TG3 Working Group

The use of Geosynthetics in Road Pavements

Arno Hefer

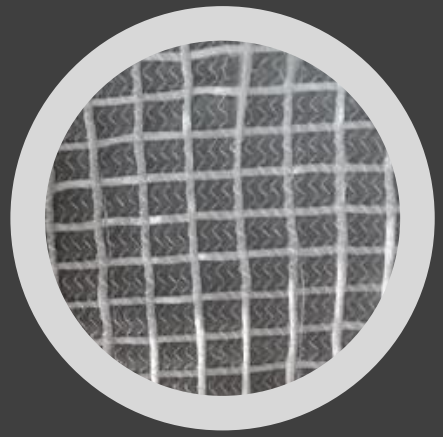
RPF November 2018

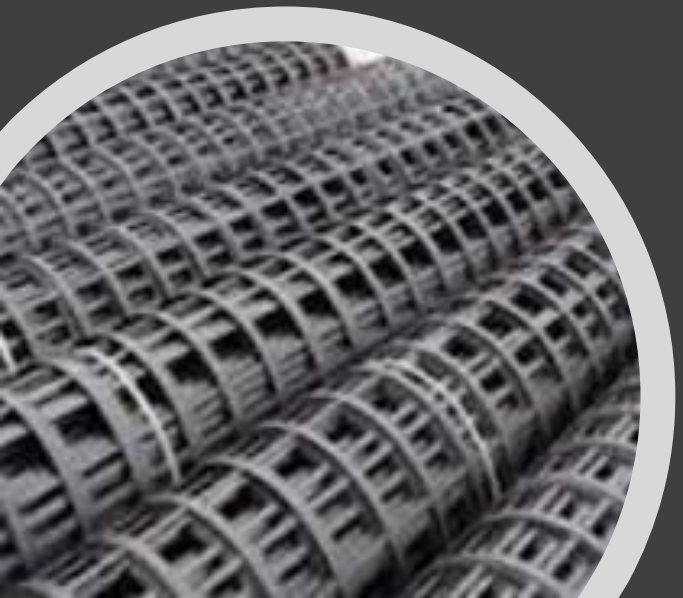





Summary of Objectives

- Update TG3 (Asphalt Academy, 2008) – Asphalt Reinforcement for Road Construction
- Expand to all pavement components
- Compile best practice guideline; international and regional experience





