

Enkadrain®

DIVISION 2
Soil Drainage

Drainage Channel
52,100 sq. yds.
Enkadrain 9812*

** Enkadrain 9812 is now a special order drain replaced by Enkadrain 3811R made with recycled polypropylene.*



A seven mile stretch of the Agua Fria highway in Phoenix uses Enkadrain instead of aggregate and fabric.

Enkadrain Chosen for Massive Highway Project in Arizona

No one thinks rainfall would create a water pooling problem in the deserts of Arizona. Annual rainfall is extremely low - about seven inches per year. But when it rains, it rains hard and most of the seven inches falls in substantial quantities over a short period of time. The slow soaking rain of the Midwest and South is not the norm in this part of the United States. Highway engineers and designers must consider the intensity of storm events along with yearly averages when designing roads that will last.

Highway drainage channels are designed to carry stormwater runoff from the road surface through calculated and predetermined areas. These concrete-lined waterways can have structural problems, including cracking, if moisture infiltrates and saturates the soil under the channel sideslopes. As a design solution, the concrete is generally poured on top of an aggregate layer wrapped with a geotextile filter fabric. The fabric functions as a separation layer, holding back concrete and soil fines which could potentially clog the aggregate drains and flood the area. This accepted design method of drainage layer / filter fabric / concrete, led to the use of Enkadrain on over seven miles of Arizona's Agua Fria highway.

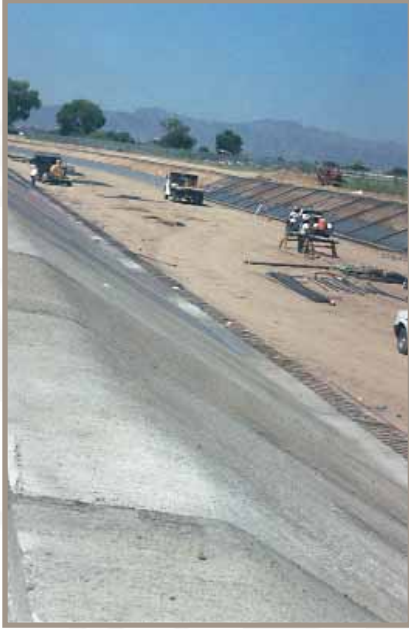
Instead of using an 8 ounce needle-punched nonwoven fabric encapsulating a thick and heavy aggregate layer, Enkadrain subsurface drainage composite was chosen as a lighter weight, and economical alternative for the project.

Enkadrain is a flexible, three-dimensional subsurface drainage composite which lays completely flat when unrolled, making it a perfect drainage solution on both horizontal and vertical applications. The drainage core is constructed of fused, entangled filaments molded into a square waffle pattern. Geocomposite fabrics are thermally bonded to one or both sides, creating a cost effective alternative to sand and gravel drains.

Using a subsurface drainage composite on this sloped section of the Agua Fria would make installation much faster and easier. Enkadrain 9812, with a rigid



Continued on reverse side...



Over seven miles of concrete-lined channel was placed on the Agua Fria highway.

HDPE core between two geotextiles, was the perfect solution because the Enkadrain separated the soil from the concrete by almost a half-inch and ensured proper drainage.

Enkadrain was placed along a 3:1 slope after the initial cut and compaction. Rebar or wire mesh was placed directly on top of

Enkadrain has proven and predictable flow rates, unlike sand and gravel drains.

the material and a low slump concrete was poured. Both sides of the channel were covered 2 meters high with Enkadrain (or about half way up the channel sideslope.)

Why is exceptional drainage so important in concrete applications?

Concrete is a porous building material that is used as a base for many construction applications. Often, it is seen as water tight, able to withstand moisture in the environment, able to prevent the migration of water from subsurface soils below, and able to support substantial loads. It is often placed on top of aggregate with accumulation pipes to channel the ground water

away from the slab. In plazas, concrete is placed on top of roofing membranes as a wear surface where it is expected to support the weight of light traffic while channeling surface water to drain pipes. Concrete expansion joints leak and the material itself shrinks and cracks. Designers have concluded that any water that passes through the concrete must have a means of getting out from under the slab. On grade concrete placement has a similar problem, but the placement of aggregate makes this problem easier to handle. Still, in sloped concrete applications the use of aggregate is difficult just due to gravity.

What about compressive strength requirements?

Certainly concrete structures provide compressive strength. But in the Agua Fria scenario, the aggregate drain is not required to demonstrate compressive strength. And, the soil subgrade can only achieve a relative amount of compaction. So, why consider compressive strength when specifying a drainage composite? Drainage composites are never considered "structural members." They are hydraulic elements in the design that contribute to the structural integrity of the section / system by providing a drainage medium to mitigate hydrostatic pressure.

For the Agua Fria project, Enkadrain proved to be the drainage composite of choice. Dimpled (sheet) drains, although they exhibit seemingly high compressive strength, are subject to catastrophic failure when subjected to certain impact loads and particularly the rigors of installation in sideslope applications. The unique design and configuration of Enkadrain withstands installation stresses and sloped conditions and provides an added factor of safety against catastrophic failure.



Geotextile fabric holds back concrete.



One-step installation of filter and drain saves time and money in labor costs.



Enkadrain channels water away from the concrete.

For more information about these and any other products marketed and manufactured by Colbond Inc. visit www.colbond-usa.com or call 800-365-7391.

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