Statens vegvesen
Norwegian Public Roads Administration

Status and perspectives of the use of geosynthetics in Norway

Aina Anthi

NPRA
President IGS Norwegian Chapter

Statens vegvesen
Norwegian Public Roads Administration

Status

- Project examples
- Pavement technology
- NorGeoSpec
- IGS Norway

Statens vegvesen
Norwegian Public Roads Administration

Status

Geosynthetics used by NPRA

Foto: www.ahlsell.no

Foto: www.geosyntia.no

Foto: www.vegvesen.no

Foto: www.geosyntia.no

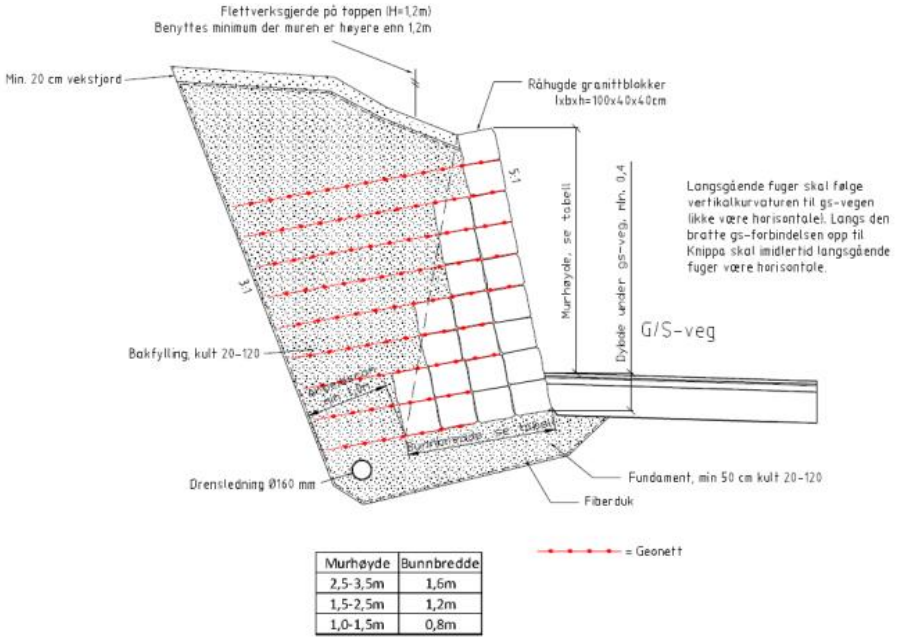
Foto: www.viacon.no

Foto: www.ostlendingen.no

Statens vegvesen
Norwegian Public Roads Administration

Project example: Retaining wall Geogrid

Hedmark, Norway



Murhøyde	Bunnbredde
2,5-3,5m	1,6m
1,5-2,5m	1,2m
1,0-1,5m	0,8m

- Geogrid tested in the laboratory

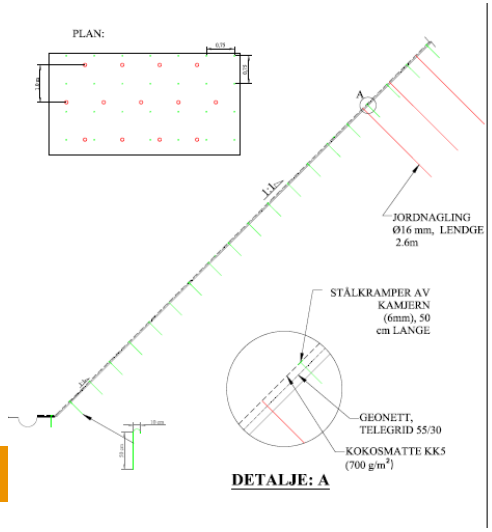
Foto: Vidar Antonsen

Statens vegvesen
Norwegian Public Roads Administration

Project example: Stabilization of a wall

Geogrid, erosion control mats and soil nailing

Øyer, Norway



Project example: Frost isolation
Nonvowen geotextiles + Foamglass

Buskerud, Norway

Statens vegvesen
