Implications of Electric Roads on Transportation Planning, Roadway Design, Construction, & Maintenance.

Doug Wilson

Director of Transportation Laboratories
Civil & Environmental Engineering,
University of Auckland
New Zealand

Introduction

- Roadway Pavements vary considerably by
  - Country
  - Location
  - Materials
  - Traffic volumes
  - Traffic composition
  - Construction technique
- Determining if there is a point of balance where charging for EV roadways is feasible
- How best to realise benefits (public / private)

Planning for Electric Roadways

THE UNIVERSITY OF AUCKLAND
Te Whare Wananga o Tamaki Makaurau
NEW ZEALAND

ENGINEERING

- Current pavements are comparatively low cost
  - NZ – predominantly Unbound granular materials or thinly bound
  - Flexible and vary in stiffness by depth
- Long term Benefits of Electric Roadway systems are more clear but not to transport sector
- Economics and user convenience will dictate solutions
- Current economic appraisal methods do not value the benefits – new policy is req

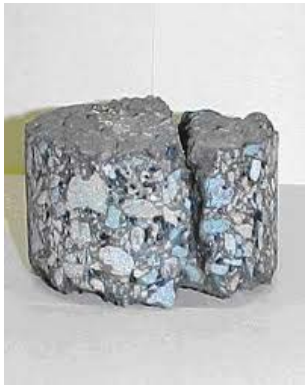
https://www.wirtgen-group.com

http://www.airsupplies.co.uk

NZ Bituminous Surfacings

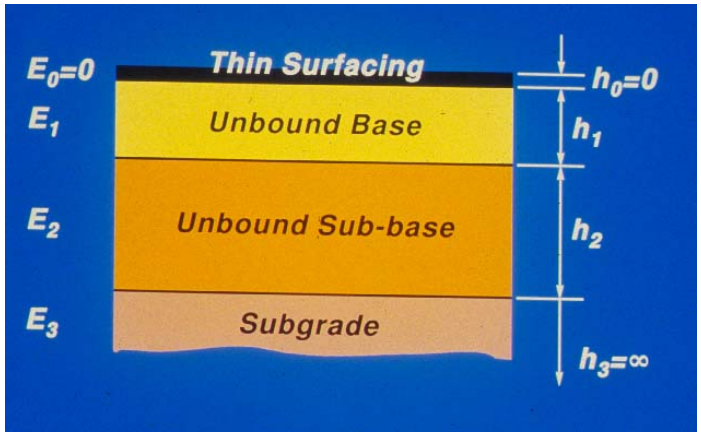
THE UNIVERSITY OF AUCKLAND
Te Whare Wananga o Tamaki Makaurau
NEW ZEALAND

