



BituForce: Ecobond BSM Base Course Material

Cold in-situ stabilization



Ecobond
BituForce has
been used in
major roads
such as the
R511 in Sandton

60,000 Vehicles per day



BituForce: getting more out of bitumen emulsion stabilization

- It works with a variety of material sources; fine sands for low volume roads, natural gravel for medium volume roads, crushed stone & reclaimed asphalt for high volume.
- It adds stiffness into the pavement structure from the base course down, often meaning faster construction.
- It can often use the materials that are in-situ, meaning less materials transport (especially in urban areas where traffic delays are problematic)
- Can be easier for contractors to build than other good base materials
- Good combination of strength, flexibility and water resistance makes for an excellent base course.
- it uses no cement, which allows for early trafficking of the roads (e.g. build Friday, prime and seal on Sunday, open to traffic on Monday).
- SAPEM 2013 and Agrement created regulatory framework to allow use. Manuals are available for design and quality control.
- Can be used in roads from 0.3MESA to over 30MESA (has carried over 50MESA in practice)
- It is cold applied and is the same hazard class as standard bitumen emulsion



It is also suitable for low volume roads, such as these roads in Soshanguve

<1 MESA over 20 years



Ecobond BituForce has been certified by the Board of Agrement South Africa. It has been certified for the stabilization of Crushed stone, Natural gravel and sands (It is not recommended for stabilizing clay material) as a BSM according to TG2 (2009) on all roads classes.

The purpose is to make the use of bitumen emulsion more efficient for stabilized pavement layers. For example, ITS tests have shown double the 24hour soaked strength when compared to bitumen stabilization with cement or lime as an active filler.

This means that the design engineer can make his BSM (Bitumen Stabilized Material) layer stronger, without making it brittle, for the same price, or alternatively, to get the same strength as the BSM with standard active filler at a lower price. (Ecobond is never mixed with cement or lime).

A specific example is when in-situ recycling of **William Nicol road in Johannesburg** we managed to attain **3.6MPa UCS (4hrs soak) and BSM1 level ITS**, which had the **same strength dry and after 24 hours under water**, all while **using only 2,35% gross binder and using no cement**.





Product Engineering Overview

BituForce			
Material Description	BSM3	BSM2	BSM1
Suitable Material +/-	PI <12	G7 or better	G4 or better
Design Guide	TG2 / SAPEM 2013 / Wirtgen Design Manual (as bitumen emulsion stabilization)		
Where in Pavement Structure?	Base Sub Base	Base Sub Base	Base Sub Base
Example of Application % of MDD	2,35% (with Sand)	2,35% (with Natural Gravel)	2,35% (with Crushed Stone)
Behaviour Strength type & Range	Stress Dependent Improved Granular Material		
	ITS (24hrs soak) 60-100kpa	ITS (24hrs Soak) 100-150kpa	ITS (24hrs Soak) >150kpa
	UCS 450-700kpa	UCS 700-1000kPa	UCS 1200-3500kPa
	Triaxial (STT) Cohesion (kPa) 50 to 100 Friction Angle (°) <30	Triaxial (STT) Cohesion (kPa) 100 to 250 Friction Angle (°) 30 to 40	Triaxial (STT) Cohesion (kPa) >250 Friction Angle (°) >40
Main Benefit (vs. conventional)	Stronger or lower cost BSMs (without sacrificing quality)		

