AFITEX Texel

LE DRAINAGE SUR MESURE • THE DRAINAGE YOU WANT

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Case study on the use of multi-linear drainage geocomposite for primary leachate collection

Introduction

- Product description
- Project description
- Elements of design
- Geocomposite installation
- Conclusion

Multi-linear drainage geocomposites

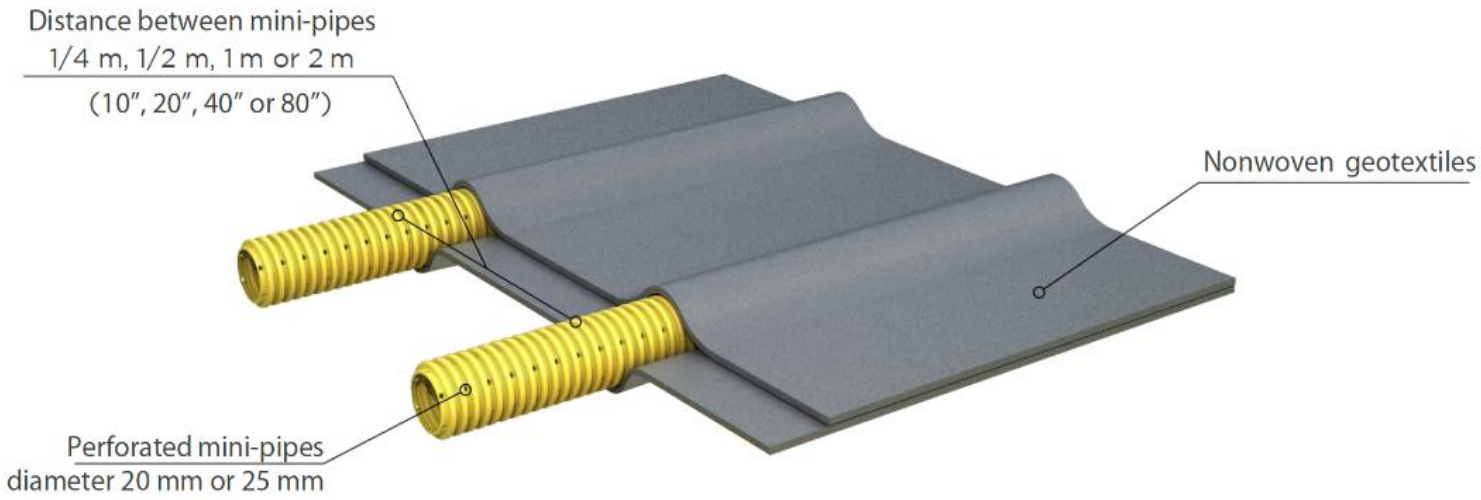
Drainage geocomposite with drainage conduits regularly spaced between two geotextiles instead of a geonet core

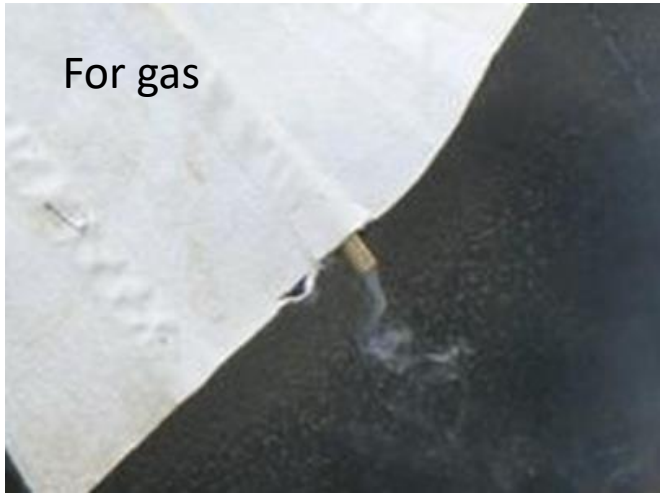
Drainage conduits:

- Perforated PP mini-pipes,
- Strip drains
- Etc.

Multi-linear drainage geocomposites

Draintube technology consists of Perforated polypropylene mini-pipes between two geotextiles layers





Geocomposite Standardization

ASTM INTERNATIONAL

ASTM D4439 *Terminology*: Multi-linear drainage geocomposite.

ASTM D7931 *Standard Guide for specifying Drainage Geocomposites*: « Multi-linear drainage geocomposites may not be sensitive to creep when confined into a soil matrix because of their core structures.

GRI GEI GII GSI GAI GCI

Geosynthetic Institute

GRI GC15 standard test method for Determining the Flow Rate per Unit Width of Drainage Geocomposites with Discrete High Flow Components

Project description

Mesa County Colorado Landfill, CO

History

Opened in 1981

Acquired by Mesa County in 1994

Operated by Mesa County since 1996

2018 New cell construction

Designed by SMA Engineers

215,000 sf cell + leachate pond

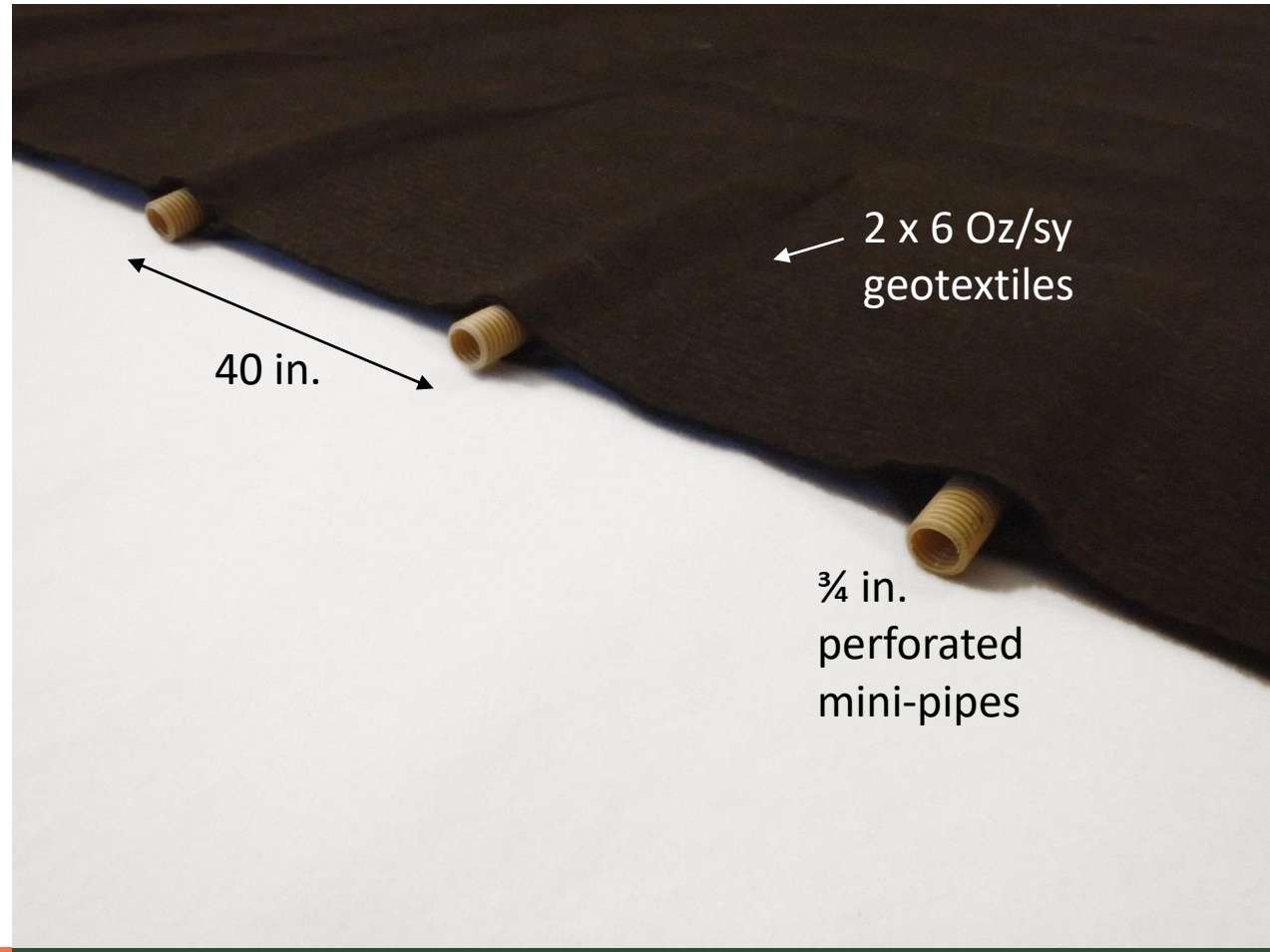
Total capacity of 282,000 cubic yard of waste