Norwegian Public Roads Administration

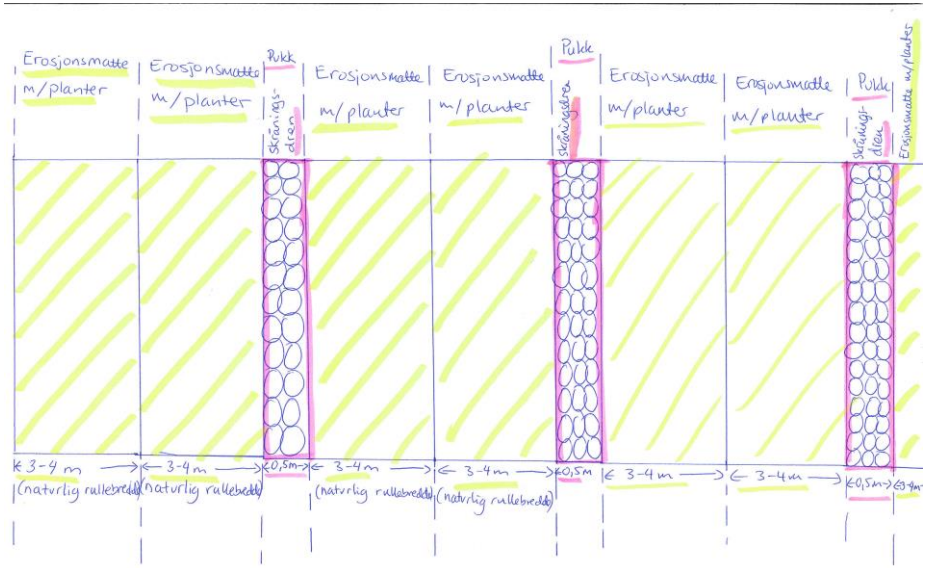
Project example: Erosion Control

Statens vegvesen
Norwegian Public Roads Administration

Status

Erosion Control mats
Gjerdrum, Norway

- Silt/Clay
- 200m*(2-5) m
- 1:2



Trees
Populus tremula – Osp
Salix caprea – Selje
Sorbus aucuparia – Rogn
Alnus incana – Gråor
Betula pubescens og/eller pendula – Bjørk
Acer platanoides – Lønn

Bushes
Salix purpurea 'Nana' – Rødpil
Salix phylicifolia – Grønnvier
Salix cinerea – Gråpil/gråselje
Salix lantana – Ullvier

Statens vegvesen
Norwegian Public Roads Administration

Status

Pavement technology

- NPRA's use of reinforcement in road pavement is small
- Reinforced roads with steel
- Reinforced roads with nonvowen geotextiles and fiberglass mat
- Does reinforcement of road pavement work?

Status

NPRA – NorGeoSpec

Statens vegvesen
Norwegian Public Roads Administration

- Technical Comitee member Tseday Damtew

- Contributes to discussions on geosynthetics for NorgeoSpec products

Status

Quality Control

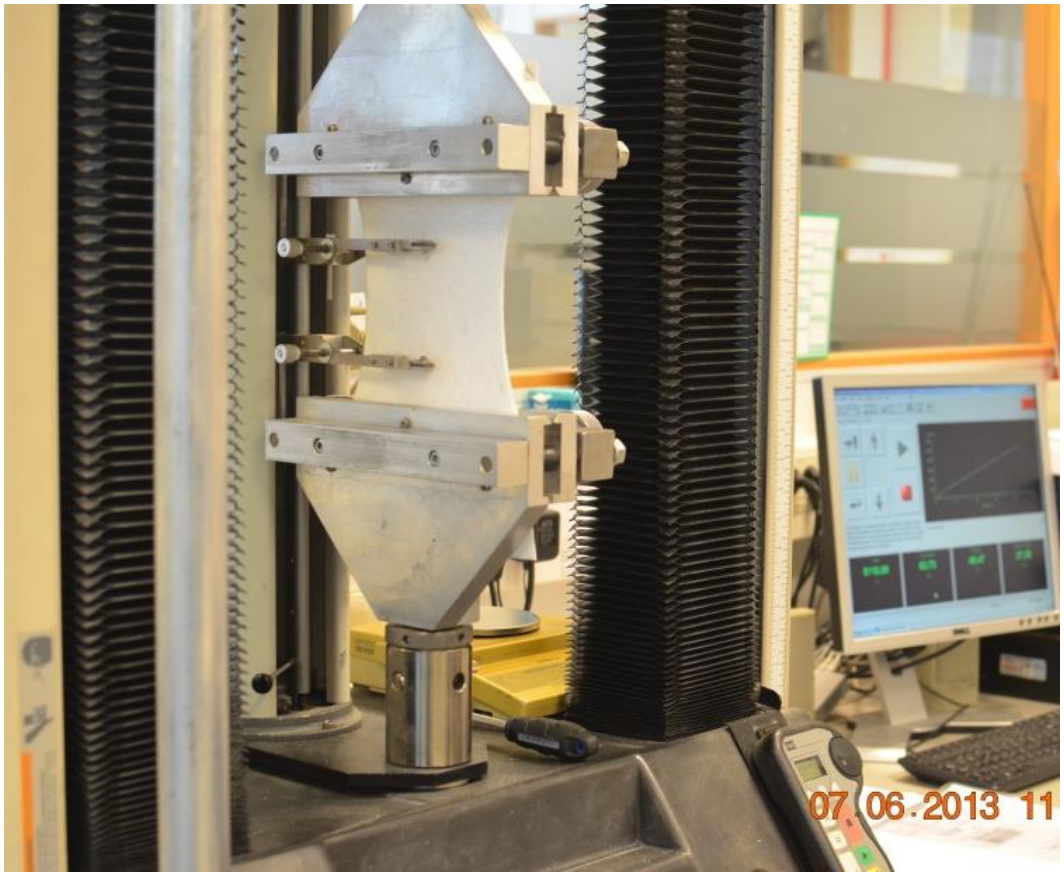
Statens vegvesen
Norwegian Public Roads Administration

