

FORMEC  
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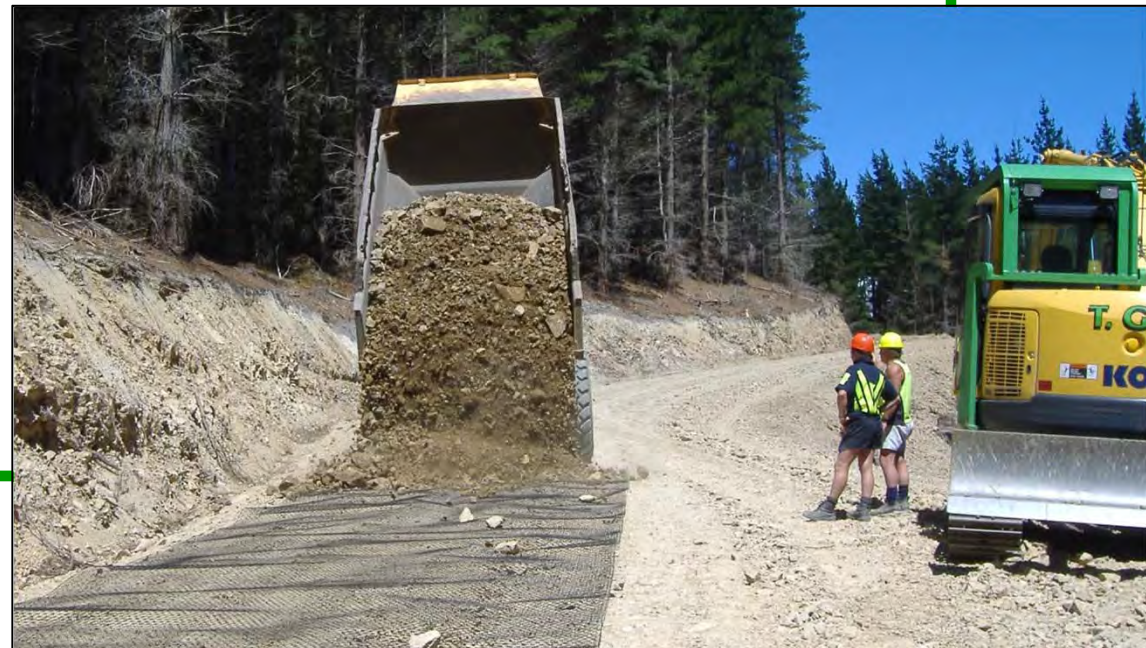
# Installation of Geogrid to Improve Forest Roads Construction



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# NZ Forest Roads

- Many new roads being constructed, esp. in steep terrain
- Design and construction relies mainly on 'experience'
- Extensive use of 'local' aggregate to keep cost down
- Road failure common problem
- Typical solution is...



# NZ Forest Roads

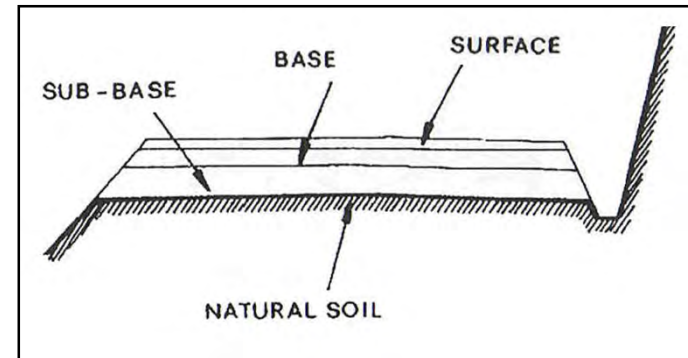
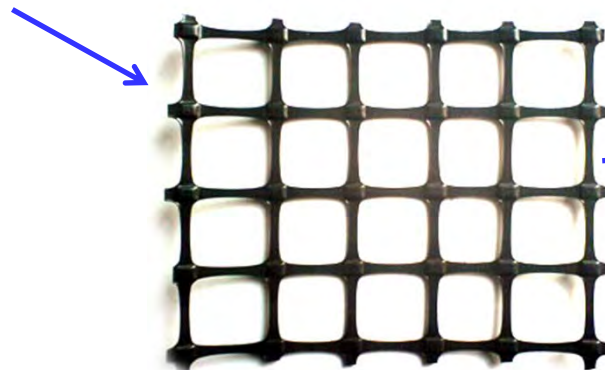
Typical solution is...

