other game daily. The previously used concrete linings were too brittle and could not handle the heavy traffic.

3. Black Top SOIL STABILISER Road Slab, Louis Trichardt (Dombo du Plessis Eng. / Makhado Council) - March 2001

100 mm Thick 1.6% SOIL STABILISER slab supported a 3mm bitumen sand seal. C 4 Strengths were for 1.5km of the project, using G9 and G10 fine sand and C3 (2 to 2.4 MPa) strengths with 1.5km G7 sand. This bus route was calculated cheaper than a gravel road over a five year monitoring period.

4. Natural SOIL STABILISER Slab, Vaalwater, Limpopo Private Game Farm – 2001

4 km – 3% 100mm SOIL STABILISER Slab roads were constructed on the game farm with relatively fine Kalahari type sand. No bitumen seals were used to retain the natural beauty of the Bushveld. A huge dam was then constructed with many Bells trucks hauling rocks to the dam wall over these roads, designed for lighter traffic. The durability of the roads was rated excellent, despite some wear on sharp bends between thorn trees caused by the twin rear axles/wheels of ADTs. The higher dosage, thicker layer straight section showed hardly any wear.

5. Black Top SOIL STABILISER Slab, TFMC, Kempston, Port Elizabeth – 2002

A 100 mm thick 3% SOIL STABILISER Slab was constructed in 1999 at TFMC, Kempston PE for an entrance road and hard stand to load / off load / store heavy machinery. A 30mm asphalt seal was added and is still in excellent condition 14 years later despite heavy use.

6. Black Top SOIL STABILISER Slab near Mokopane, Limpopo ILO / CSIR / Limpopo Province – 2003

A 150 mm thick Natural SOIL STABILISER Slab Provincial Road Section was constructed in two 75mm layers labour intensively on a 3% CBR sub-base. The lower part of the base course used 2% SOIL STABILISER dosage and the upper section 2.8% dosage. CSIR tested 296% CBR strength 6 weeks after construction. Water poured onto the surface does not penetrate but runs off the surface. A bitumen seal was added later (which required only 60% CBR support strength). The construction team of 30 workers was slightly cheaper than using a water truck, grader and roller. Thirty (30) teams would be faster than mechanical construction and slightly cheaper.

7. Natural SOIL STABILISER Slab, Jozini, KZN (KZN DOT) – 2003 – Stewart Scott International

In situ fine sand was used (81% passed the 0.425 mm sieve and 29% the 0.075 sieve) to construct a 100 mm thick 3% SOIL STABILISER Slab. An additional 1% dosage of SOIL STABILISER was planned in the surface of the Slab but could not be constructed with the available equipment. A bitumen slurry seal (in the design) was also not added.

SOIL STABILISER strengthened the fine sand extremely well (Soilco Vryheid laboratory tested 5mPa UCS strength after 11 days) and made it highly water resistant. Some wear of the fines occurred after some time in the unprotected surface used by heavy vehicles.

8. Natural SOIL STABILISER Slab, Coegha Harbour – 2003

A 300m – 100mm, 3% SOIL STABILISER Slab was constructed with in situ sea sand for the temporary haul road to dump rocks into the harbour. The SOIL STABILISER road had no bitumen seal and curved downhill to the right to a stop street where trucks had to stop. The SOIL STABILISER road lasted very well for the 7 months during which time 13 million tons of aggregate and rocks were hauled to the harbour at very low road building cost.

9. Natural SOIL STABILISER Slab, Upington, North Cape DoT – 2003

3.5 km – 2.4% dosage, 75mm thick SOIL STABILISER slab was constructed in the surface of the existing provincial gravel road near Upington in 2003. Despite many trucks, cars, buses and tractors the road has performed well for 5 years at very low life cycle cost.

10. Black Top SOIL STABILISER Slab New Denmark Colliery Haul Road Eskom - 2004

This coal truck haul road used only 1% SOIL STABILISER dosage in a 150mm sub base on metres of heaving clay and 2% SOIL STABILISER 150mm base course under an asphalt seal. Coal trucks have been using the road for 7 years. The previous road failed regularly as the cement stabilization was too rigid and brittle and cracked when the clay road bed moved. SOIL STABILISER's water resistance keeps more water out of the lower layers, causing less movement of the clay and is somewhat elastic to accommodate some motion but stiff enough to carry the heavy loads.