Project description

Mesa County Colorado Landfill, CO

Cross section of the cell (from bottom to top):

- 12 in of compacted clay
- 60 mil HDPE geomembrane
- **DRAINTUBE 606 ST1 D20**
- 12 in of native soil



Elements of design

Drainage geocomposite

DRAINTUBE 606 ST1 D20 selected instead of a 250 mil double sided (6 Oz/sy geotextiles) geonet geocomposite

- Same geotextile properties
- Same index transmissivity

What about Long Term Drainage Capacity?

Elements of design

GSI White Paper #4 (Koerner)
Reduction Factors (RFs) Used in Geosynthetic Design

$$Q_{allow} = \frac{Q_{ult}}{RF_{in} \,.\, RFcr \,.\, RFcc \,.\, RFbc}$$

q_{allow} = allowable (or design) flow rate or transmissivity,

q_{ult} = ultimate (or as-manufactured) flow rate or transmissivity,

RF_{IN} = reduction factor for intrusion of geotextiles or geomembranes into the core of drainage product,

RF_{CR} = reduction factor for creep of the drainage core or covering geosynthetics,

RF_{CC} = reduction factor for chemical clogging of drainage core, and

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Elements of design

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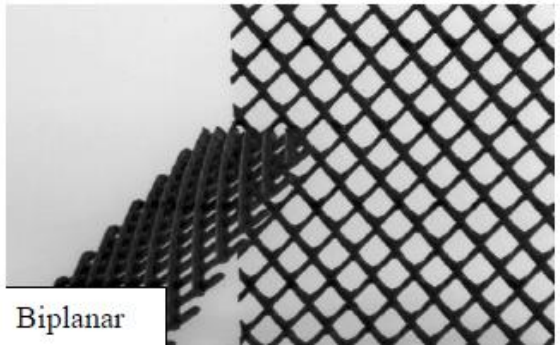
Elements of design

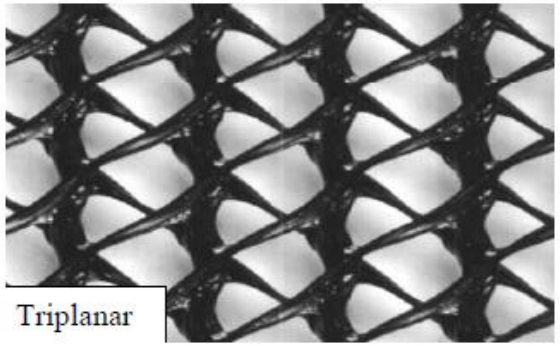
Reduction factor for creep and geotextile intrusion

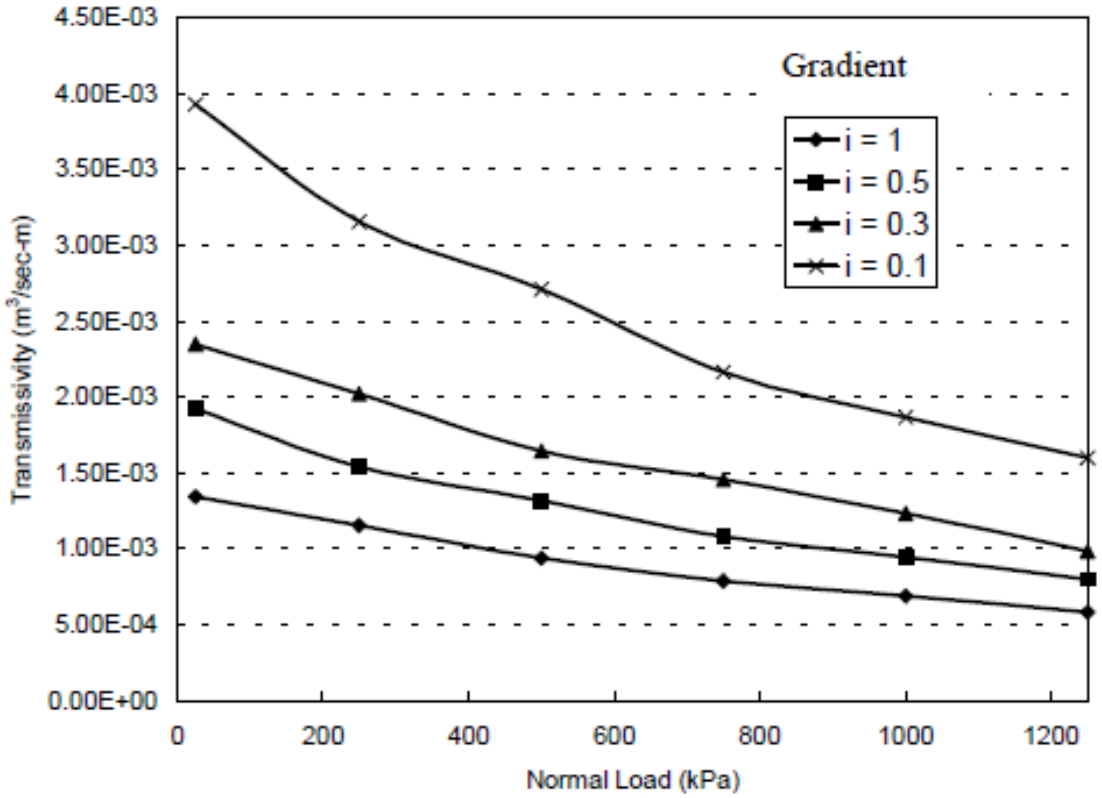
Function of the shape of the drainage core

For geonet drainage core

Reduction of the drainage capacity under load







Transmissivity vs. normal load for a double sided triplanar geonet geocomposite (soil / geocomposite / steel plate)