- Add more rock / aggregate

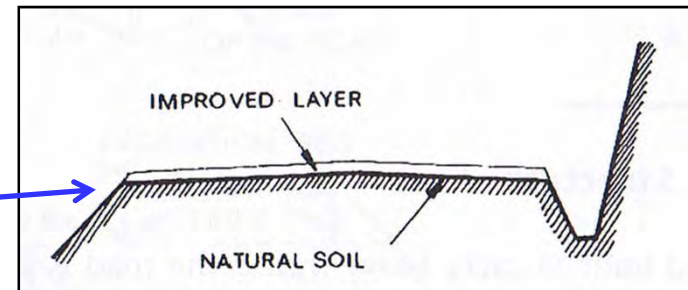


# Design of Forest Road Pavements

- Public 'engineering' road standards  
→ most conservative and expensive
- Forest industry typically uses lowest cost 'fit-for-purpose' option  
→ acceptance of failure
- Use of improvement products, but performance not well understood  
→ i.e. lime, ash, cement, geocloth, Geogrid



*Typical design of a public low-volume road  
(Sessions, 2007)*



*Typical design of a forest road  
(Sessions, 2007)*

# Research Project

- Can Geogrid improve the strength of forest roads?
- Can Geogrid improve the shape integrity of forest roads?
- Is Geogrid cost-effective for reinforcing forest roads?



# Limitations?

- Geogrid is an engineer designed product:
  - Specific aggregate size (40mm) and strength (80 CBR)
  - Reduce depth of material (i.e. from 400 → 200mm)
  - Careful installation...



# Experimental Design

Seven sites



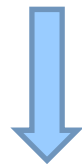
Two repetitions per site



Three 25 metre treatments within each trial



Control



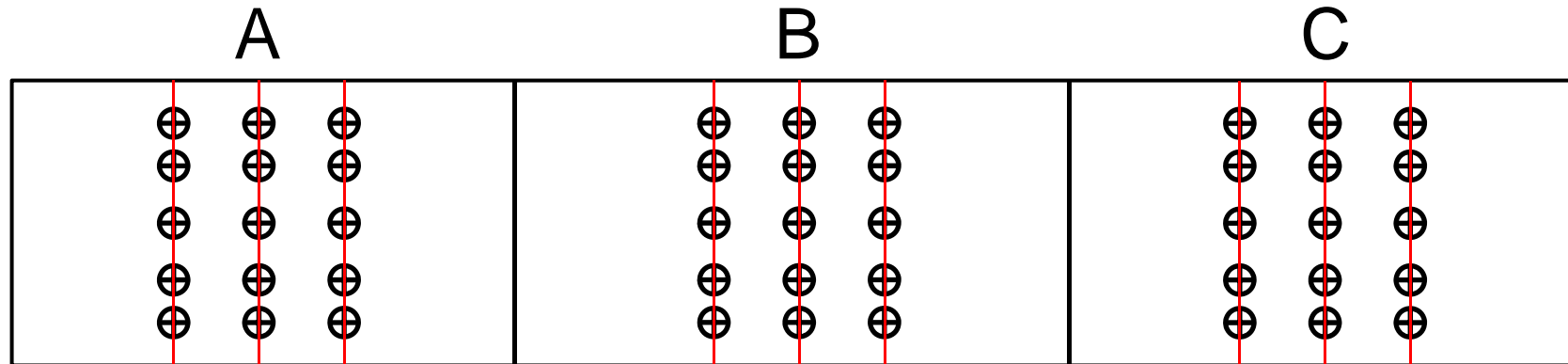
Geogrid +  
Control



Geogrid +  
reduced  
aggregate



# Experiment Measurement



- Subgrade and Aggregate Samples
- Clegg Hammer – subgrade, pre and post-use
- Cross-section pre and post-use





# What is a failed forest road?

- Rutting
- Pot-holes
- Scouring
- Corrugations
- Heaving



# Unsealed Road Classification Index (URCI)

- Quantitative measure of road quality developed by US Army Corps of Engineers
- Measurements of observable road defects are recorded
- A series of graphical charts combine to give the road a final score

URCI	RATING
100	Excellent
85	Very Good
70	Good
55	Fair
40	Poor
25	Very Poor
10	Failed
0	

# The Good News...

- Easy to install... 75 kgs  
75m rolls, 3.8m wide.

- Also road curves are no  
great problem...



# The Bad News...

- Need to modify 'common' forest road construction practice?
  - More consistent subgrade preparation
  - Even spread of aggregate



# Results: Clegg Hammer

- Stat. sig. (but small) strength improvement 'Geogrid' vs 'Control'
  - split-plot design & site variation very high
- No difference between 'Geogrid' vs 'Geogrid + reduced Aggregate'
  - no cost-benefit can be established



# Results: URCI

■ Before



● After



- No significant difference – to be retested after longer use

# Geogrid Conclusion

- Easy to lay down, but difficult to 'install' correctly
- Has shown potential improve forest road strength
- Cost-benefit not established
- Further work required to understand subgrade, aggregate and installation factors → where it will work