Work Packages

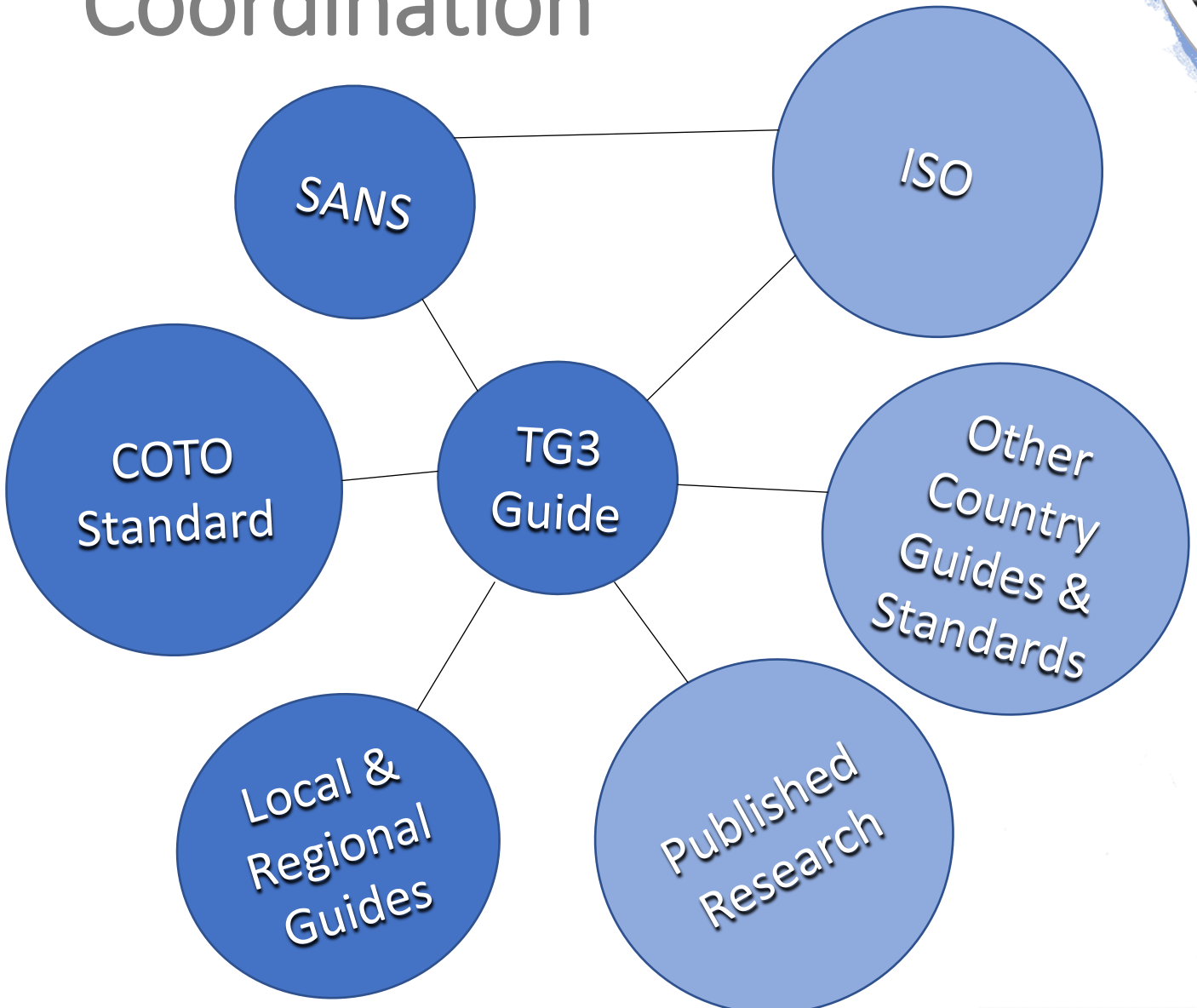
- WP1:
  Introduction (Philip Joubert)
- WP2:
  Design (Arno Hefer)
- WP3:
  Product Type, Selection & Specification (Colin Gewanlal)
- WP4:
  Construction & Quality Control (Christian Mulol)

