

# MIRAFI H2Rx

Mechanical stabilization and moisture management



**MIRAFI® H2Rx** offers exceptional mechanical stabilization and moisture management for superior basecourse and ballast performance.



**MIRAFI H2Rx** uses super high tenacity polypropylene yarns to achieve a very high biaxial 2% tensile modulus, providing tensile restraint both along and across a pavement.

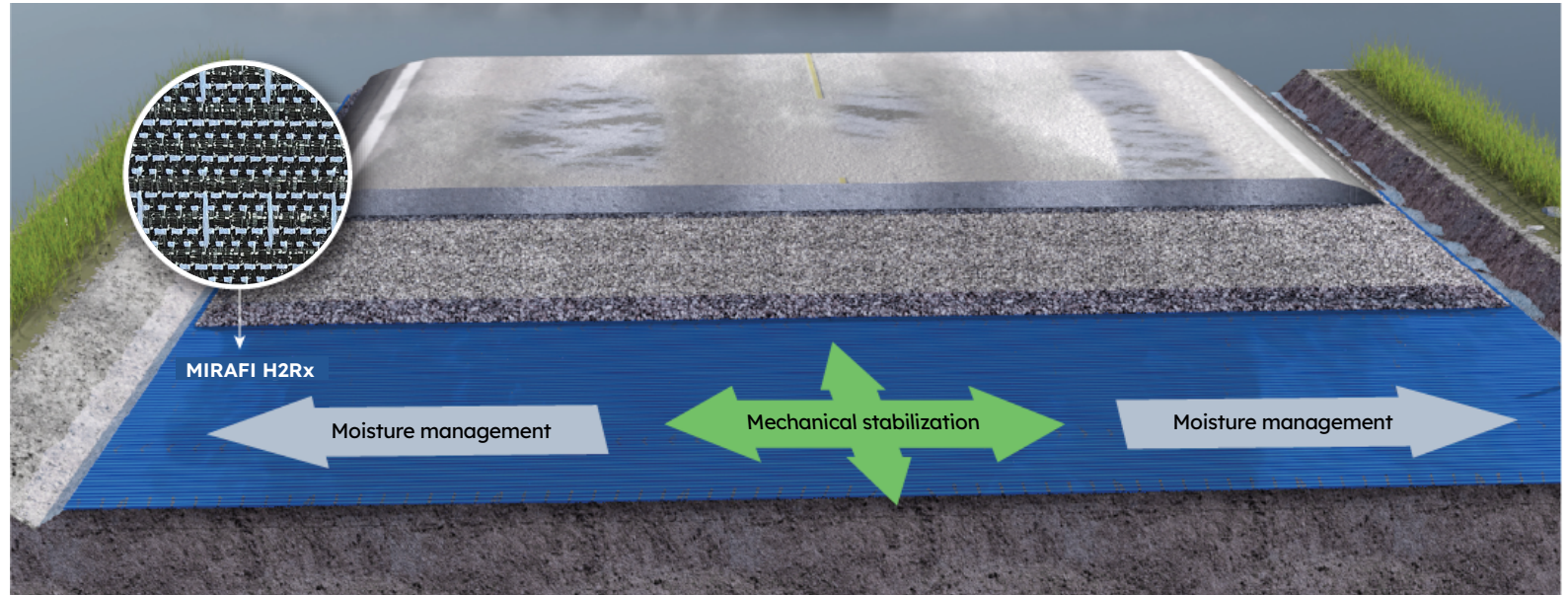
Its superior moisture management capabilities involve the use of innovative proprietary moisture suction yarns and weave design. The addition of wicking loops improves absorbency and enhances in-plane drainage by drawing and removing excess moisture through capillary flow across the pavement.

The combination of separation, mechanical stabilization and moisture management in one geotextile helps improve long term pavement performance in a number of ways.

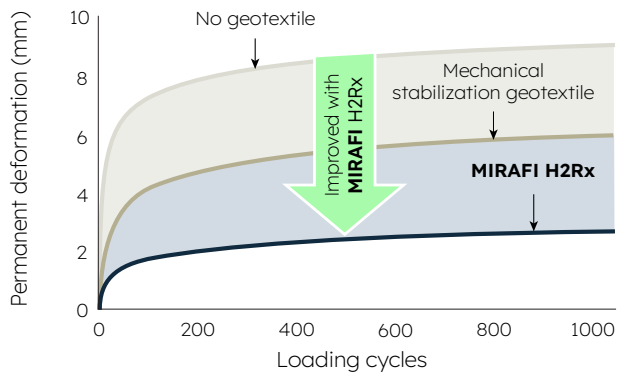
### **Improvement in basecourse performance with MIRAFI H2Rx**

- **MIRAFI H2Rx** provides tensile stiffness modulus to mechanically strengthen the basecourse.
- It provides internal suction to lower the equilibrium moisture content in the basecourse, thereby increasing the operational resilient modulus of the basecourse and hence performance.
- After a rainfall event, **MIRAFI H2Rx** quickly removes the excess moisture to restore the equilibrium moisture content in the basecourse.