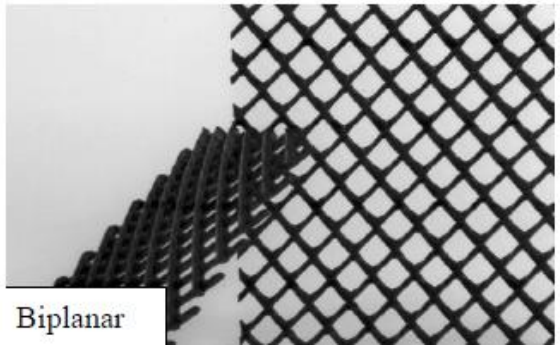
Elements of design

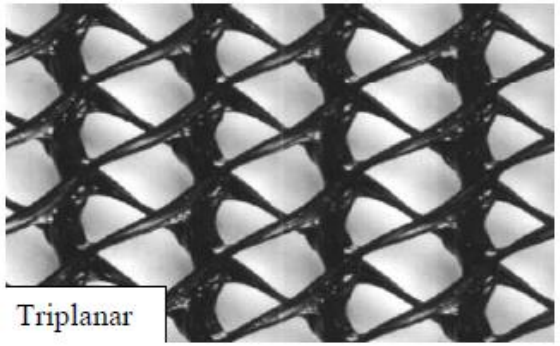
Reduction factor for creep and geotextile intrusion

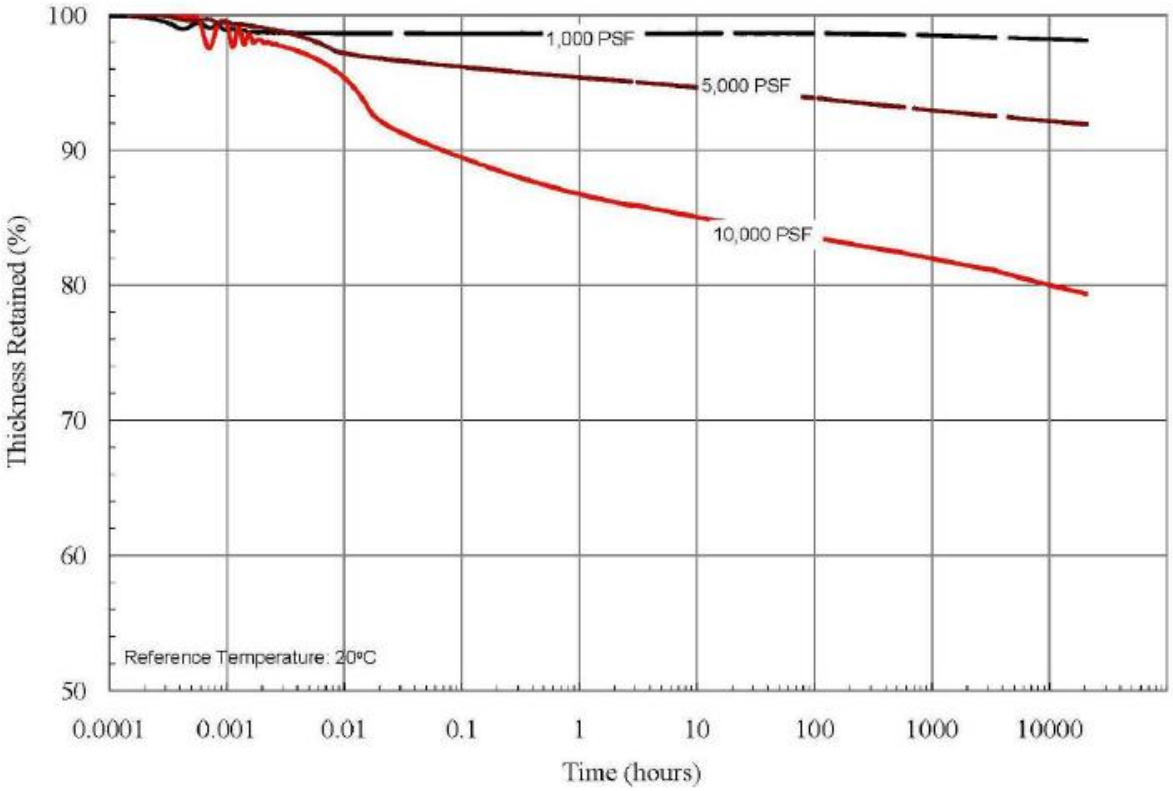
Function of the shape of the drainage core

