TenCate Mirafi®

INSTALLATION GUIDELINES

Mirafi® H_2Rx For Mechanical Stabilization and Moisture Management

Contents

1. General

This document is prepared to help ensure that the mechanical stabilization and moisture management geotextile, once installed, will perform its intended design functions. To do so, the product must be identified, handled, stored and installed in such a way that its physical property values are not affected and the design conditions are ultimately met as intended. This document does not account for every possible construction scenario. This document contains information consistent with generally accepted practices of identifying, handling, storing and installing geotextiles for most subgrade stabilization applications. Failure to follow these guidelines may result in the unnecessary failure of the geotextile in an otherwise properly designed application.

2. Product and Application

Mirafi® H_2Rx is a unique geotextile with mechanical stabilization and moisture management capabilities specifically engineered for applications in roads, railways and other load bearing platforms, see Figure 1. Mirafi® H_2Rx uses super high tenacity polypropylene yarns to derive very high biaxial tensile modulus to allow mobilization of tensile resistance for reinforcement benefits at low working strains of 2%. In addition, Mirafi® H_2Rx uses proprietary super-wicking yarns to extract moisture from overlying and underlying layers of soil and gravel and drain laterally in-plane of the geotextile, even under unsaturated soil conditions.

Mirafi® H_2Rx utilizes a proprietary weaving technique to give a highly texturized woven geotextile surface for excellent bonding with soil and gravel. The super-wicking yarns are placed within the mini-corrugation throughs of the surface texture to result in enhanced in-plane lateral drainage. Figure 2 shows a conceptual Mirafi®

H_2Rx road application and the principal mechanical stabilization and moisture management directions.

3. Material Identification, Storage and Handling

Mirafi® H_2Rx mechanical stabilization and moisture management geotextile shall be rolled on cores having strength sufficient to avoid collapse or other damage from normal use. Each roll shall be wrapped with a plastic covering to protect the geotextile product from damage during shipping and handling. Each roll shall be identified with a durable gummed label or the equivalent, clearly legible on the outside of the roll wrapping. The label shall indicate the manufacturer's name, the style number and the roll number.

Upon delivery, check the roll labels to verify that the correct geotextile product has been received. Immediately inspect the geotextile rolls to ensure it is free of any flaws or damage that might have occurred during shipping or handling. While unloading or transferring the geotextile from one location to another, care should be taken to prevent damage to the wrapping, core, label or the geotextile itself.

If the geotextile is to be stored for an extended period of time, the geotextile shall be located and placed in a manner that ensures the integrity of the wrapping, core and label as well as the physical properties of the geotextile product. This can be accomplished by elevating the geotextile rolls off the ground on dunnage (see Figure 3).

Care should be taken to ensure that the geotextile rolls are adequately covered and protected from ultraviolet radiation, chemicals that are strong acids or strong bases, fire or flames including welding sparks, temperatures in excess of 60°C, and human or animal destruction.

Due to the high moisture suction capability of the super-wicking yarns incorporated into Mirafi® H_2Rx rainwater may seep through any exposed part of the geotextile roll. However, water seeping into the geotextile roll will not change the mechanical and hydraulic properties and performance of the geotextile. Any gain in moisture however may result in a small weight increase of the roll of geotextile during installation.

4. Ground Preparation

Mirafi® H_2Rx mechanical stabilization and moisture management geotextile is commonly placed at the structural gravel layer and subgrade soil interface. However, it may be possible in design to have the geotextile specified for laying at different layer interfaces when involving gravel sub-layers or a capping layer. Construction typically begins with preparation of the subgrade. Excavate or fill to the designed subgrade level (if required) and grade the subgrade according to the Engineer's design and drawings (see Figure 4). Trim or remove any large roots or sharp objects that might puncture or tear the geotextile, refilling any voids created if necessary.

5. Installation - Laying, Jointing and Edge Termination

5.1 Laying

Mirafi® H_2Rx mechanical stabilization and moisture management geotextile is supplied generally in standard rolls of specific roll length and width. Before unrolling the geotextile, verify the roll identification, length, and installation location with the contract drawings. While unrolling the geotextile, inspect it for damage or defects. Discard or repair any damage that occurred during storage, handling or installation as directed by the Engineer.