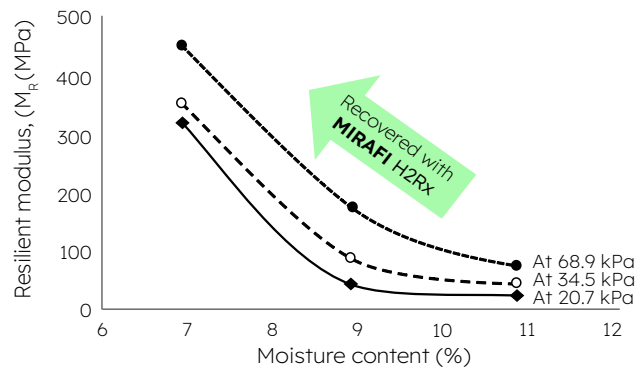
**MIRAFI H2Rx is an innovative multi-functional geotextile that offers separation, mechanical stabilization and moisture management for road pavements and railway structures.**



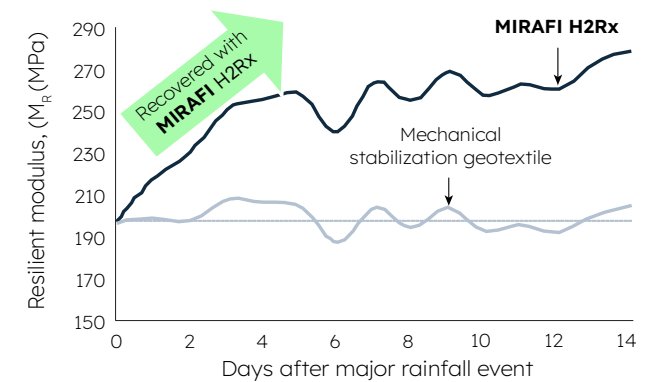
Mechanical stabilization and moisture management



Pavement performance improvement due to mechanical stabilization and moisture management using **MIRAFI H2Rx**



Improved resilient modulus due to reduction in equilibrium moisture content using **MIRAFI H2Rx**



Rapid recovery of resilient modulus after rainfall event due to moisture management function of **MIRAFI H2Rx**

# Removal of ponded water in subgrade depressions

Subgrade depressions can exist; from traffic induced deformations and/or construction levelling imperfections.

Water ponded in the subgrade depressions however will remain to soak into the subgrade resulting in localized weakening of the subgrade. The weakened subgrade is responsible for formation of potholes.

## Solutions and benefits of MIRAFLI H2Rx

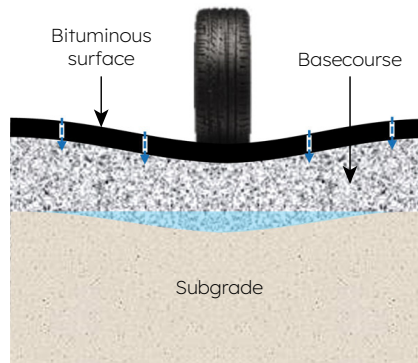
- Significantly reduce formation of traffic load induced subgrade depressions through mechanical stabilization.
- Remove ponded water in the subgrade depressions through moisture management. Water is removed from subgrade depression through wicking drainage function.



MIRAFLI H2Rx wicking technology for moisture management

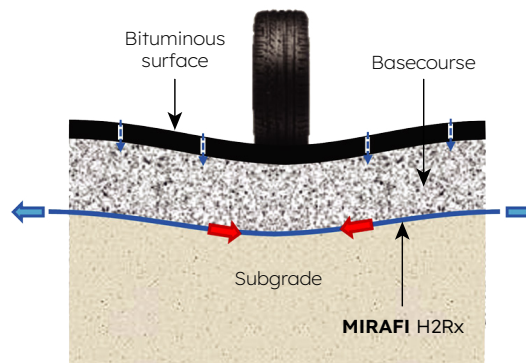
### WITHOUT MIRAFLI H2Rx

Water ingress and ponding in the subgrade depression



### WITH MIRAFLI H2Rx

MIRAFLI H2Rx removes water ponded in the subgrade depression



Potholes formed due to spot weakening of the subgrade

Prevent water ponding  
in subgrade depressions  
effectively with **MIRAFI H2Rx**.