For geonet drainage core

Reduction of the drainage capacity over time







Creep Curves for a 250 mil geonet

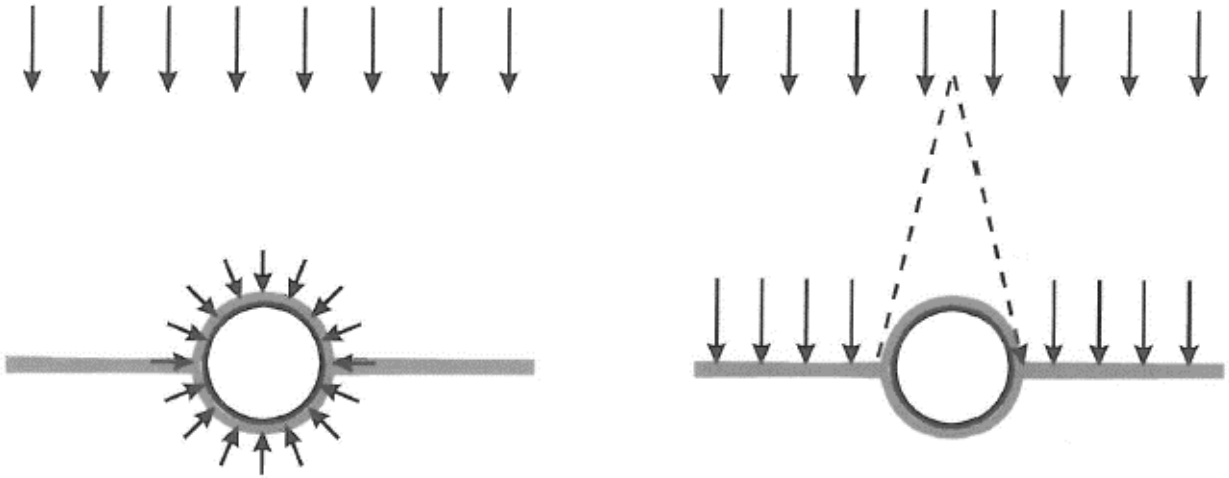
Elements of design

Reduction factor for creep and geotextile intrusion

Function of the shape of the drainage core

For tubular drainage conduits

Arching effect when confined in soil



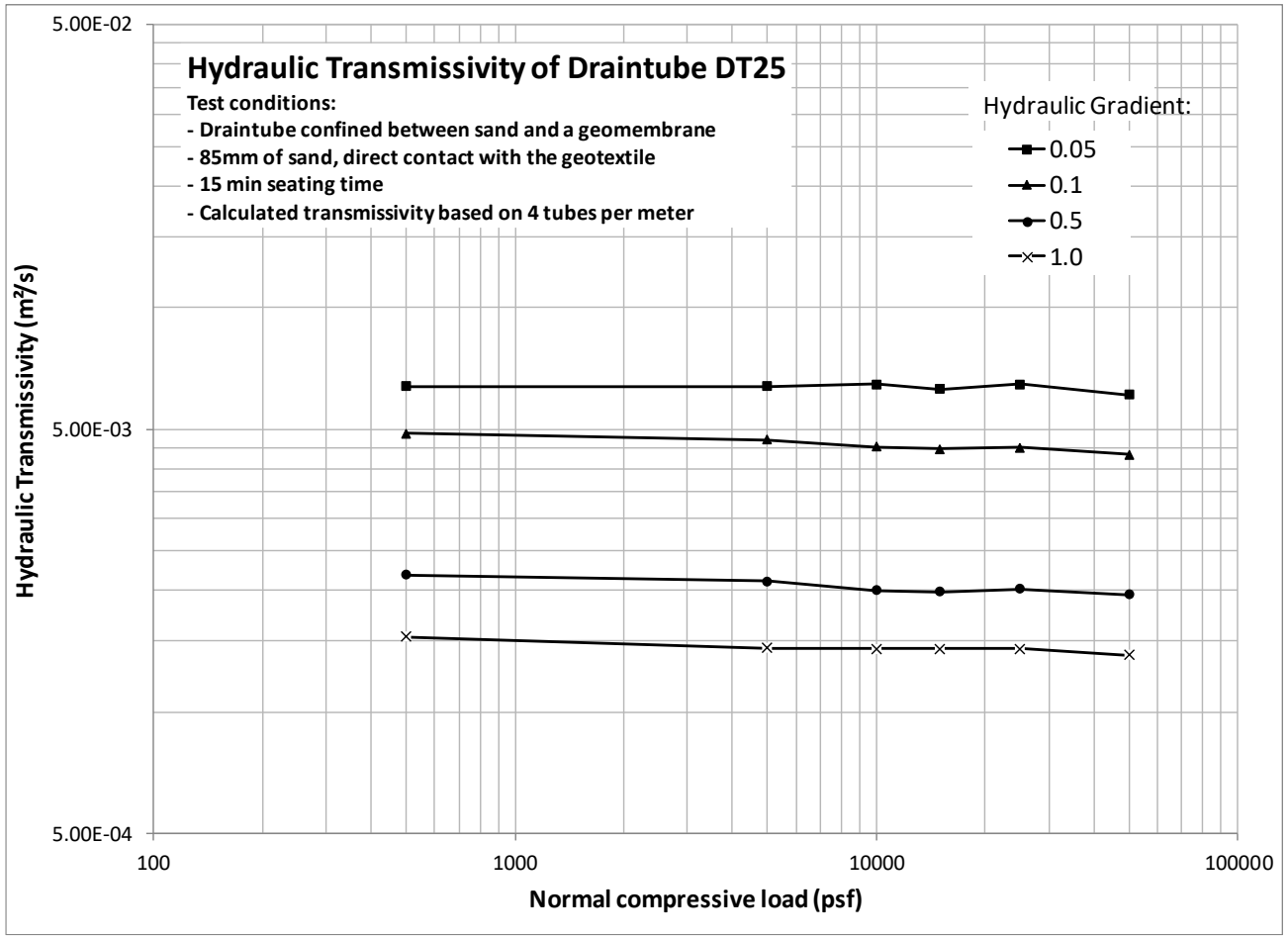
Elements of design

Reduction factor for creep and geotextile intrusion

Function of the shape of the drainage core

For tubular drainage conduits

No change in transmissivity with load



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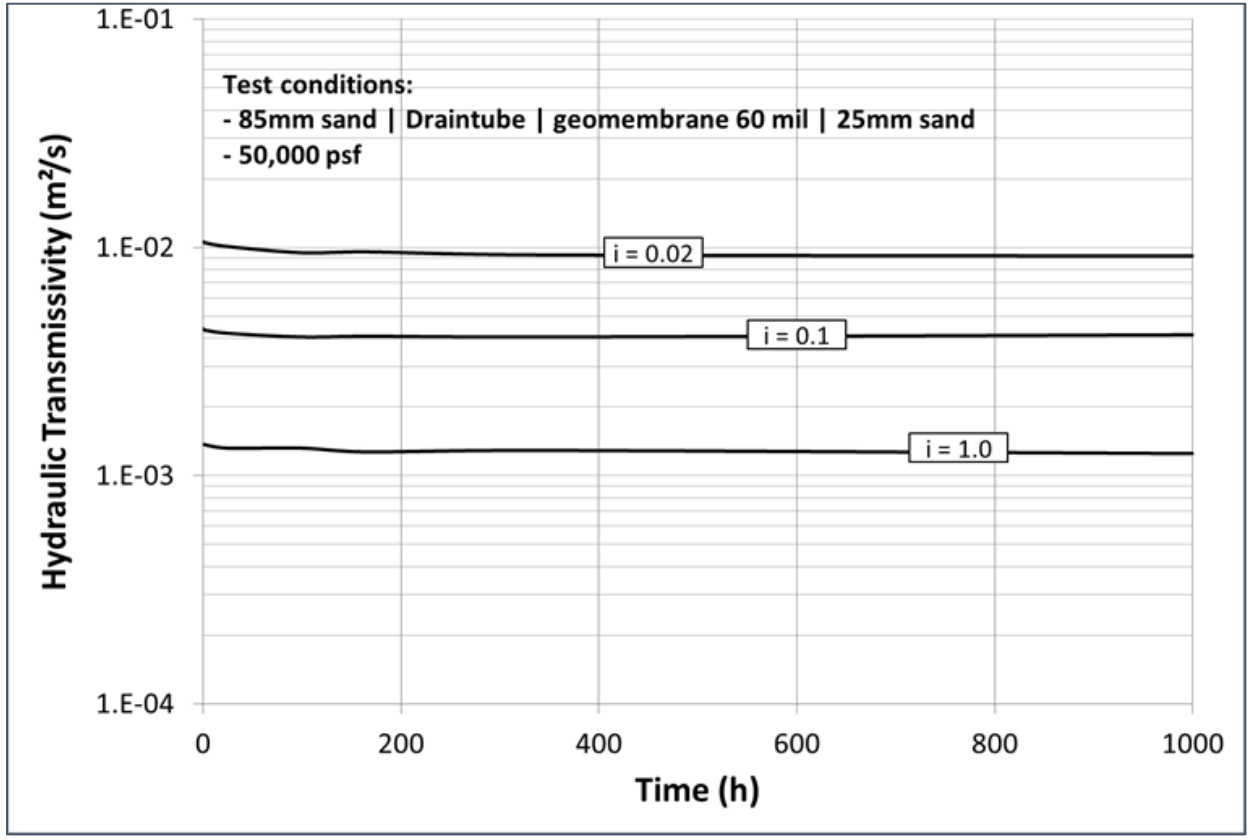

Published related reference

Assessment of the Resistance of Drain Tubes planar drainage geocomposites to high compressive loads
Eric Blond (SAGEOS) and Pascal Saunier (AFITEX-Texel), ***ICG 2010***

Elements of design

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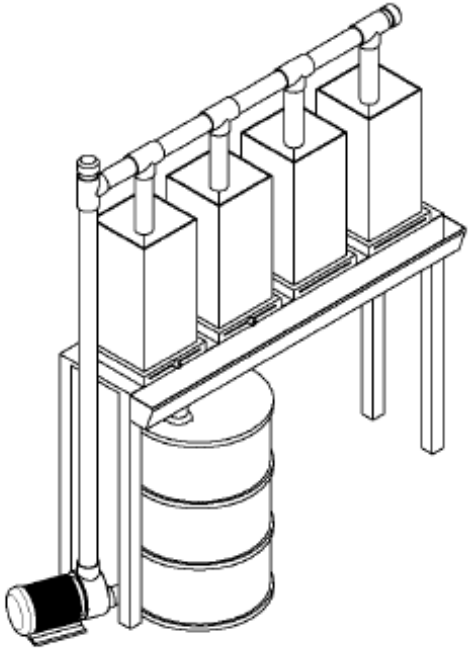
Elements of design