Lay the Mirafi® H_2Rx geotextile as shown and specified in the Engineer's drawings. Place the Mirafi® H_2Rx geotextile over the prepared ground to be as smooth and wrinkle free as possible. The direction of enhanced in-plane lateral drainage of Mirafi® H_2Rx is the cross-machine direction of the geotextile. This direction of enhanced in-plane lateral drainage should be placed to coincide with the cross direction of the road or railway so that moisture can flow sideways towards the edges of the road or railway. Figure 5 is a photo showing the laying out of Mirafi® H_2Rx mechanical stabilization and moisture management geotextile in a road construction project. Note that the geotextile is unrolled in the longitudinal direction of the road.

5.2 Jointing

A nominal geotextile edge overlap of 300 mm is generally sufficient to prevent formation of geotextile discontinuity during backfilling operation. However, in some applications this may not be adequate. Table 1 shows the recommendation for Mirafi® H_2Rx mechanical stabilization and moisture management geotextile edge jointing under different subgrade CBR conditions.

The overlapping layers of the Mirafi® H_2Rx mechanical stabilization and moisture management geotextile should be shingled in a manner similar to roof tiles, allowing water to shed from the upper layer overlap onto the lower adjacent layer. The road or railway surface may be designed with slight fall towards both sides in straight sections or with slight fall to one side through super-elevations at curve sections. Figure 5 shows the middle roll of geotextile overlapping the two adjacent side rolls in a double cross elevation fall. Figure 6 shows the overlapping of geotextile rolls in a road section with super-elevation on right.

5.3 Edge Termination

5.3.1 Geotextile edge terminated within – for moisture equalization across subgrade

This approach represents the traditional way of laying geotextile whereby the geotextile is laid directly over the subgrade and underneath the structural gravel layer with the geotextile edge terminated within the road or railway structure. For Mirafi® H_2Rx mechanical stabilization and moisture management geotextile this approach is useful when the moisture content needs to be maintained and distributed evenly across the subgrade, ideal for equalization of moisture in expansive clay subgrades to minimize differential heave across the subgrade. Figure

7(a) is a typical cross section diagram for this approach. Figure 7(b) shows the layout of Mirafi® H_2Rx with this termination approach.

5.3.2 Geotextile edge terminated at side – for moisture removal

This approach is good for roadway and railway embankments that can allow water to flow out of the system at the edge. A directional gradient that drains water laterally and down towards the shoulder into large drainage rock (ballast or small riprap) should be incorporated with this approach. Figures 8(a) and 8(b) are typical cross section diagrams for this approach. When necessary a suitable grade Polyfelt® TS geotextile should be placed separating the structural gravel layer and the more open drainage rock (see Figure 8b). Figure 8(c) shows such a termination approach adopted for a road project.

5.3.3 Geotextile edge terminated beneath rock cover – for moisture removal

This approach involves the draped extension of Mirafi® H_2Rx with a protective rock cover layer above the geotextile drape. A minimum geotextile drape of 300 mm is recommended. Figure 9(a) is a typical cross section diagram for this approach. Figure 9(b) shows such a termination approach adopted for a road project. This approach may not be the most effective in environments with very high or constant humidity.

5.3.4 Geotextile edge terminated beneath bio-wicking vegetated soil cover – for moisture removal

This approach involves the draped extension of Mirafi® H_2Rx with a soil cover layer above the geotextile drape. A minimum geotextile drape of 300 mm is recommended. This approach relies on local vegetation to draw water from the system through their roots, away from the exposed edge of Mirafi® H_2Rx. Vegetation can be selectively planted on the sides of the road to enable evapotranspiration. Local riparian based plants with a shallow root system can be selected and planted after construction, or the use of existing on-site topsoil for native species plant growth. Figure 10(a) is a typical cross section diagram for this approach. Figure 10(b) shows such a termination approach adopted for a road project.