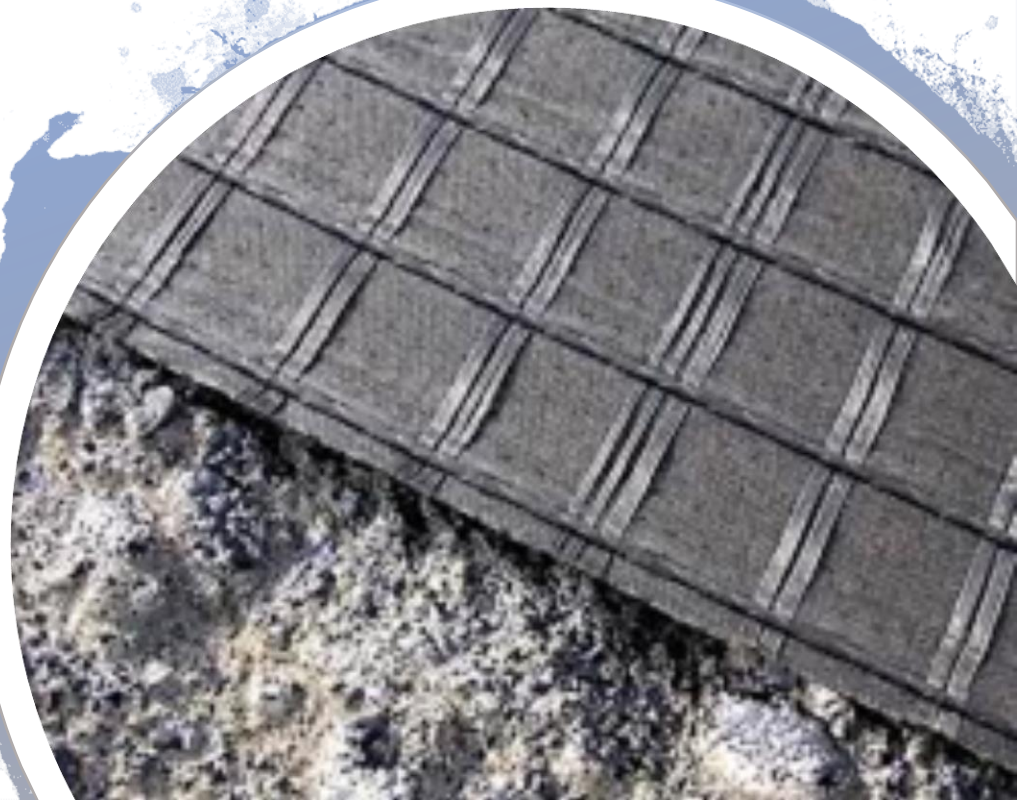
TG 3 Guideline Document

Project Timeline - High Level

	Description/ Details	2018						2019											
		July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
1	**WP1 Introduction**																		
	Background																		
	How to use TG3																		
	Technical considerations																		
	Life Cycle Considerations																		
2	**WP2 Design**																		
	Introduction																		
	Design phylosophy																		
	Dessign process																		
	Categorsation and selection of design methods																		
	Structural design																		
	Empirrical knowledge base methods																		
	Generalised empirical methods																		
	Mechanistic-based methods																		
3	**WP3 Product Type, Selection, & Specifications**																		
	Introduction																		
	Asphalt reinforcing and paving fabrics																		
	Geogrids																		
	Steelmesh																		
	Geocells																		
	Compsites																		
	Summary																		
	Specifications																		
4	**WP4 Construction and Quality Control**																		
	Construction																		
	Asphalt reinforcing and paving fabrics																		
	Geogrids																		
	Steelmesh																		
	Geocells																		
	Compsites																		
	Quality control																		
5	**WP5 Implementation**																		

Resources, Inputs & Coordination





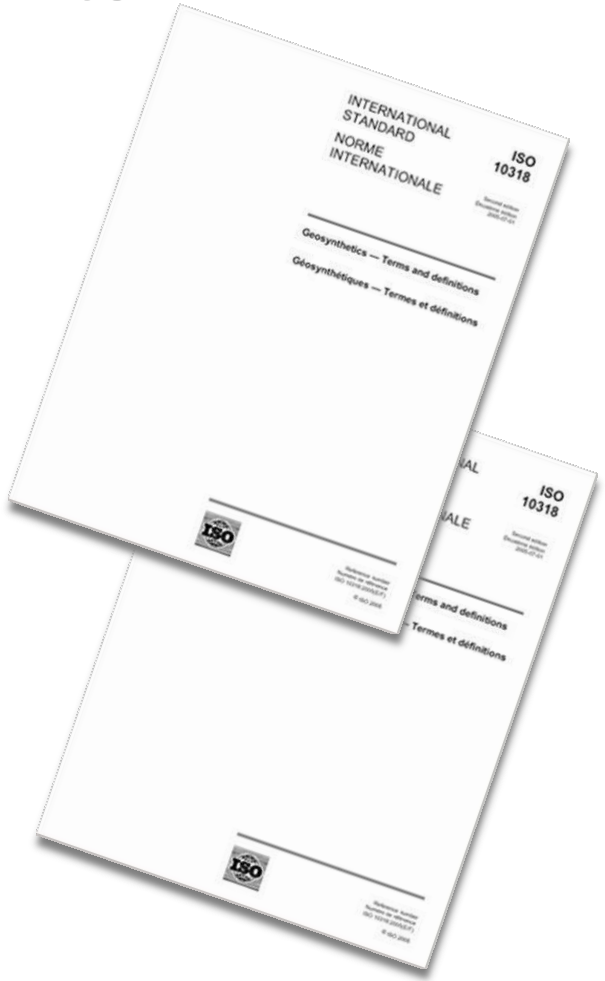
Global Development & Status

- Technology matured
- Now commonly accepted
- Typically 3 - 5% of total project cost
- Savings of 30% in total project cost
- Risk up +100% of total project cost
- Adequate standards for geosynthetics lacking or non-existent
- ISO/TC 221: Suite of standards – major functions and applications
  (Ref. ISO/TC 221 N408)