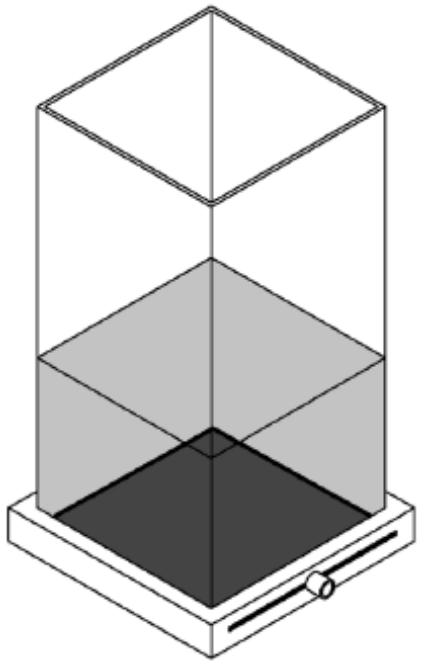
Reduction Factors for Biological and Chemical clogging

3 year test (2013-2016) with Koerner at Fairless Hills Landfill (PA)

Elements of design

Reduction Factors for Biological and Chemical clogging



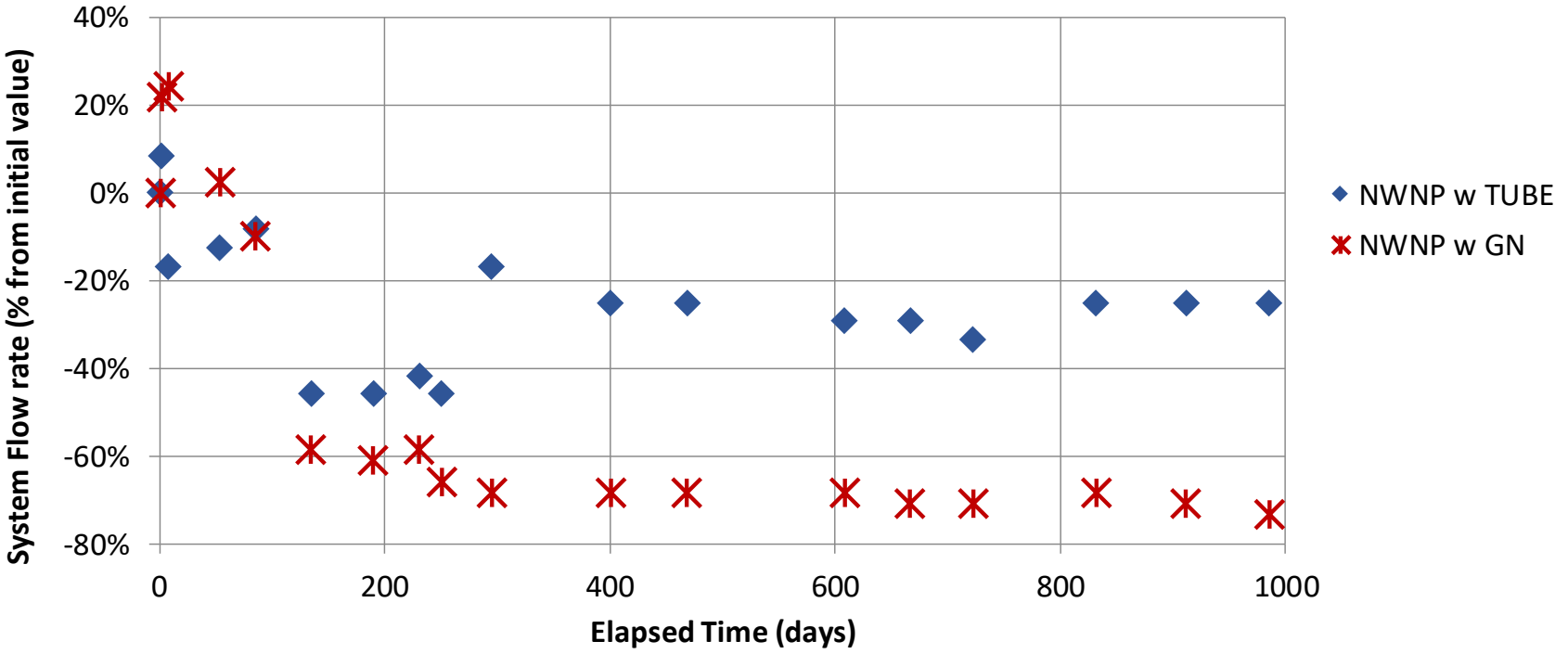


Elements of design

Reduction Factors for Biological and Chemical clogging

Tubular geocomposite: **NWNP w TUBE**

Single sided biaxial geonet: **NWNP w GN**



Elements of design

"it is important to note that the needle punched nonwoven geotextile performed the best when placed over the tubular drainage composite*. It is well designed with respect to the concrete sand's gradation to avoid piping and is open enough to resist long term clogging. This is demonstrated by its ability to remain free flowing with leachate as a permeant for over three years of testing."*

Published related reference

Biological Clogging Resistance of Tubular Drainage Geocomposites in Leachate Collection Layers
E. Blond (SAGEOS), S. Fourmont and P. Saunier (AFITEX-Texel), ***Geosynthetics 2013***

Evaluating Tubular drainage geocomposites for use in Lined Leachate Collection Systems,
E. Steinhauser (Sanborn, Head & Ass.) and S. Fourmont (Afitex-Texel), ***Geo-Environmental Engineering 2015***

Determining the Long-Term Transmissivity of Selected Drainage Geocomposites to Landfill Leachate, *G. Koerner (Geosynthetic Institute) and S. Fourmont (Afitex-Texel),* ***Geo-Frontiers 2017***

Elements of design

Long term drainage capacity (using GRI GC8, GSI White paper #4, ASTM D7931)