5.3.5 Geotextile edge terminated into trench drain – for moisture removal

This approach should be used for designs with existing curb and gutter or where the shoulder elevation is flat. In this approach the Mirafi® H_2Rx edge is terminated into a conventional trench drain with perforated pipe or directly into a non-perforated, saw-cut pipe. A minimum 100 mm diameter HDPE drain pipe is recommended for use in these applications. A minimum 250mm vertical drop of the geotextile is recommended. Figure 11(a) is a typical cross section diagram for this approach into a French Drain. Figure 11(b) is a typical cross section diagram for this approach into a saw-cut pipe. A suitable grade Polyfelt® TS geotextile should be placed covering over the geotextile insertion into the saw-cut pipe (see Figure 11b). Figure 11(c) shows such a termination approach into a saw-cut pipe adopted for a road project.

6. Backfilling and Compaction

Place and compact aggregate fill in specified lifts as instructed by the Engineer. Construction equipment is not allowed to operate directly on the laid out Mirafi® H_2Rx mechanical stabilization and moisture management geotextile prior to backfilling. In addition, turning of construction equipment shall be kept to a minimum to prevent displacement of fill and damaging the geotextile.

6.1 Compaction Standard

Unless otherwise instructed by the Engineer, the aggregate is generally compacted to a minimum of 95% of the optimum dry density and +2% of the optimum moisture content, according to the AASHTO T-99.

Table 1. Recommendation for Mirafi® H_2Rx mechanical stabilization and moisture management geotextile edge jointing under different subgrade CBR conditions.

Subgrade CBR	Recommended joint
> 3	0.3 m overlap
2 - 3	0.45 m overlap
1 - 2	0.6 m overlap
< 1	consider sewing

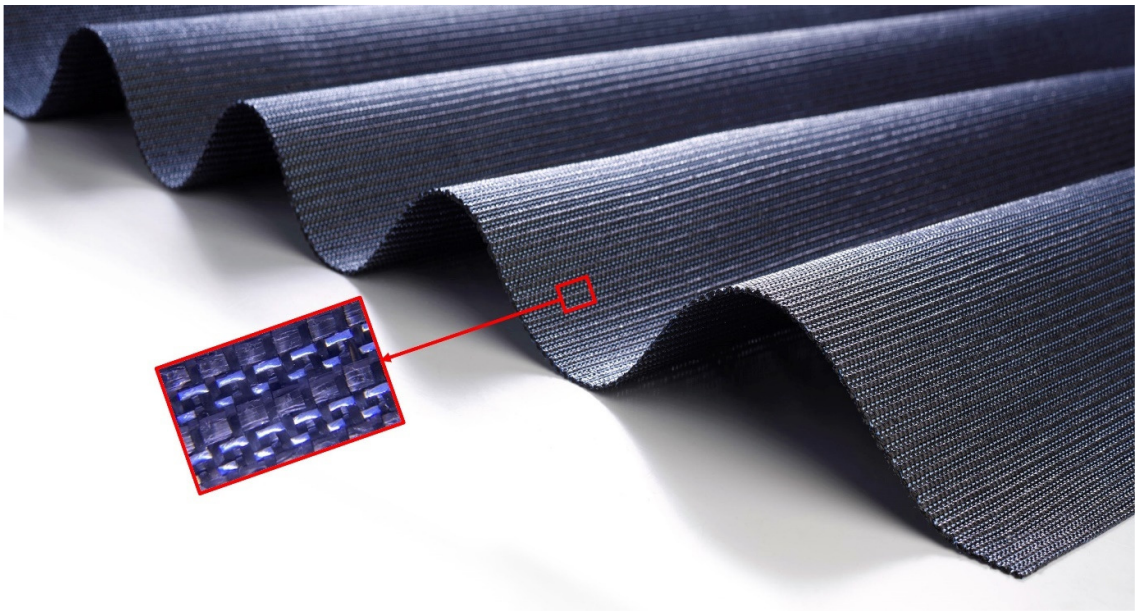

Figure 1: Mirafi® H_2Rx mechanical stabilization and moisture management geotextile.