Mitigate problems unique to expansive subgrades with **MIRAFI H2Rx**.



# Expansive clay subgrades

Expansive clays exhibit significant change in volume in association with changes in moisture content. They contain some form of expansive clay mineral, such as smectite or vermiculite, and these minerals absorb water and swell; the more water they absorb, the greater the volume increases and consequently the larger the ground heave. Conversely, they can also become very hard when dry, resulting in shrinking and cracking of the ground.

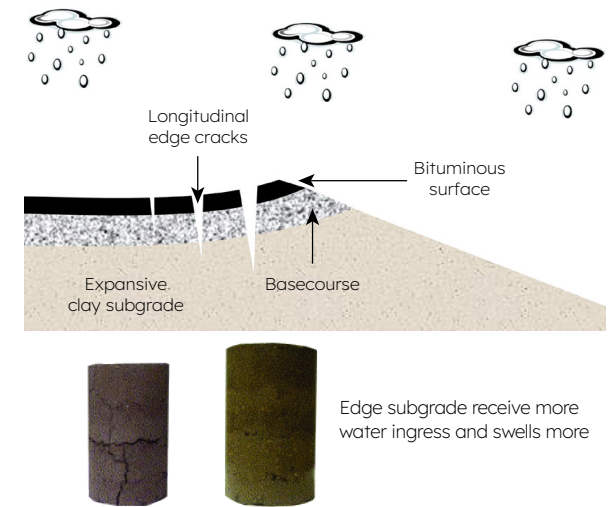
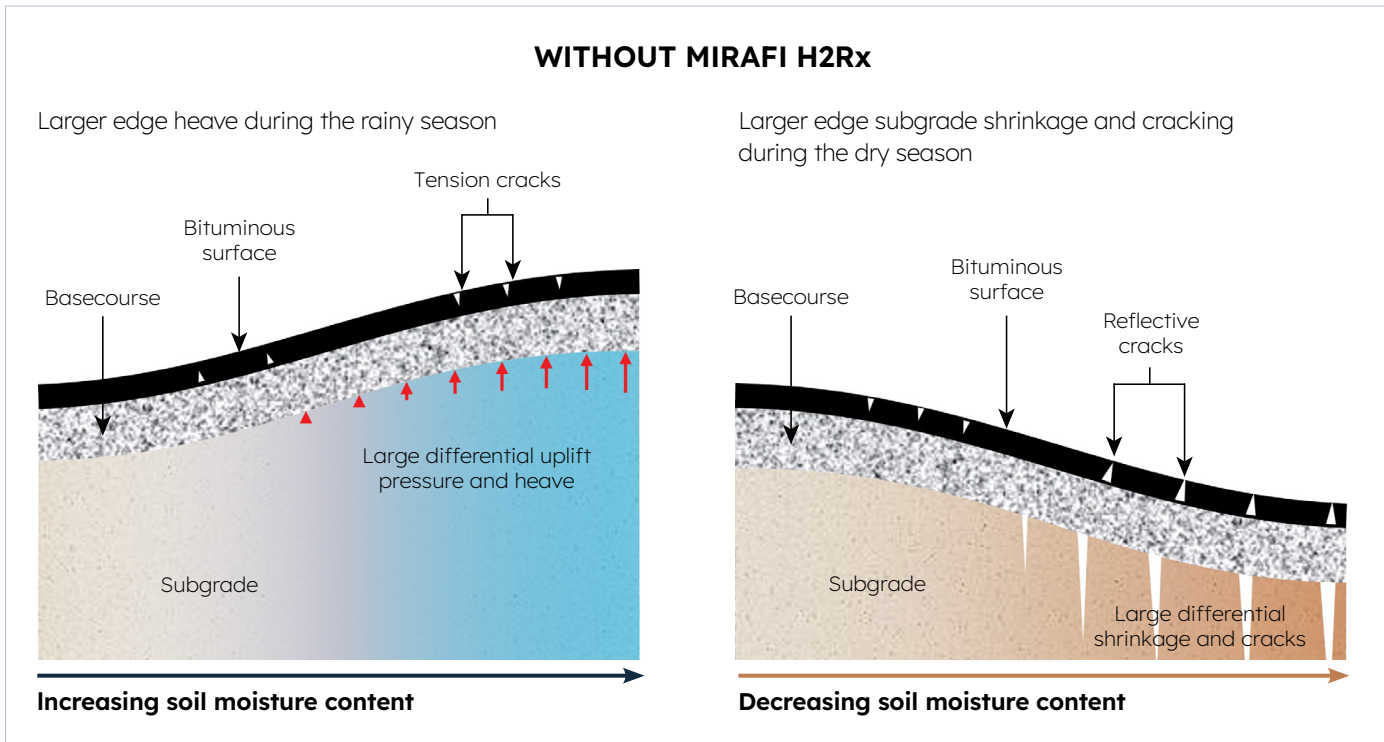
Depending upon the supply of moisture in the ground, expansive clays can experience changes in volume of up to thirty percent or more. Cyclic ground heave and shrinkage can cause pavement surface undulations, resulting in