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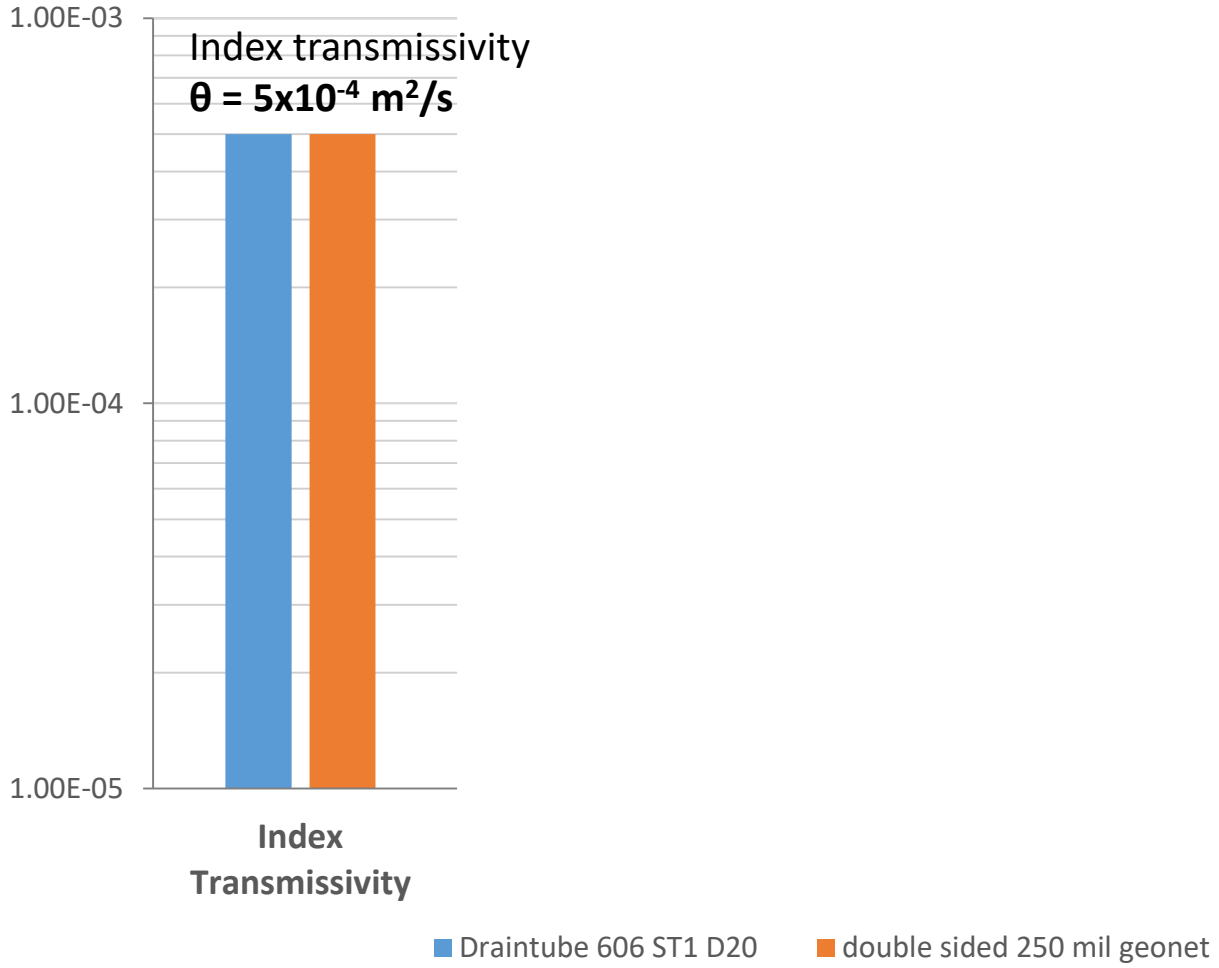

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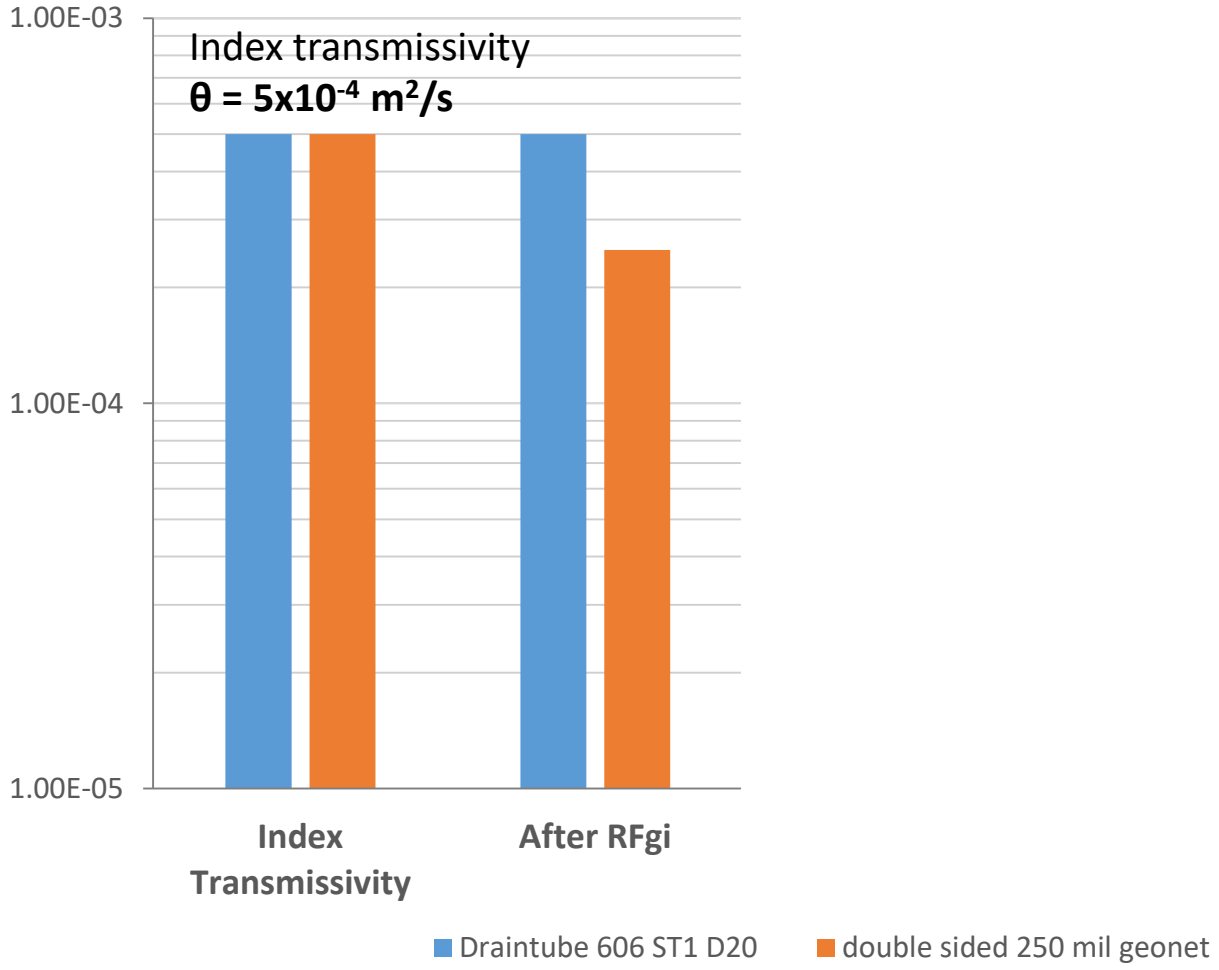