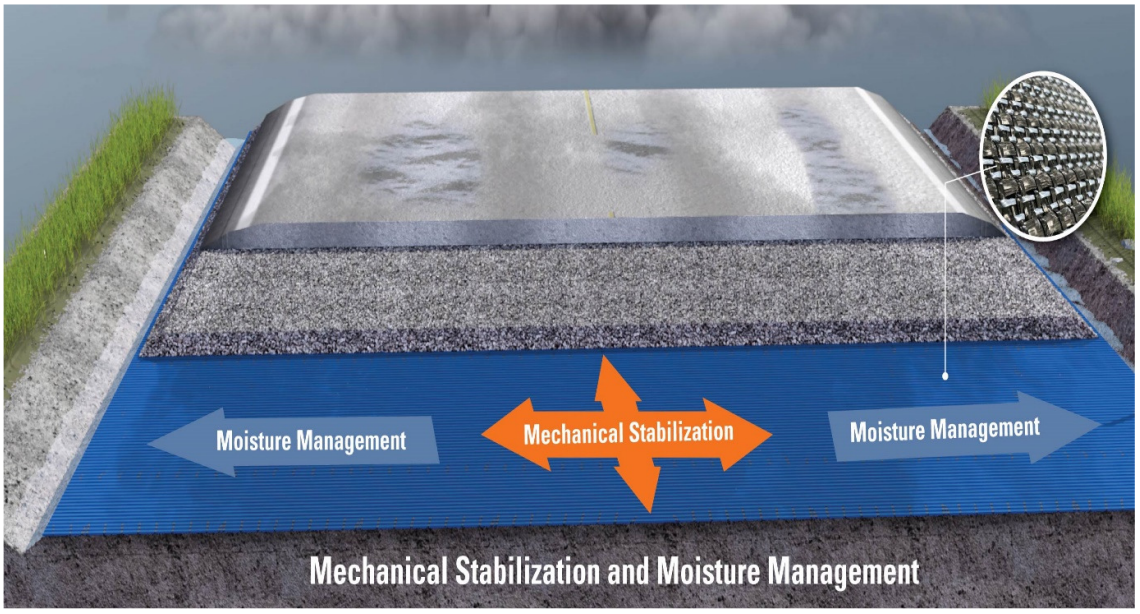

Figure 2: A conceptual Mirafi® H_2Rx road application showing the principal mechanical stabilization and moisture management directions.

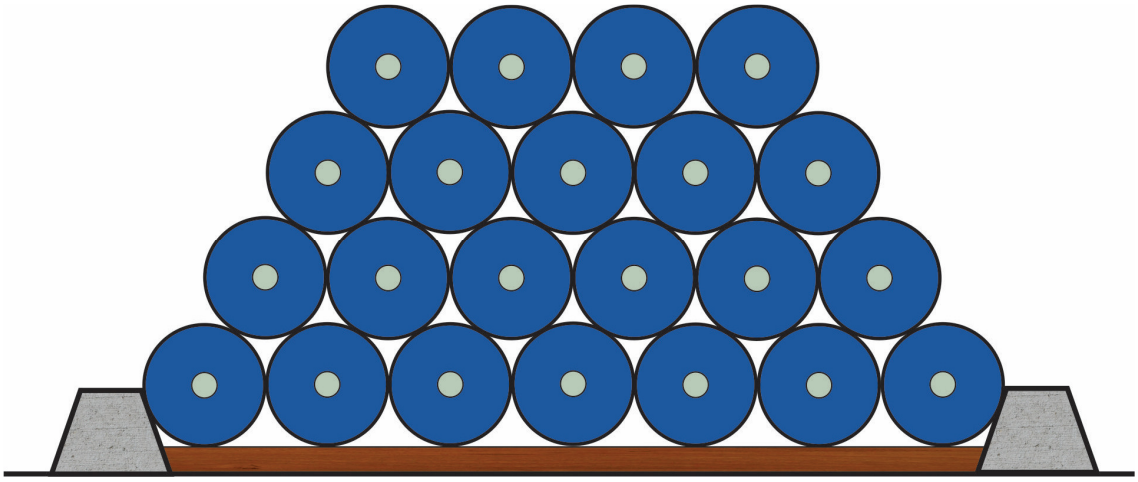

Figure 3: Recommended setup for safe onsite stacked storage of Mirafi® H_2Rx mechanical stabilization and moisture management geotextile rolls.