serviceability problems and safety concerns. In pavements, rainfall infiltrates the unpaved shoulders more so than the paved surfaces, resulting in uneven moisture levels over the subgrade surface.

The heave and shrinkage distortions to the pavement structure are therefore greatest at the pavement shoulder area. In time, these cyclic heave and shrinkage distortions induce longitudinal pavement cracks near the pavement edges. These longitudinal cracks allow rainwater to seep through the otherwise relatively impermeable paved surface. The resulting outcome is that further longitudinal cracking occurs inward from the edge of the pavement surface.



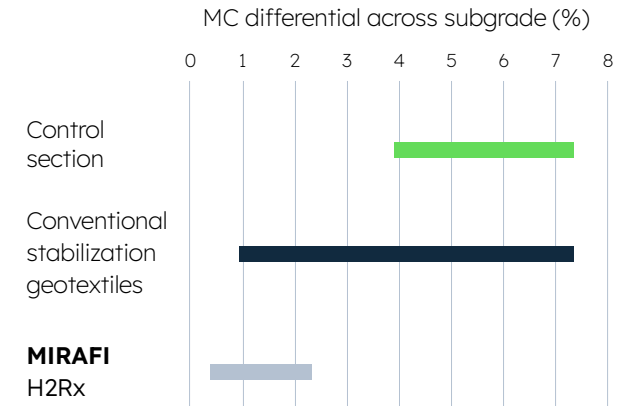
Longitudinal pavement edge cracks in road over expansive clay subgrade



Cracks formed due to repeated cycles of differential heave and shrinkage

## Solutions and benefits of MIRAFAI H2Rx for expansive clay subgrades

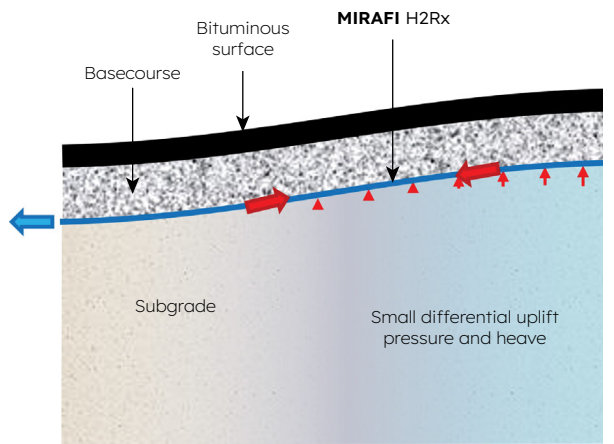
- Equalizes the expansive clay subgrade moisture content to reduce differential heave in the subgrade during the rainy season.
- Equalizes the expansive clay subgrade moisture content to reduce differential shrinkage and cracking in the subgrade during the dry season.
- Provides lateral tensile restraint to prevent the development of pavement surface longitudinal cracks.
- Its high tensile and frictional resistance between the expansive clay subgrade and any granular upper layer prevents the reflection of subgrade contraction cracks to the pavement surface.
- Provides longitudinal tensile restraint to minimize the formation of pavement surface heaves along the road axis.