Relevant ISO Standard Developments

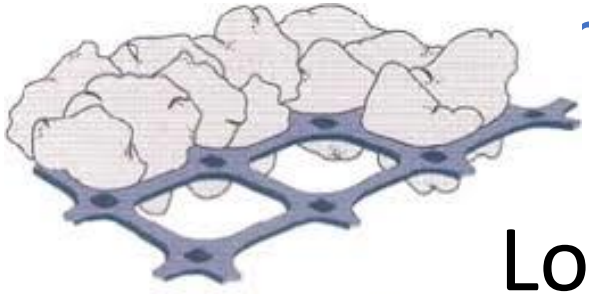
- Asphalt layers: ISO TC 221/ WG6/ PG10 Design Using Geosynthetics: Part 10 – Asphalt overlays (Working Draft stage)

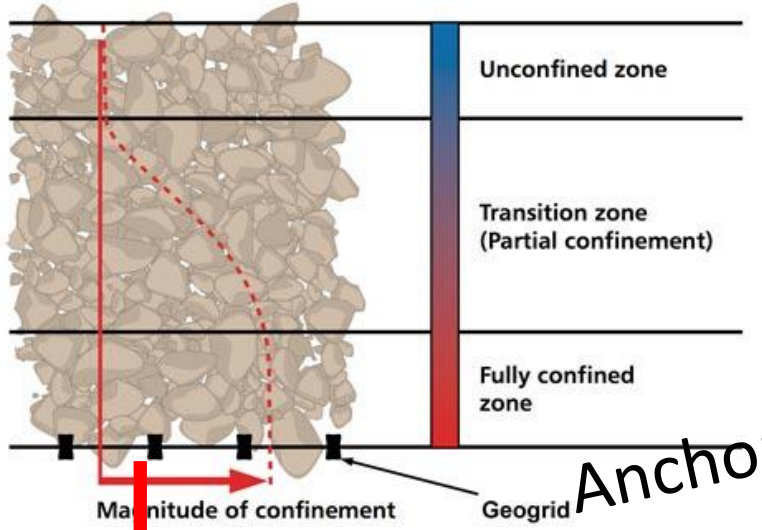
- Granular layers: ISO TC 221/ WG6/ PG05 Design Using Geosynthetics: Part 05 – Stabilisation (Working Draft stage)