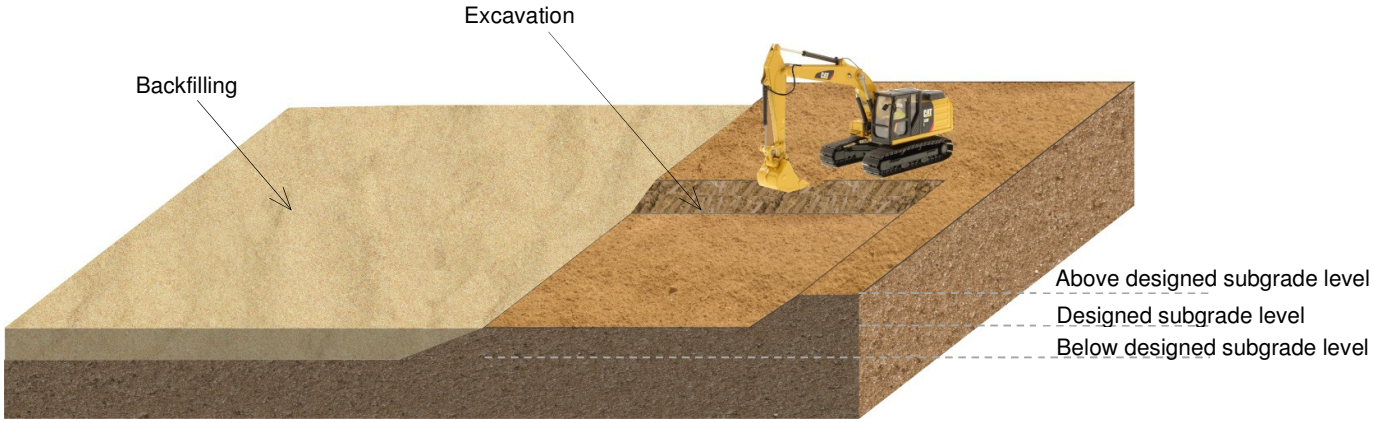

Figure 4. Preparation of the designed subgrade level

Figure 5. Installation of Mirafi® H_2Rx with the geotextile unrolled in the direction of the road alignment and middle roll overlapping the two adjacent side rolls in a double cross elevation fall.

Figure 6: Installation of Mirafi® H_2Rx with the geotextile unrolled in the direction of the road alignment and the overlapping of geotextile rolls from right to left in a road section with super-elevation on right.

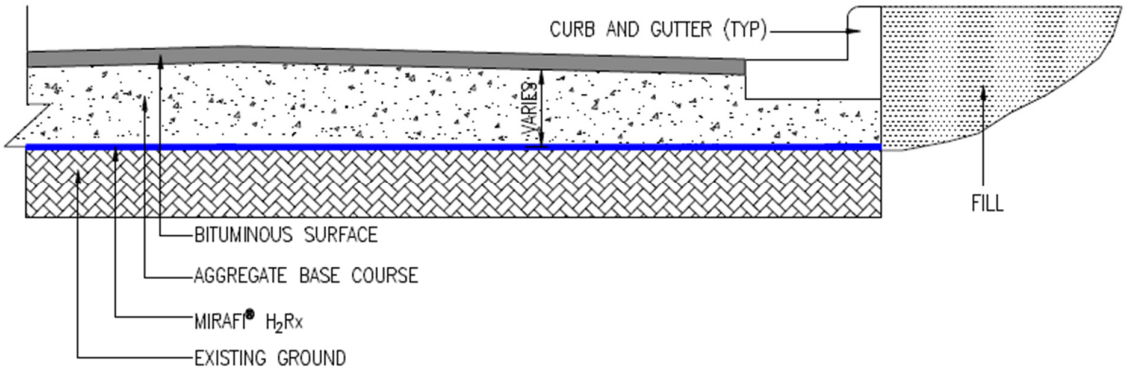

Figure 7(a): A typical cross section diagram for geotextile edge terminated within.

Figure 7(b): Photo of a Mirafi® H_2Rx with geotextile edge terminated within.