11. SOIL STABILISER Slab Parking Lot Meyerton (BHP Billiton / Samancor / AGC Eng) - 2004

A large parking lot with an asphalt seal in excellent condition after 7 years (no maintenance). On site manganese waste was utilized as aggregate for stabilization

12. Natural SOIL STABILISER Slab / Seal, Piggs Peak, Swaziland (Swazi Government / ZMCK Eng) - 2005

3km SOIL STABILISER Slabs and Seals constructed on steep Drakensberg slopes with severe drainage problems. The road surfaces were strengthened considerably (no bitumen seal) with excellent engineers report (ZMCK). The SOIL STABILISER Slab (mix in) and SOIL STABILISER Seal (spray on) lasted for 6 years without maintenance. Concrete side drains washed away in many sections.

13. Modikwe SOIL STABILISER Slab Road, Northwest Province – Dec 2005

3.5km x 7m x 100mm 2.4% SOIL STABILISER Slab was constructed by an emerging contractor and Mahlangu Consulting engineers near Rustenburg (both went out of business and the Rustenburg (district) Council completed construction. Lab tests at Rustenburg showed excellent C3 strength. A 6.7mm bitumen slurry seal was added onto the SOIL STABILISER Slab base course. Still in good condition after 11 years.

14. Natural SOIL STABILISER Slab, Sandhurst Towers, Sandton, Group 5 - 2005

Group 5 needed a truck haul road on a 6m high embankment to import stone, sand, cement, steel, wood etc., for construction of a large multi story building next to Sandton City. 125 mm – 3% dosage SOIL STABILISER Slab was constructed with 75% imported crusher sand, mixed with 25% very weak in situ soils. The steep incline road carried many trucks through a very wet summer with no visible wear on the surface. The embankment, however, began to fail 4 metres lower down. The embankment was removed and recompacted in layers. Group 5 reported that the SOIL STABILISER road was still performing very well 5 months later after they replaced and compacted the broken pieces of SOIL STABILISER back onto the surface.

15. Black Top SOIL STABILISER Slab, Caledon /Hermanus (PD Naidoo / Overberg Council) – 2007

A 100 mm 2.5% SOIL STABILISER Slab just below a mountain pass was constructed under a bitumen double seal. After heavy rain and traffic it is in good condition and should provide very low life cycle costs with low maintenance for many years.

16. Natural SOIL STABILISER Hardstand, Mpongwe, near Ndola, Zambia Verus Farms – 2007

6000 m² 3% - 100mm thick SOIL STABILISER Slab was constructed for a road and hardstand for maize storage. The weighbridge was also constructed with a 4% dosage SOIL STABILISER Slab. The very fine laterite sand contains approximately 50% silt with mostly fine sand making up the balance. The gross weight of loaded trucks exceeded 60 tons, which trucks started using the SOIL STABILISER Slab 4 days after construction, before a 6.7mm bitumen slurry seal could be added. No visible damage was caused after more than 20 000 tons of maize was trucked onto the SOIL STABILISER Slab.

17. SOIL STABILISER Natural Slab, Chintsa, East London (Lukhozi Engineers / Pam Golding Development) 2007.

A 3.5km x 7m x 150mm, 2.7% SOIL STABILISER Slab wearing course was constructed by Robert Bros / Lukhozi Construction Engineers. Despite heavy rain during construction the imported Sabunga gravel was considerably hardened and water proofed by the SOIL STABILISER polymers to carry the design traffic without a bitumen seal. This preserves the natural look of the beautiful environment.

18. SOIL STABILISER Slab Pond Lining, Bapsfontein, Gauteng - 2007

A 75mm thick, 3.3% SOIL STABILISER Slab was used to line the sides of a 20 000m² dam which could never before be filled due to excessive leaking. The dam is now full (3m deep) with no leaks. This is an indication of the water resistance of SOIL STABILISER and the protection it provides to roads pavement structures where layers stay strong despite moisture and keeps lower layers dry and strong.

