

## Pavement Subsurface Drainage Using Techdrain Geocomposite, for PWD, Tripura, Agartala

This case study discusses the possible causes of flexible pavement failures with poor subsurface drainage under high infiltration and capillary rise conditions, recommends TechDrain Drainage Composite for subsurface drainage instead of conventional gravel drainage for Improvement/Widening to two laning with paved shoulder of Agartala Udaipur section of NH 44 under SARDP-Phase A, in the state of Tripura.

### Project Challenges

The state of Agartala is one of the high rainfall areas and performance of pavement majorly depends on the effective drainage of infiltrated subsurface water out of the pavement layers. The detrimental effects of water in the pavement system are significant, as per AASHTO (1993) reports:

- Water in the asphalt surface can lead to moisture damage, modulus reduction and loss of tensile strength. Saturation can reduce the dry modulus of the asphalt by as much as 30 percent or more.
- Added moisture in unbound aggregate base and subbase is anticipated to result in a loss of stiffness on the order of 50 percent or more.
- Modulus reduction of up to 30 percent can be expected for asphalt-treated base and increase erosion susceptibility of cement or lime treated bases.
- Saturated fine -grain roadbed soil could experience modulus reductions of over 50 percent.

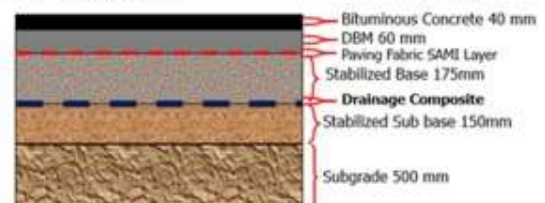
Most of the water in a pavement section infiltrates through the pavement surface during rain events. The incorporation of open-graded, free draining base/sub base layers into the pavement section as shown provides excellent drainage. For this the requirement of good quality graded aggregate is a must, whereas the project site conditions contradicts the requirements. The available aggregate were of marginal quality which needed to be stabilized to

achieve desired modulus values. In the process of stabilization, it was of utmost importance to ensure proper drainage requirements.

### Solution proposed:

After a careful evaluation of the project requirements and site conditions, Central Road Research Institute (CRRRI) has carried out detailed analysis and approved the usage of Techdrain Drainage Composite TDC 55130 which is in accordance with the requirements of MoRTH specifications section 704. The pavement designs submitted to CRRRI were reviewed using IIT Pave software and permissible strains were computed using IRC 37:2012 and the layer thicknesses were recommended as tabulated below:

S. No	Type of Layer (Top to Bottom)	Layer Thickness
1.	Bituminous Concrete with VG 30 Bitumen	40 mm
2.	Dense Bituminous Macadam with VG 30 Bitumen	60 mm
3.	Paving Fabric – SAMI Layer	As per MoRTH Section 708
4.	Stabilized Base Course	175 mm
5.	Geocomposite Drainage Layer (TechDrain)	As per MoRTH Section 704
6.	Stabilized Subbase Course	150 mm
7.	Prepared Subgrade	500mm



**Figure 1: Typical Cross Section of the pavement**

As per IRC 37 Clause 7.2.2, it is required that the stabilized soil layer should retain the permeability when water is likely to enter into pavement from shoulder, median or through cracks. It was therefore recommended that Techdrain Drainage Composite which possess required permeability and facilitates the subsurface drainage shall be laid between base and sub base layers. It was ensured that the drainage composite layer is running up to the end of the toe for sub base layer including shoulders.

### Project Photos:

Techfab India has supplied the entire quantity of

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**Figure 2: TechDrain Drainage Composite Unrolled on the Stabilized Sub Base**



**Figure 3: Overlapping of Drainage Composite ends with the adjacent rolls**

TechDrain Drainage Composite within the stipulated time and meeting all the quality requirements. The road construction has been completed and is open to traffic. The project met the desired objectives and road is functioning well.

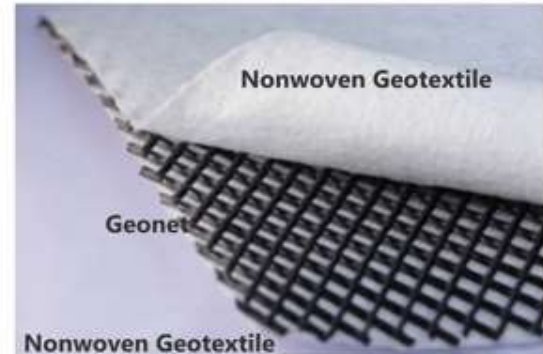
### Product Details:

#### TechDrain Drainage Composite:

Drainage Composite is a specifically designed drainage composite to meet the drainage and protection requirements in structurally demanding water draining applications. Drainage Composite effectively eliminates hydrostatic pressure by collecting and conveying groundwater to a drain pipe for discharge. Drainage composites are prefabricated sub surface drainage products which directly replace the granular drainage layer. The formed polymer core encapsulated in a bonded geotextile filter fabric retain soil particles while allowing water to freely enter the drainage core and convey to designated outlets

Figure 4 shows a typical Drainage Composite which

are made of lightweight three-dimensional, high-compressive strength polymeric core and nonwoven geotextile, provided on both sides.



**Figure 4: Typical Drainage Composite**

Drainage composites provide effective solution over conventional drainage layer. Some of the inherent advantages of drainage composite is:

- Extremely effective solution compared to traditional stone drainage layer
- Being light in weight, it is easy to handle and install them quickly.
- Made of PP and PE, so they are durable and chemical resistant
- High flow capacity as compared to conventional gravel drain
- Acts as drainage as well as protection layer due to its high puncture resistance and Highly compressive strength core
- Drainage Composite being factory manufactured product, it is very easy to install and suitable for wide range of soil gradation.
- Drainage Geocomposites have a filter geotextile layer attached to its drainage core which shall not allow the clogging of drainage core and thus ensures requires in-plane flow capacity and proper functioning.
- The burden on natural resources for gravel/aggregate is also reduced.
- There is also a reduction in emission of greenhouse gases due to reduction in blasting and crushing of rock aggregates.