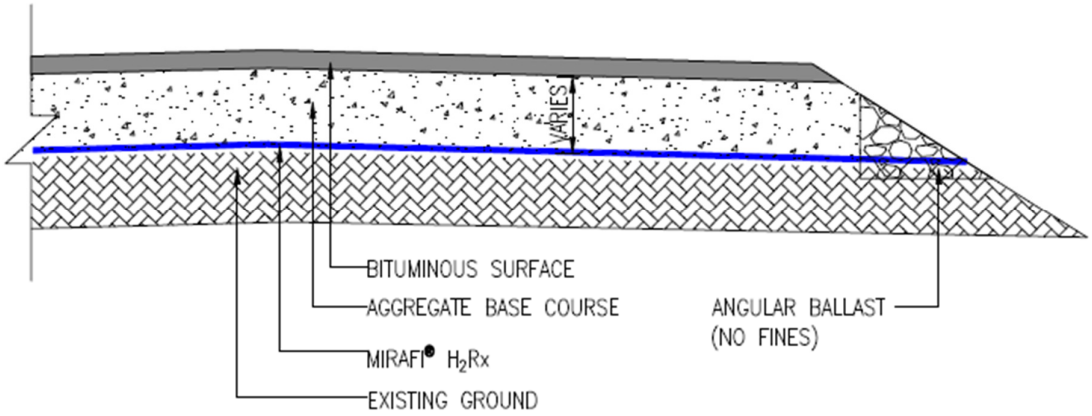

Figure 8(a): A typical cross section diagram for geotextile edge terminated at side with angular ballast protection.

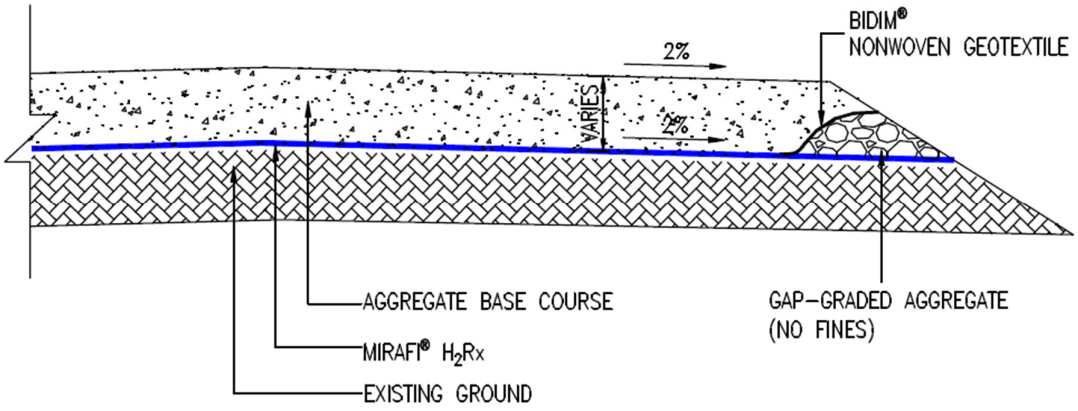

Figure 8(b): A typical cross section diagram for geotextile edge terminated at side with riprap protection.