19. SOIL STABILISER Cable Trench Protection, Boksburg, Ekhuruleni, Gauteng, 2007

10km x 1% SOIL STABILISER Cable trenches were backfilled with SOIL STABILISER reinforced soil and a 3m wide 75mm + 75mm thick 1.2% / 2.4% SOIL STABILISER Slab inspection road was constructed over it. This provides quick access for
patrol vehicles. Not a single cable theft was reported since installation and many other trenches have / are being protected with SOIL STABILISER.

20. SOIL STABILISER low dosage slab selected layer, Qumbu, Eastern Cape (Madan Singh G Bester Eng. / Haw Inglis Construction - 2008

A 23km provincial road north west of Qumbu required improved selected layer support under the sub base in moist areas next to hill sides. 3.5km x 150mm thick 1% SOIL STABILISER Slab was mixed into the selected layer with considerably increased strength and water resistance. This helps to ensure adequate support for the sub base, base and bitumen seal and balances the pavement structure. This low dosage helps to prove that SOIL STABILISER can support low traffic road sub / base and bitumen seals.

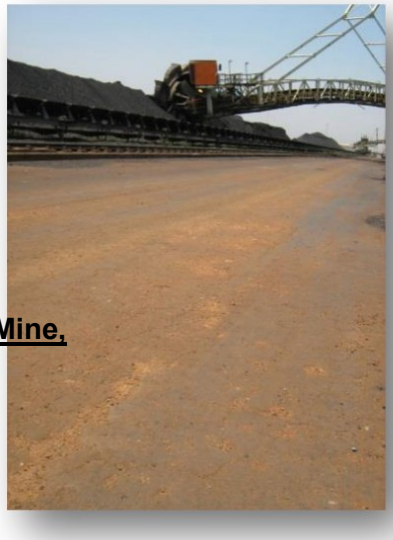
21. <u>SOIL STABILISER Slab Access Road, Eikenhof, Rand Water Board - 2008</u>

A 1,2km x 150mm 2% SOIL STABILISER Base Course was constructed with local G2 material and surfaced with a 6.7mm slurry seal. Excellent compaction densities and strength was measured before the bitumen slurry seal was added. The SOIL STABILISER layer is remarkably strong and water resistant and is being used as an access road to the pump station.

22. <u>SOIL STABILISER Natural Slab, Hekpoort, Gauteng – 2008 Stormline Civil Engineers</u>

1.5km x 4m x 75mm 3% SOIL STABILISER Slab road in rural area without bitumen seal, preserving the natural beauty of the environment while providing a durable all weather wearing surface. It also keeps the sub layers dry and strong.

23. <u>SOIL STABILISER Slab Haul Road, Hendrina, Mpumulanga (contractors Tau Ya Mariri) - 2008</u>



A 16km x 150mm 2,5% SOIL STABILISER Slab was constructed with imported local sand on top of the existing gravel road and surfaced with 30mm asphalt to carry coal trucks from the Total coal mine to the Hendrina power station at Pullens Hope.

24. <u>SOIL STABILISER Wearing Course modification, Phola Mine, Mpumalanga (WBHO / Anglo Coal) - 2010.</u>

1 km of internal inspection roads had become impassable due to a combination of poor quality material and drainage problems. 1% SOIL STABILISER was mixed into the layer 100mm thick and compacted to improve the bearing capacity and reduce the ingress of water.

25. <u>SOIL STABILISER Insitu road recycling - Eskom & Bigen Africa - 2010.</u>

In-situ recycling of 9km of an old, unusable provincial road using 0,5% SOIL STABILISER. The road carries approximately 2000 coal trucks per day. Initially designed as a 3 month temporary road, it has been in service for 9 months. An additional SOIL STABILISER base course is to be added and surfaced with a bituminous seal for long term use.