- Receives products according to signed contracts
- Contacts the laboratory for quality control in accordance with internal QC system

- Collects samples
- Performs quality check mass/area & tensile strength (EN ISO 9864 & EN ISO 10319)
- Compares values against product class & product certificate
- Reports back to projects

Statens vegvesen
Norwegian Public Roads Administration

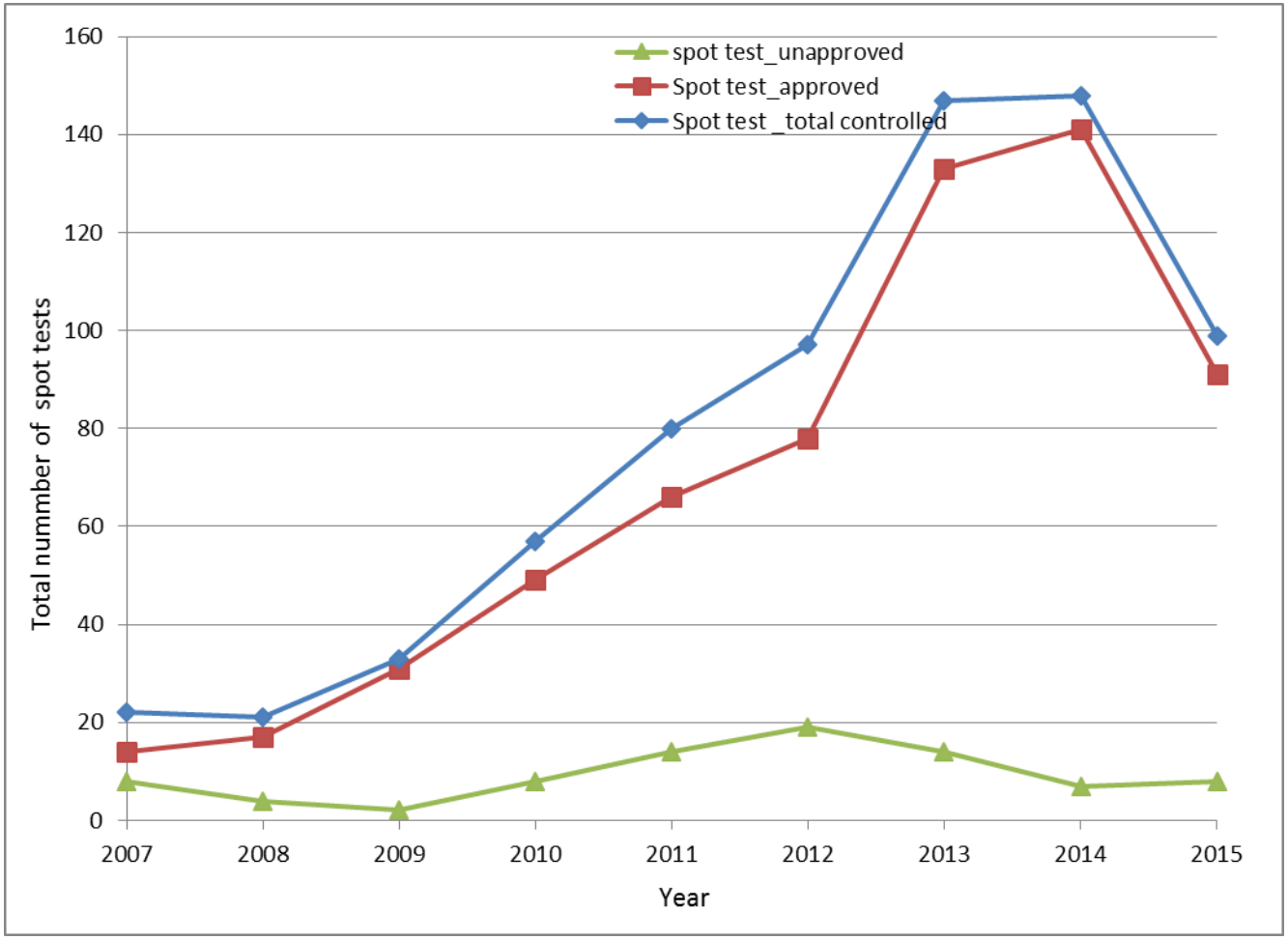
Quality Controll – Nonvowen geotextiles (NorGeoSpec) – Testing