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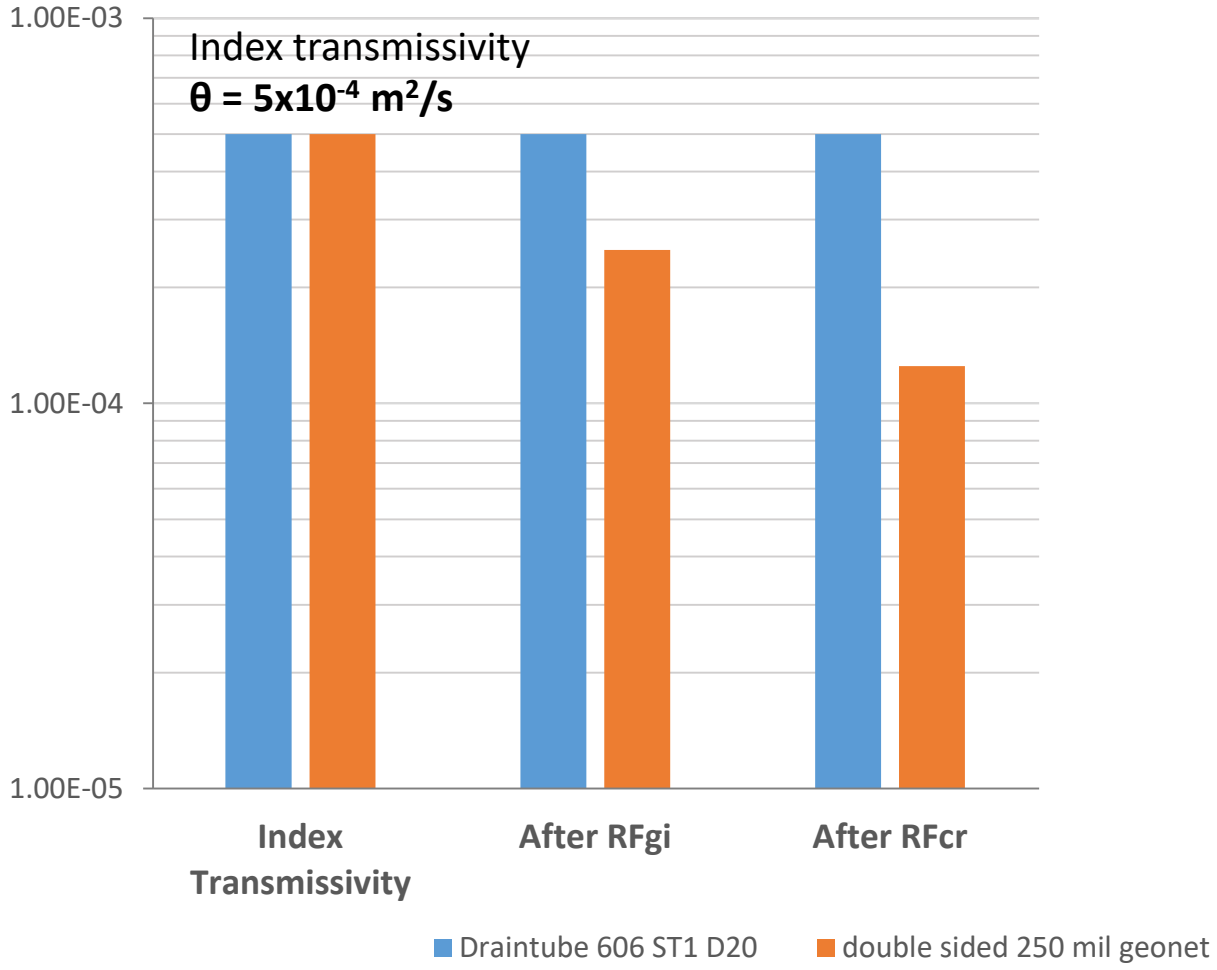

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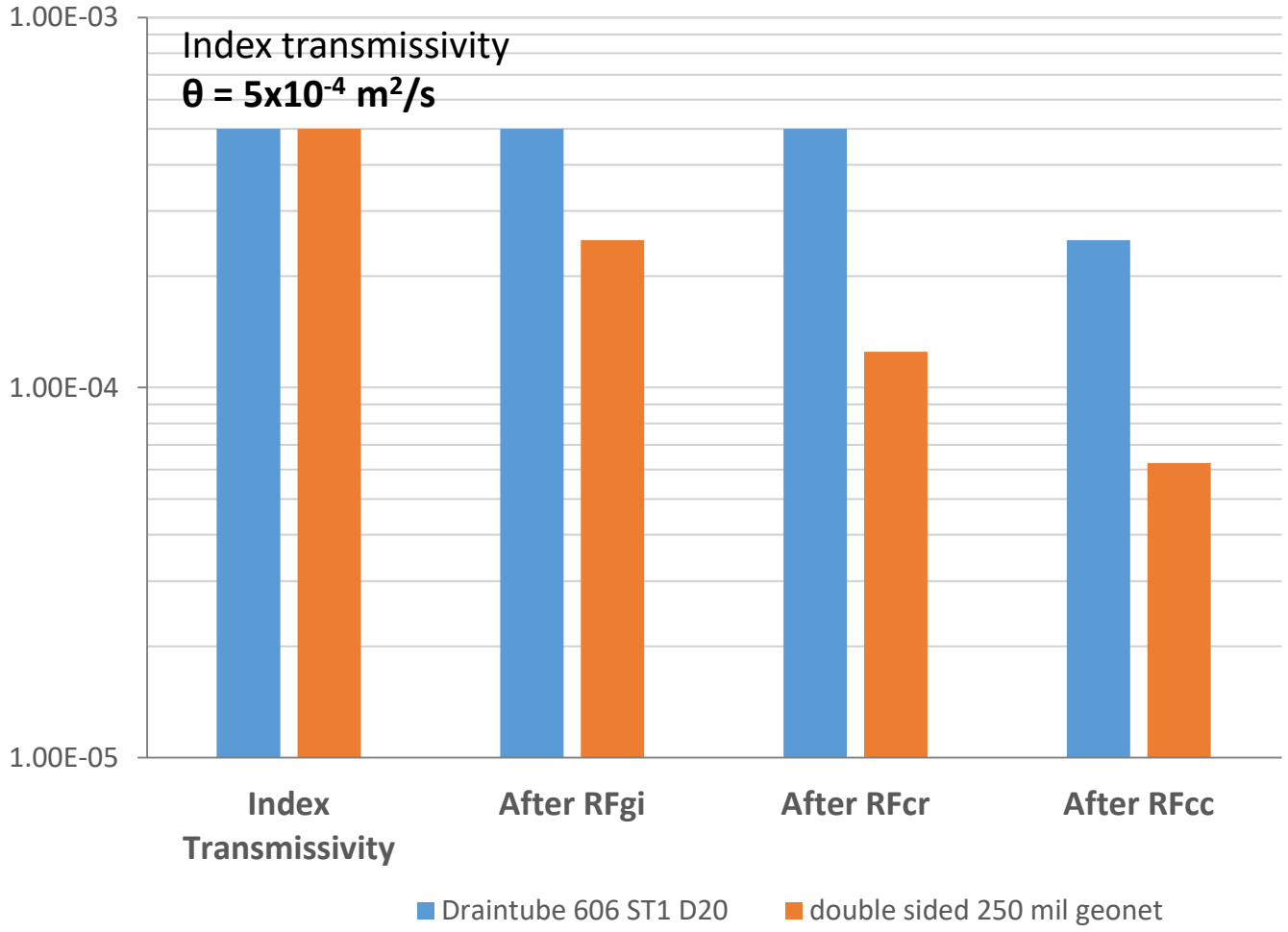