26. <u>SOIL STABILISER Urban Road – Stockville road, Pinetown, Ethikweni Municipality, Tau Ya Mariri Construction Jan 2010.</u>

Reconstruction of an old, unusable urban road using 2,5% SOIL STABILISER. The previous asphalt, ETB and concrete road had failed and a 150mm SOIL STABILISER base course was installed and surfaced with asphalt. A short section at Carnation place was also reconstructed using the same design.

27. <u>SOIL STABILISER Wearing course – Rabie Ridge, Johannesburg Roads Agency, Stevrob Construction July 2011.</u>

G6 material was imported on top of an existing failed gravel road to allow all weather access for the local community. With a 3% SOIL STABILISER StabilMix dosage, mixed into a 100mm aggregate layer, an effective and durable wearing course was provided.

28. <u>SOIL STABILISER E-Base – Parys 2012 – Freestate Provincial Government – Thutela Bogolo</u>

A 2% SOIL STABILISER 100mm E-Base road was constructed in the township and sealed with 25mm cold-mix asphalt. A lighter seal was also found to be feasible, e.g. 7mm bitumen slurry seal.
This proved to be an ideal, durable low traffic volume solution which can create much employment and improve conditions for many communities. This road design can extend existing road budgets further.

29. <u>SOIL STABILISER Asphalt Base – Hungary 2012 – Duna Aszfalt</u>

Several Budapest roads were recycled using SOIL STABILISER modified asphalt as an effective wearing course. As SOIL STABILISER treated aggregates can bend and return without cracking. This type of application has a large potential for roads in sub-zero temperatures.

30. SOIL STABILISER Road Shoulders – Zwartkops Pretoria (2012) - EPWP

Dangerous edge-breaks and drop-off occur regularly on the Old Johannesburg Pretoria road as the gravel road shoulders erode and wash away regularly. SOIL STABILISER was mixed in labour intensively, placed and compacted. It reinforced the road aprons considerably and greatly reduced or eliminated erosion and costly re-graveling. This application can create sustainable job opportunities and reduce road shoulder maintenance costs. Persons trained to do this can then also construct bicycle and pedestrian paths, side-walks and many other SOIL STABILISER applications.

31. SOIL STABILISER Base Course – Soshanguve Pretoria (2012) – Superway Construction – City of Tshwane

Nyeleti Engineers designed a pavement structure around a 2% dosage SOIL STABILISER BituForce base that reduced the overall cost of the road by approximately 30%. Such a significant saving could allow the construction of significantly more roads with the same budget. Tests showed exceptional UCS & ITS strengths even after soaking. Tshwane City Council is satisfied with the quality of the 11km of roads constructed roads through to 2015 and continues to reorder and benefit from SOIL STABILISER.

32. SOIL STABILISER Base Course – Radiokop (2012) – Johannesburg Roads Agency – Lidwala

An SOIL STABILISER BituForce base-course was designed for JRA by Lidwala consulting engineers for several urban road sections in Johannesburg. Sealed with 30mm hot-mix asphalt these roads eased service delivery in an economical and effective way.

33. SOIL STABILISER Base Course – Manzini Municiaplity Swaziland (2012)

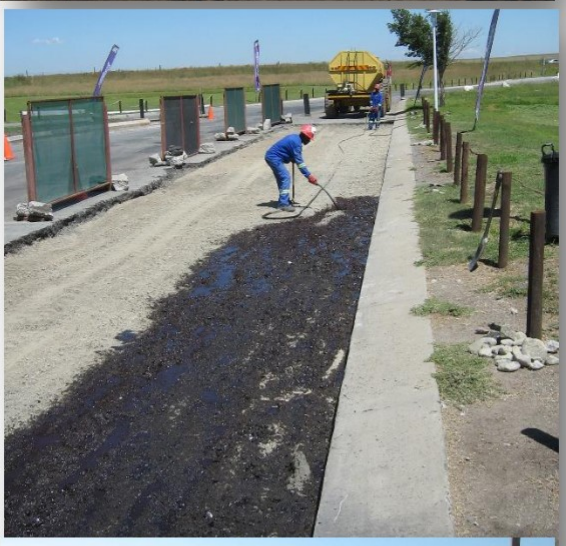
This SOIL STABILISER E-Base was constructed in 2011 and endured traffic and weathering for over a year before the bitumen seal was added without any significant erosion or maintenance. Similar roads were ordered and constructed by Manzini council with further roads planned for the future.