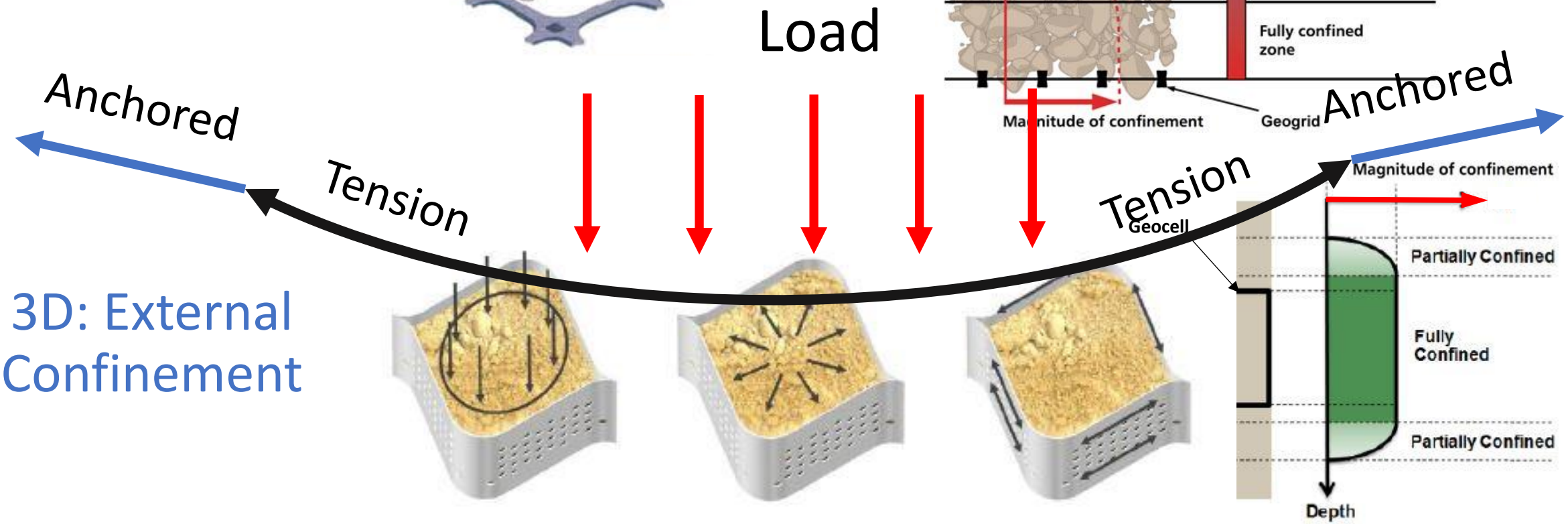
Mechanisms: Granular Layers

2D: Internal Confinement





3D: External Confinement

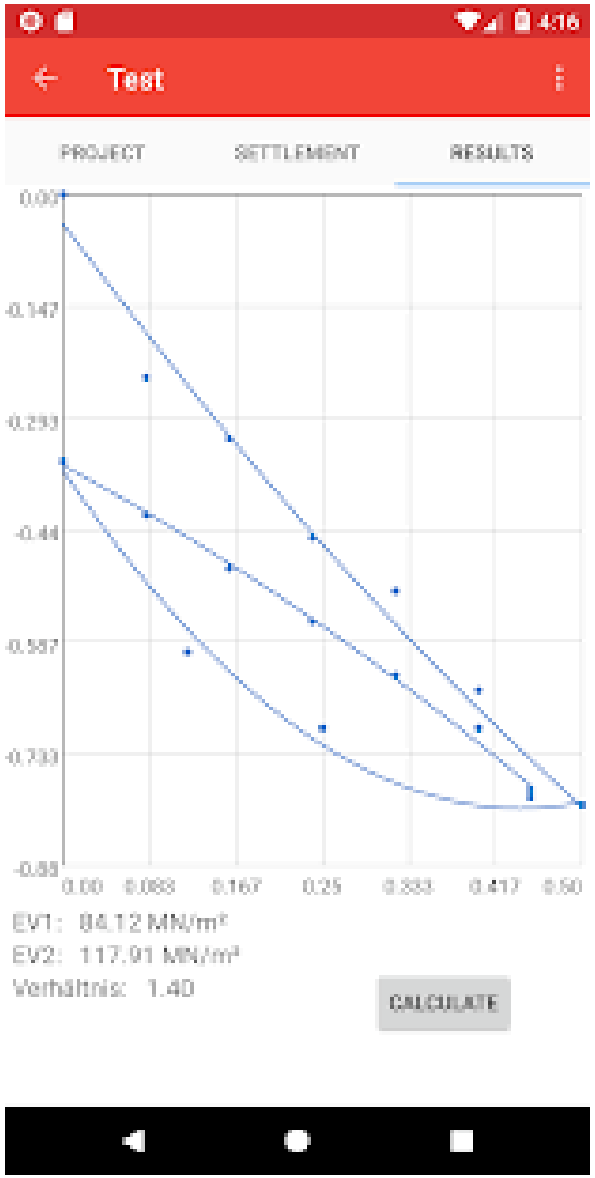


Evidence of Benefits - Design?

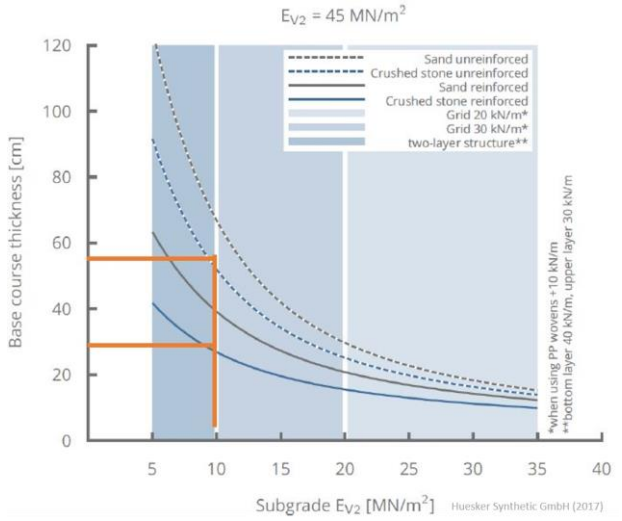
- “As yet it is impossible to include a generic product characteristic in any of these methods to represent the stabilising effect..”
- “.. they are limited to the use of a certain product…”

Visit to Germany

- Dr Arash Lavasan – Ruhr-Universität Bochum
- European approach to Design – Asphalt, base, subbase, subgrade reinforcement
- Standards: German, Swiss, Dutch
- FEM?