The range of moisture content differentials (difference between the highest and the lowest soil moisture content across the subgrade) at various times for different geotextiles laid over the subgrade

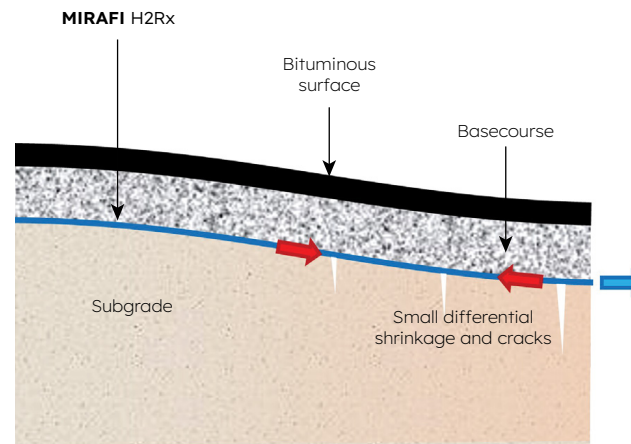
### WITH MIRAFAI H2Rx

MIRAFAI H2Rx equalizes the subgrade moisture to reduce differential heave during the rainy season



Increasing soil moisture content

MIRAFAI H2Rx equalizes the subgrade moisture to reduce subgrade shrinkage, cracking and provide tensile restraint to prevent surface crack formation during the dry season



Decreasing soil moisture content



Pavement rehabilitation over expansive clay subgrade



**MIRAFI H2Rx** resolves challenges specific to frost action in subgrades.



# Frost heave and thaw weakening of subgrades

Frost action is the process of alternate freezing and thawing of moisture. Frost action in soil typically occurs on permafrost ground but can also occur on ground that seasonally freezes and thaws. Three conditions must exist together before frost action can occur in soil:

- a soil material that is frost susceptible (typically silts, silty clays and fine sands),
- a sufficiently cold climate to allow freezing temperatures to penetrate below the ground surface, and
- a supply of water (from capillary rise, aquifer and moisture existing in soil pores) into the freezing zone.

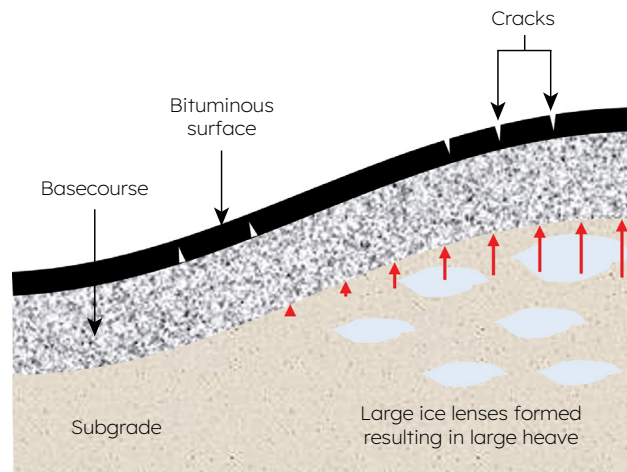
During the cold season when freezing reaches frost susceptible soil, ice lenses form at the frost boundary through a process called cryosuction and grow in size as capillary water from the unfrozen ground water table below is drawn towards the ice lenses. As freezing progresses the frost boundary shifts downwards with more ice lens formation extending lower into the ground. The ice lenses formed cause the ground to swell upwards and pavements built on such ground are subject to heave and cracking.



Pavement surface cracking due to frost action in subgrade

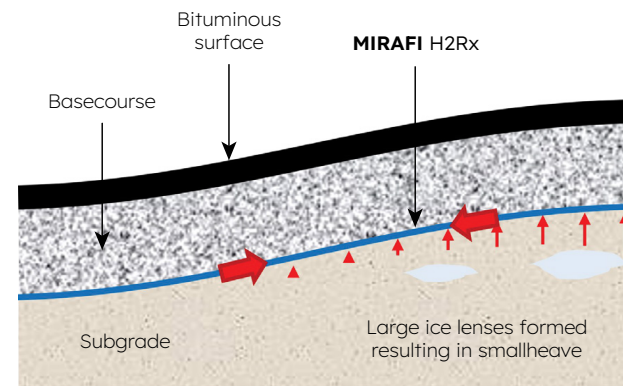
## WITHOUT MIRAFI H2Rx

Pavement heave and cracking due to ice lens formation in the subgrade during the freezing season



## WITH MIRAFI H2Rx

MIRAFI H2Rx removes rainfall ingress to prevent soaking of the subgrade for reduced ice lens formation during the freezing season



Pavement surface heave due to frost action in subgrade

As the weather warms up the ground starts to thaw, starting at the top and progressing down-wards as well. The thaw process liberates water and weakens the soil layer above the still frozen lower layers. The weakened subgrade soil causes the pavement surface to crack and the free water from the ice-melt supersaturates the subgrade soil. The free water and the fines in the subgrade soil is then squeezed out as mud under the action of wheel loads, a phenomenon referred to as frost boil.