34. SOIL STABILISER Base Course – Namibia (2013) – RCC/MCC Joint Venture

11km of SOIL STABILISER BituMod sub-base was constructed in the very fine in-situ Caprivi sand reducing costs and quarry material. A low dosage of 0.75% SOIL STABILISER effectively bound the fine sand allowing the road to be used as a wearing course for some time.

35. SOIL STABILISER Base Course – Villiers One Stop (2013) - Engen

SOIL STABILISER E-Base of 150mm depth with 2% dosage was constructed to support the asphalt seal under very heavy traffic at the Engen 1 Stop on the N3 south-bound. GMH Consulting Engineers designed and supervised the construction.



36. SOIL STABILISER Dust Control – Westonaria Landfill (2013) – ProPlan Consulting Engineers – Specplan Construction

An SOIL STABILISER ModSpray with 0.5% dosage, 150mm deep was constructed on unstable sub-layers leading to a refuse-dump used by the council and the nearby mine. This wearing course design is maintained by spraying SOIL STABILISER SprayOn onto the surface when and where required. This has not been required for almost 2 years. It is significant that the SOIL STABILISER reinforced soil can bend and return under loads without cracking as it is non-continuously bound.

37. SOIL STABILISER Dust Control – Kwamahlanga Municiaplity (2013)

The SOIL STABILISER SprayOn is a new and unique way to control dust and reduce erosion of gravel road surfaces in township and rural areas. This improves the quality of life of the community and reduces the maintenance cost of regular grading and re-gravelling. The surface must be maintained with ReSprays as and when required. The frequency depends on the traffic, climate and soil type used.

38. SOIL STABILISER Base Course – Soshanguve (2014) – City of Tshwane, Boitshoko/Vharanani Construction

This road is part of the ongoing construction of roads in Soshanguve by Tshwane City Council as stated previously.

39. SOIL STABILISER Base Course – Mogale City Municipality (2014)

Following the success of the SOIL STABILISER roads in Soshanguve, Mogale city decided to test SOIL STABILISER at a SANAS accredited laboratory and constructed a road of similar design. The laboratory tests showed excellent wet strength and the council was very satisfied with the completed road. The council is specifying SOIL STABILISER BituForce roads in future projects.

40. SOIL STABILISER Dust Control – DRC - FreeportMcMoRan (2015)

This 200 ton Caterpillar 777 off-highway haulage truck leaves no or very little dust while travelling on the SOIL STABILISER SprayOn treated haul road. This is to be maintained by regular SOIL STABILISER Micro Sprays with very low dosage at low cost. Such ReSprays can often be done only once or twice a week where dust inhibitors that rely mainly on water sprays to inhibit dust would be needed at least 21 times per week at much greater cost.

41. SOIL STABILISER Base Course – DRC Roads Authority (2015)

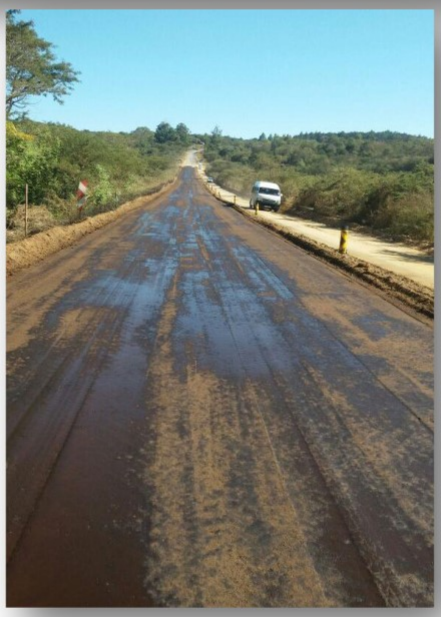
In situ-stabilization of an un-cohesive sand for an urban road in Kinshasa, surfaced with a bitumen slurry seal.