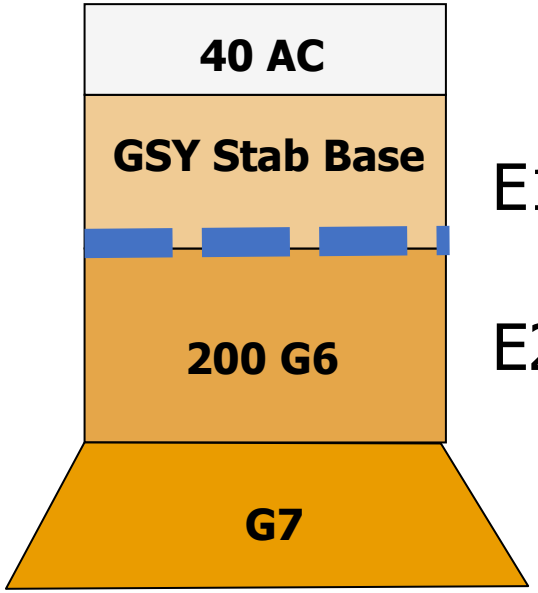


E_{v2}-value [MPa] on the surface of the UGL		≥ 80	≥ 100	≥ 120	≥ 150	≥ 100	≥ 120	≥ 150
		⇧				⇧		
Type of UGL	Crushed rock base course [cm]	15*	15*	25	35**	–	20	25
	Gravel base course [cm]	15*	15*	30	50**	–	25	35
	Frost blanket course [cm] made of predominantly crushed material	15*	20	30	X	15*	25	X
	Frost blanket course [cm] made of predominantly uncrushed material	20	25	35	X	–	–	X
		⇧				⇧		
E_{V2}-value [MPa] for base		45				80		
Base		Formation						



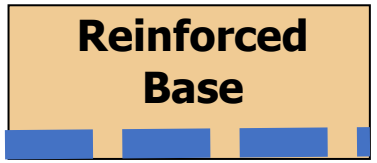
Dutch Standard (2018)

Support Improvement Factor (SIF)



$$\frac{E1 = 600}{E2 = 150} = 4$$

Modulus Improvement Factor (MIF)



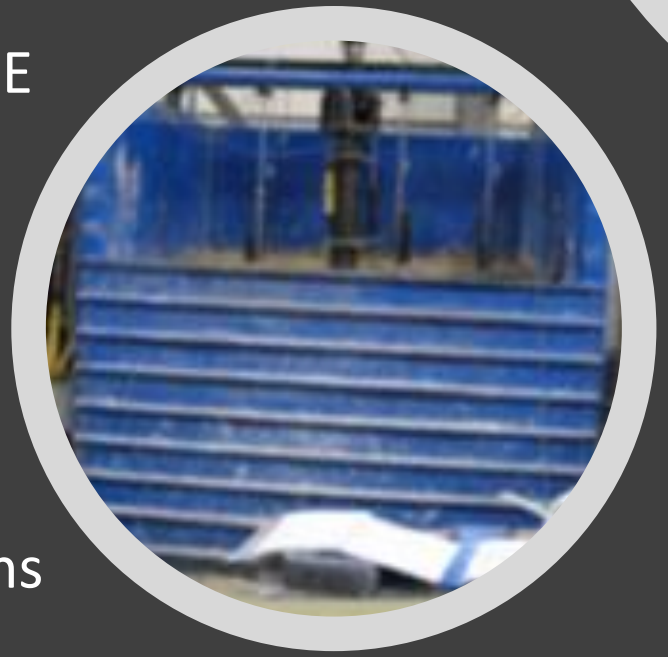
vs

$$\frac{E_r = 300}{E_{ur} = 100} = 3$$

Ideal Test Method

- Ability to capture mechanism of confinement
- Provide parameter(s) suitable for M-E design
- Provide good repeatability
- Parameters that distinguish performance of different geosynthetics
- Sensitivity under low strain conditions
- Easy to do

(Ref. Zornberg, 2011)



(Ref. PRS-Med, 2016

General

- Adequate progress in past decade to address design methods in more detail
- Identify/ recommend suitable test methods to characterise reinforced/ composite layer
- Provide parameters suitable for M-E design?
- Representative case studies to validate performance/ design methods

Request

- Want to join us, or make contributions or suggestions?
- Projects using GS in pavements?

Please contact Philip Joubert (WG Coordinator)

philip.joubert@rhdhv.com