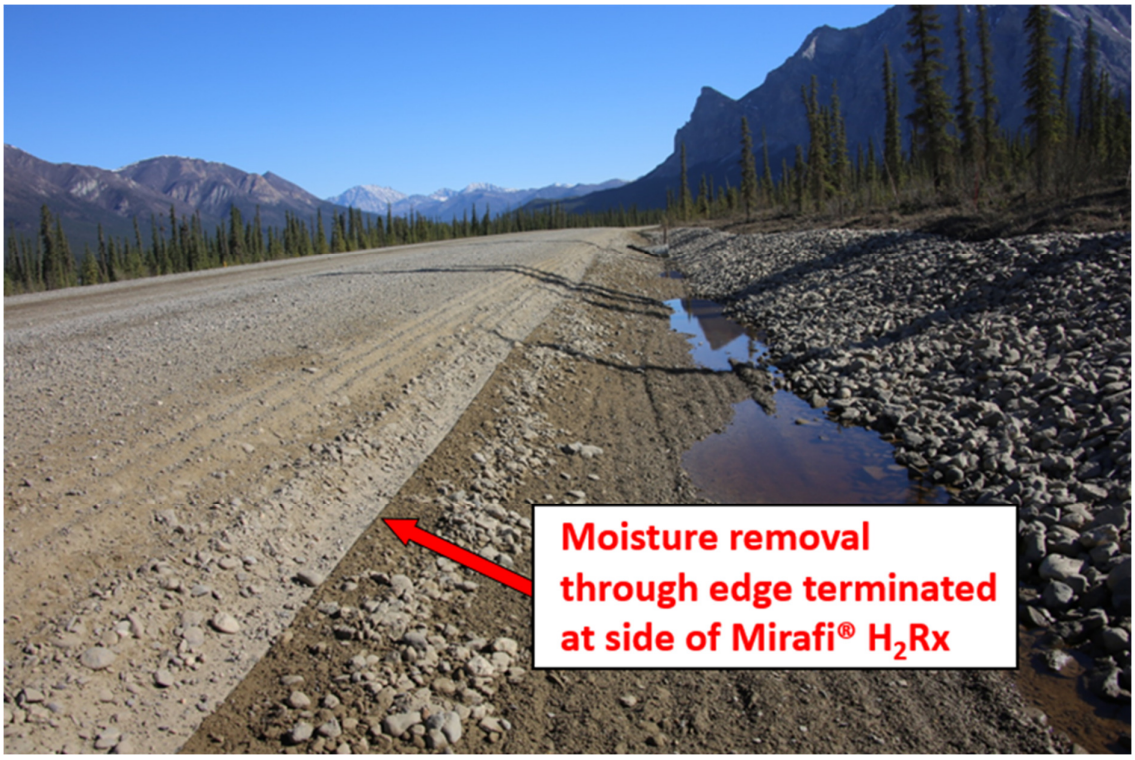

Figure 8(c): Photo of a Mirafi® H_2Rx road project with geotextile edge terminated at side.

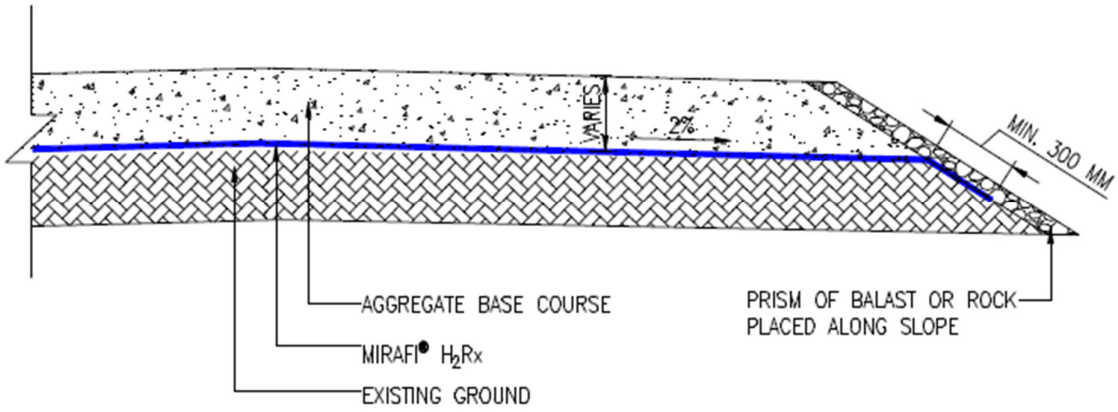

Figure 9(a): A typical cross section diagram for geotextile edge terminated as a draped tongue beneath a rock cover.

Figure 9(b): Photo of a Mirafi® H_2Rx road project with draped geotextile tongue beneath a rock cover.