Statens vegvesen
Norwegian Public Roads Administration

Status

Quality Controll – NorGeoSpec – Nonvowen geotextiles



Status

Statens vegvesen
Norwegian Public Roads Administration

Quality Controll – Geogrid – Testing

- Revised std – only NorGeoSpec products for reinforcement

Foto: Jan Inge Senneset, Tom Andre Kynbråten

Status

Statens vegvesen
Norwegian Public Roads Administration

IGS Norwegian Chapter

- 34 members IGS Norway

- Teaching geosynthetics:
  - NMBU
  - HiØ
  - NTNU Gjøvik
  - Internal NPRA courses

- Nordic seminar on use of geosynthetics together with Roads Administration in Sweden and Finland?

- Web site on geosynthetics «Geosyntetguiden»

http://www.igsnorge.no/geosyntetguiden/

Statens vegvesen
Norwegian Public Roads Administration

Perspectives

- Project example without geotextiles
- Environmental benefits
- Descriptions on geotextiles used in road projects
- New use of geotextiles
- Pavement technology

Statens vegvesen
Norwegian Public Roads Administration

Perspectives

What can happen if you don't use geotextiles? – Save money??

- Peat, clay
- 2m crushed stone
- No nonvowen geotextiles for separation
- No geogrid for reinforcement of ground

Foto: Jan Vaslestad

Statens vegvesen
Norwegian Public Roads Administration

Perspectives

Environmental benefits

- Paper presented ICG Berlin 2015, H. Wallbaum:

«Environmental benefits by using construction methods with geosynthetics»

- A geosynthetic reinforced wall causes lower environmental impacts compared to a reinforced concrete wall

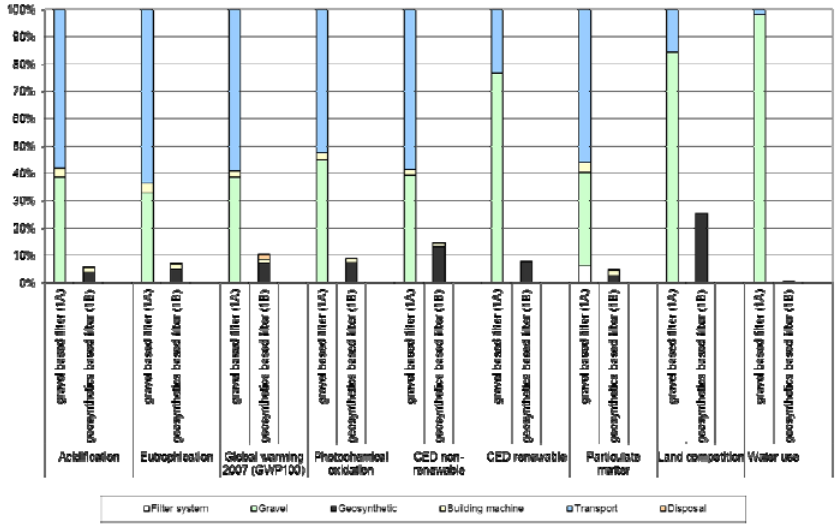


Figure 6. Scheme of retaining walls: the concrete reinforced wall (case 4A, left) versus the geosynthetics reinforced v
4B, right).