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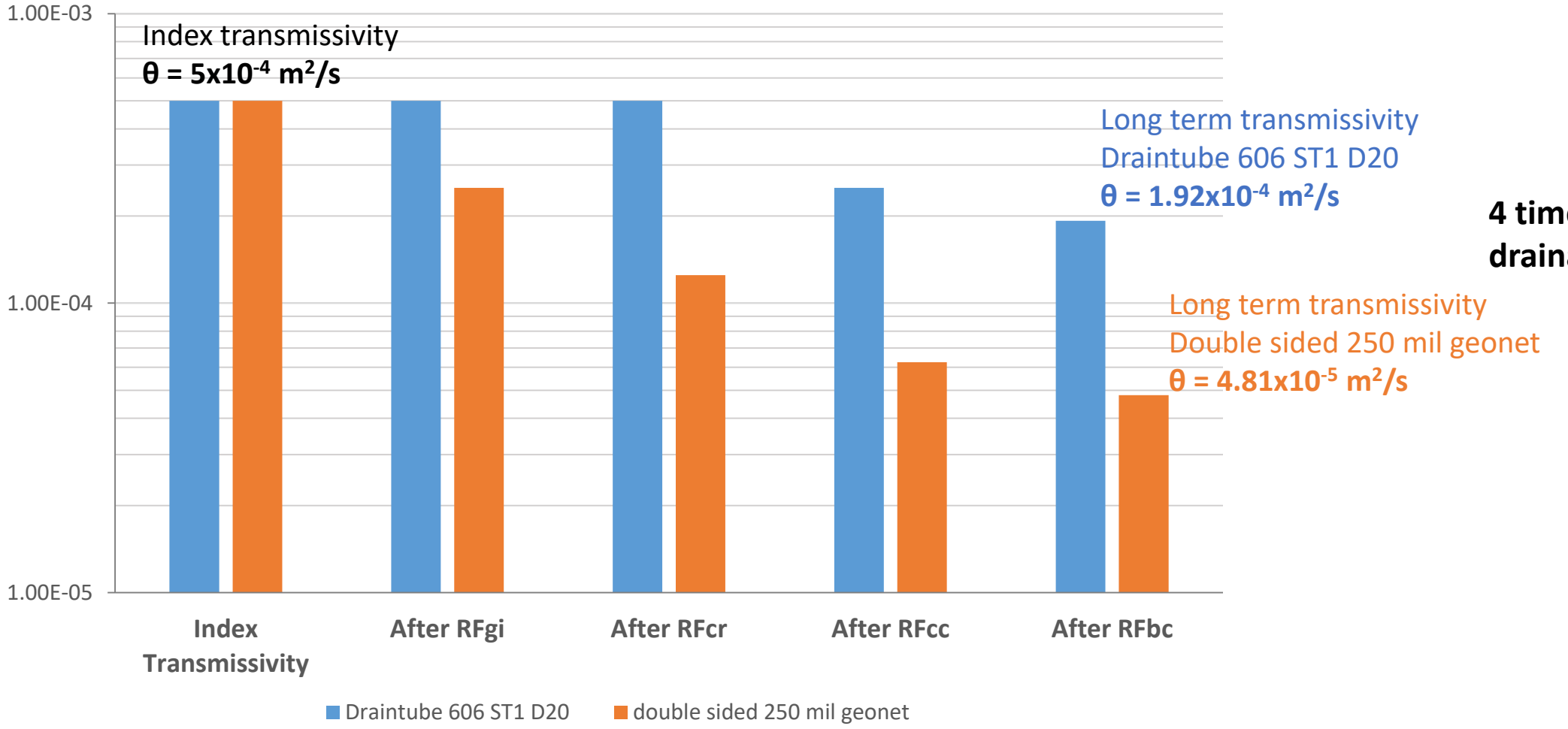
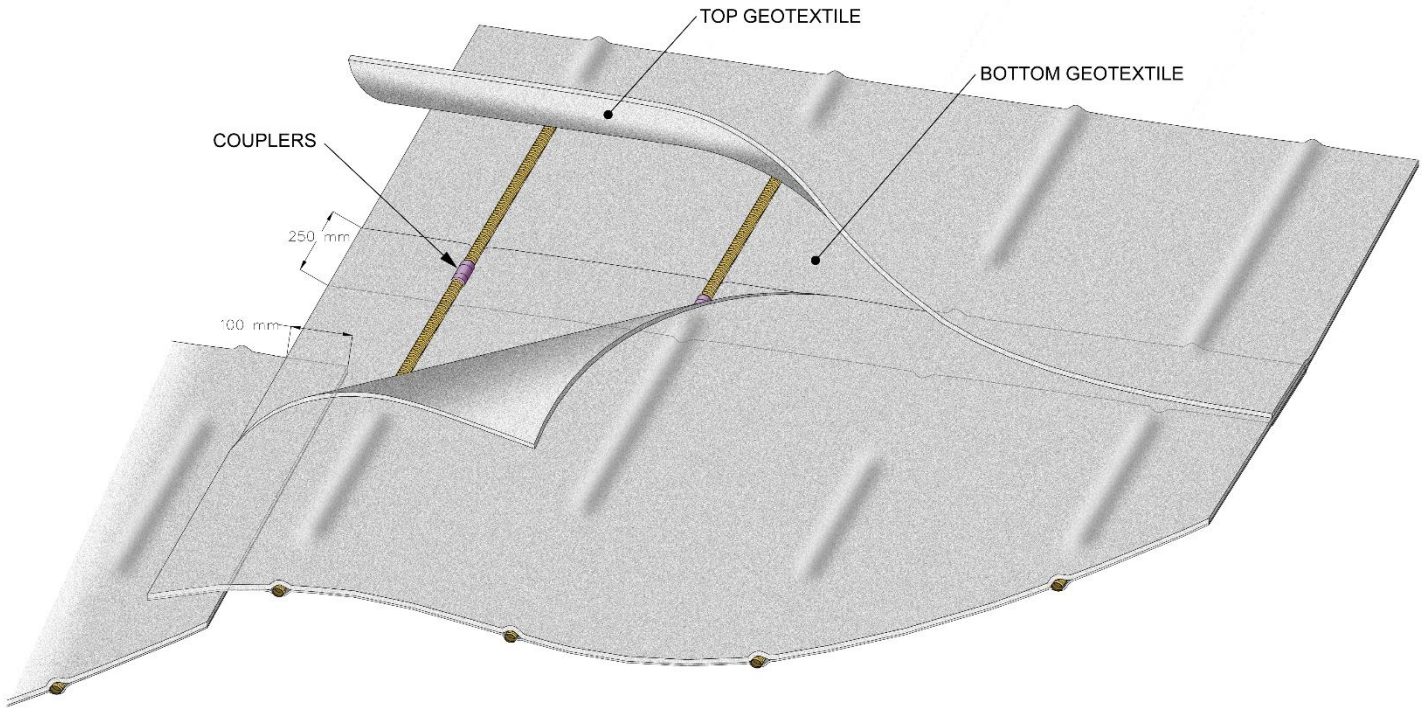


4 times higher long-term drainage capacity

Installation

Installation

Specific points on installation



Specific points on installation

Installation

Conclusion

Multi-linear drainage geocomposite

- Available on the market for 30 years
- GRI and ASTM standards
- Solid technical background
- Stable long term drainage capacity

"The Mesa County Solid Waste Management team has been very impressed with both the DrainTube product and their representatives. Working with Afitex-Texel truly has been a pleasure."

Jennifer Richardson *- Solid Waste Operations Manager*
Mesa County Landfill

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Thank you for your attention