### Solutions and benefits of MIRAFI H2Rx for frost action in subgrades

- During rainfall prior to ground freeze, **MIRAFI H2Rx** intercepts infiltration and drains laterally thereby

preventing ingress into the frost susceptible subgrade soil, and consequently reduces the availability of water in soil that helps intensify the formation of ice lenses and ground heave during the ground freeze.

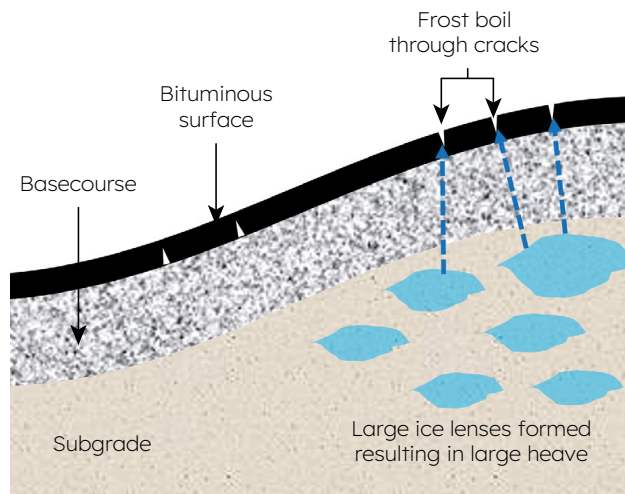
- Provides biaxial tensile restraint to minimize the formation of pavement surface heaves along and across the road axis during ground freeze.
- Provides high biaxial tensile modulus to mechanically stabilize the road structure over the weakened subgrade during ground thaw.
- Intercepts any rising ice-melt water from the thawing subgrade and drains horizontally to the roadside thereby preventing pavement frost boil.



Basecourse rutting due to thaw weakened subgrade

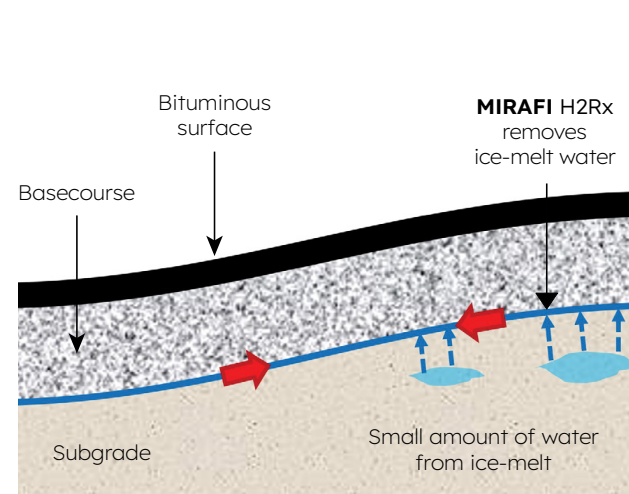
#### WITHOUT MIRAFI H2Rx

Subgrade weakens due to melting ice and the ice-melt water mixed with soil fines escapes through the cracked surface when the frozen ground thaws



#### WITH MIRAFI H2Rx

**MIRAFI H2Rx** removes ice-melt water to reduce weakening of the subgrade and prevent frost boil through the pavement surface when the frozen ground thaws



Frost boil through cracked pavement surface

## About us

Solmax is a world leader in sustainable construction solutions, for civil and environmental infrastructure. Its pioneering products separate, contain, filter, drain and reinforce essential applications in a more sustainable way – making the world a better place. The company was founded in 1981, and has grown through the acquisition of GSE, TenCate and Propex. It is now the largest geosynthetics company in the world, empowered by more than 2,000 talented people. Solmax is headquartered in the province of Quebec, Canada, with subsidiaries and operations across the globe. To find out more, contact [infoasia@solmax.com](mailto:infoasia@solmax.com).

## Uncompromised quality

Our products are manufactured to strict international quality standards. All our products are tested and verified at our dedicated and comprehensive laboratories which maintain numerous accreditations. We offer our partners a wide scope of testing according to published standards to ensure products delivered to sites meet specified quality requirements.

# Let's build infrastructure better

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