Environmental benefits by using construction methods with geosynthetics

H. Wallbaum
Chalmers University of Technology, Gothenburg, Sweden
Sybille Büsser, René Itten, Rolf Frischknecht
treeze Ltd., Uster, Switzerland

ABSTRACT: Geosynthetic materials are used in many different applications in the civil and underground engineering. In most cases, the use of geosynthetic material replaces the use of other materials. On behalf of the European Association for Geosynthetic Manufacturers (EAGM) the authors quantified the environmental performance of commonly applied construction materials (such as concrete, cement, lime or gravel) versus geosynthetics. To this end a set of comparative life cycle assessment studies are carried out, according to the ISO 14040 and 14044 standards, concentrating on various application cases, namely filtration, foundation stabilised road, landfill construction and slope retention. The environmental performance of geosynthetics is compared to the performance of competing construction materials used. The environmental impacts of the full life cycle of the four cases show overall the following results:

- A filter using a geosynthetic layer causes lower impacts compared to a conventional gravel based filter layer with regard to all impact category indicators investigated.
- A conventional road causes higher impacts compared to a road reinforced with geosynthetics with regard to all impact category indicators.
- A geosynthetic drainage layer causes lower environmental impacts compared to a gravel based drainage layer in all impact categories considered except land competition which is about the same in both cases.
- A geosynthetic reinforced wall causes lower environmental impacts compared to a reinforced concrete wall in all impact categories considered.

Keywords: Geosynthetic materials, LCA, ISO 14040/14044, environmental impacts, Global Warming Potential, GWP, Cumulative Energy Demand, CED, filter, road, drainage, reinforced wall

Statens vegvesen
Norwegian Public Roads Administration

Perspectives

Description of geosynthetics in road projects by consultans and internal NPRA people

- Bad descriptions
- Low interest and knowledge of geotextiles
- Product specific descriptions
- Why???
- What to do?

Statens vegvesen
Norwegian Public Roads Administration

Perspectives

Geosynthetic reinforced soil (GRS) abutment for bridge support

Foto: www.deseretnews.com

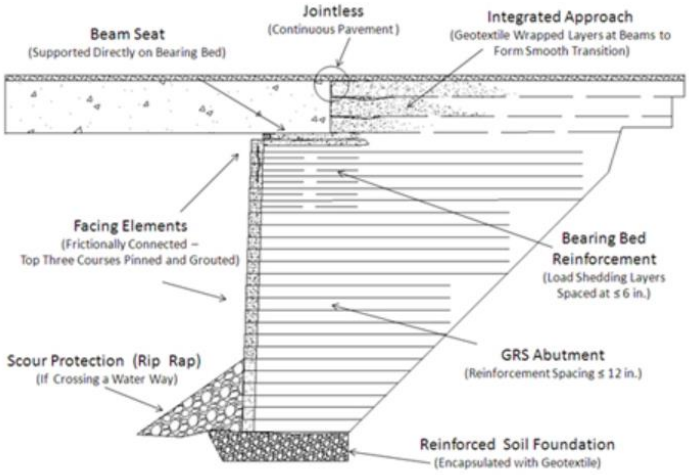


Figure 1. Illustration. Typical GRS-IBS cross section.

- New/more use of geosynthetics in NPRA

Foto: www.fhwa.dot.gov

- Cooperation/Study-visit to Utah
  - UDOT
  - University of Utah

Perspectives

Pavement technology

Steel as reinforcement of road pavement after 12-13 year

Statens vegvesen
Norwegian Public Roads Administration

Statens vegvesen
Norwegian Public Roads Administration

Perspectives

Reinforcement of road pavements

- Better/New products?
- Ok for low traffic roads?
- More documentations on long term effects on reinforced road pavement in cold climate?
- More studies?
- Money?
- Other products than geotextiles better for reinforcement of road pavements?

Statens vegvesen
Norwegian Public Roads Administration

Thank you for your attention

Hemsedal 2016