42. SOIL STABILISER Base Course – Zakkariya Park (2016) Johannesburg Roads Agency – Acto-Phambili / CMP / Nyeleti / Primat

In situ-stabilization of existing surfaced roads in Johannesburg, surfaced with an asphalt seal.

43. SOIL STABILISER Dust Control – Elim (2016) Roads Agency Limpopo – Inyatsi Construction – Nyeleti Consulting Engineers

SprayOn dust control of gravel roads by-pass lanes during re-construction of the provincial road.

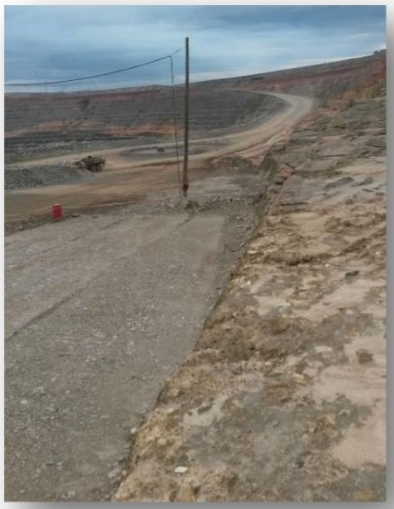


44. SOIL STABILISER Base Course – Elim (2016) – Inyatsi Construction – Nyeleti Consulting Engineers

In-situ stabilization of a provincial road for RAL. Existing road pavement structure was retained and the top 200mm and surface was milled into the pavement. This was then Primed and Re-Sealed.

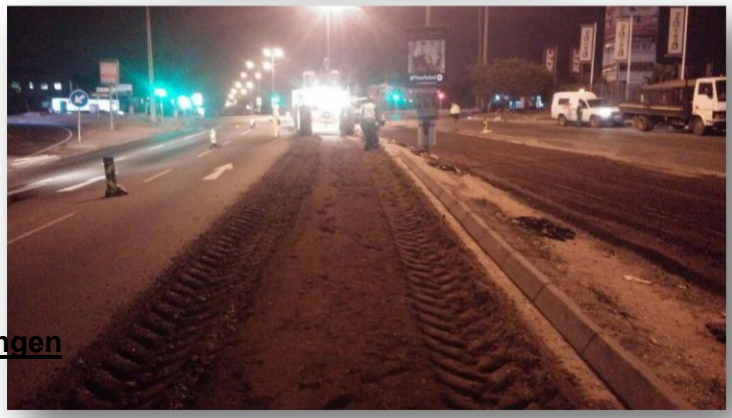
45. SOIL STABILISER Dust Control – Zambia (2016) – Mossmart Construction

Spray On dust control of mine haul roads for a variety of vehicles such as ADTs and mining haul trucks up to 200t.



46. SOIL STABILISER Base Course – William Nicol Drive (2016) – Johannesburg Roads Agency - TranaCon Construction / GMH Consulting Engineers

In situ-stabilization of an urban 6 lane road carrying over 60,000 vehicles per day. Due to the traffic volume the road had to be constructed on weekends. Stabilization of base course took place on Friday nights, with priming and asphalt surfacing taking place on the Sunday so that the road could be opened to traffic again on Monday.



47. SOIL STABILISER Base Course – Engen "the Blockhouse" R59 Alberton/Meyerton – Engen – Motheo Roads Construction – GMH Consulting Engineers

In situ stabilization/recycling of on/off-ramps, roads and driving surfaces for 2 Engen garages next to the R59. SOIL STABILISER was used due to its cost-effectiveness and speed of constructing. Minimizing traffic delays.

48. SOIL STABILISER Gravel Road – Molteno Municipality, Eastern Cape Province – EN Trading – GMH Consulting Engineers

Treatment gravel roads in the form of the DuraGrav product, future maintenance SprayOn applications to be done by municipality.
The use of SOIL STABILISER is allowed on any class of road in South Africa and we will soon be starting our first National Roads project.
Many other examples of potholes/road maintenance, airstrips, pond linings, roads, labour intensive applications etc. can be provided.