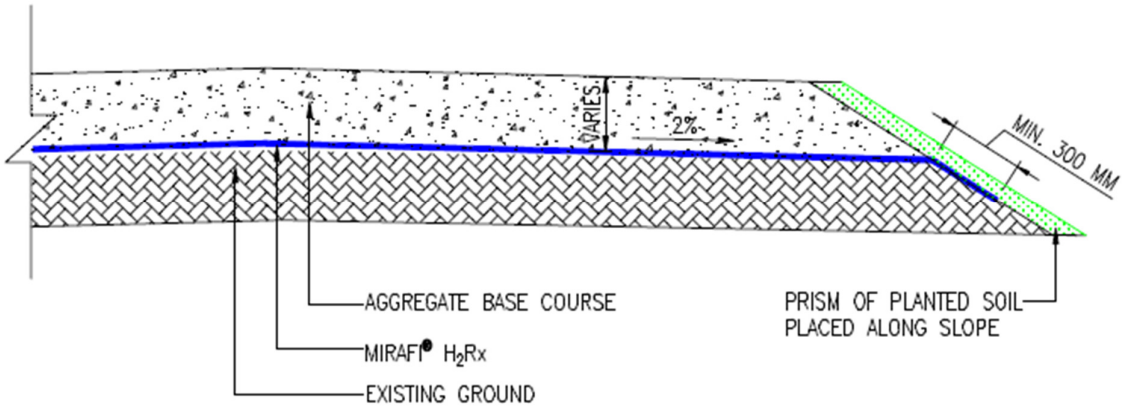

Figure 10(a): A typical cross section diagram for geotextile edge terminated as a draped tongue beneath a bio-wicking vegetated soil cover.

Figure 10(b): Photo of a Mirafi® H_2Rx road project with draped geotextile tongue beneath a bio-wicking vegetated soil cover.

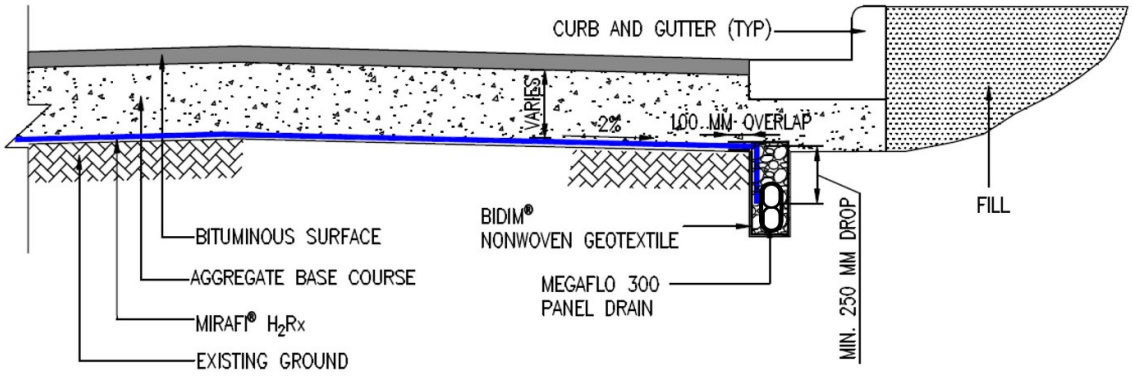

Figure 11(a): A typical cross section diagram for geotextile edge terminated in a Megaflo® panel drain (with outlets).

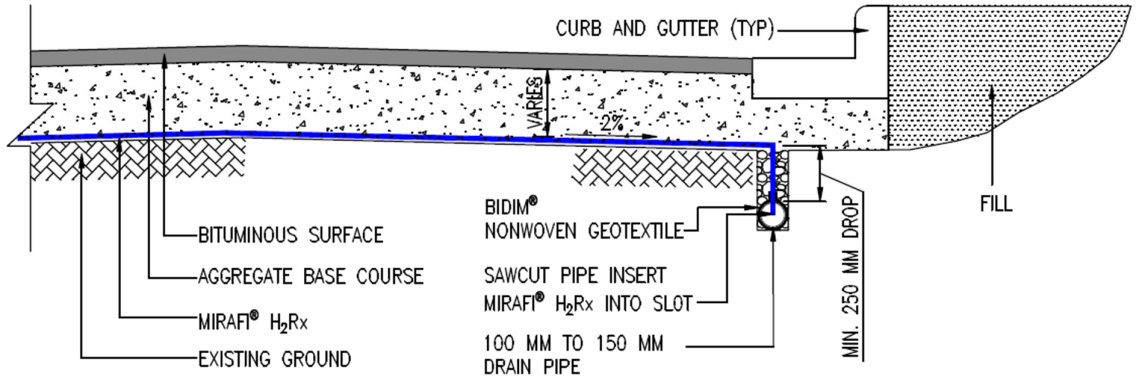

Figure 11(b): A typical cross section diagram for geotextile edge terminated in a saw-cut pipe.

Figure 11(c): Photo of a Mirafi® H_2Rx road project with geotextile edge terminated in a saw-cut pipe.