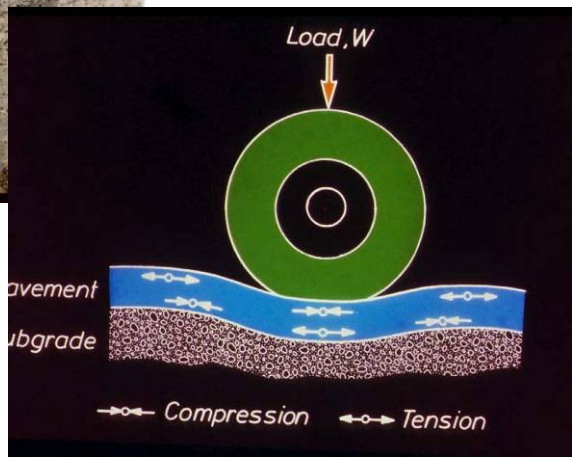
ENGINEERING



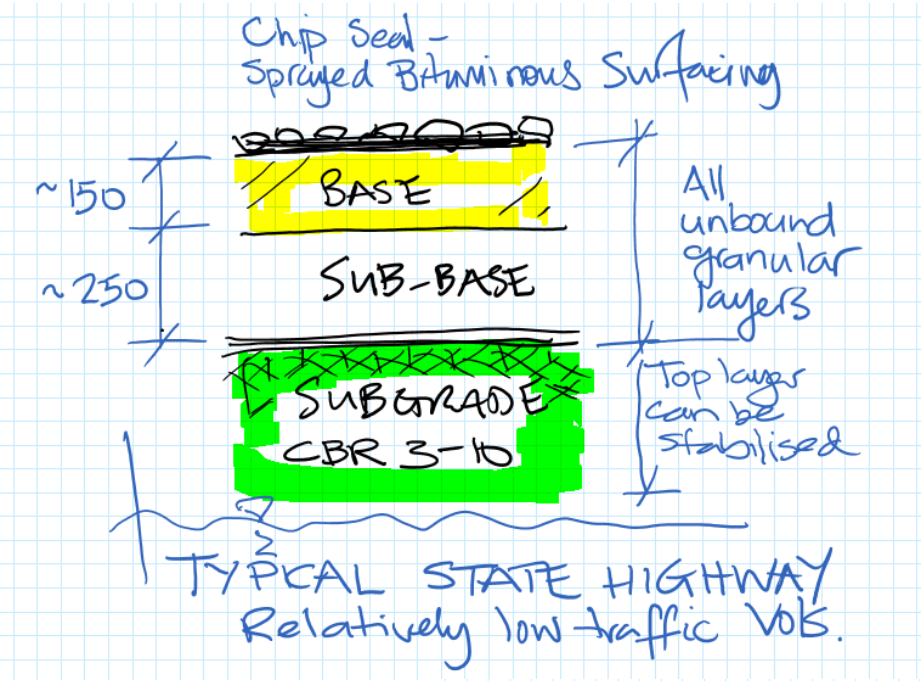
Designing Electric Roadways

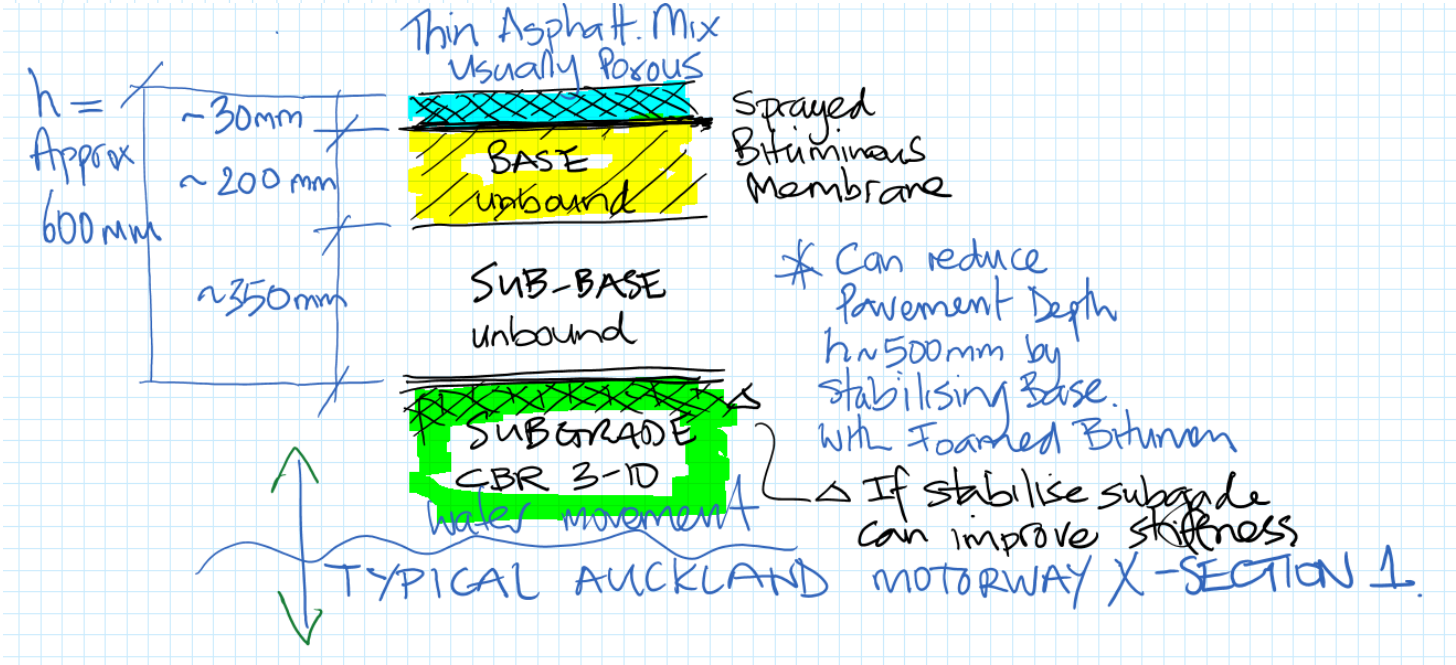
- Optimisation of location to maximise benefits - modelling
  - stationary
  - Semi dynamic and full dynamic
- Modelling key to demonstrate lower cost implementations with high benefits
- IPT pad and electro-magnetic performance – highly durable materials to encase pads
- Material durability and performance will dictate new design approaches
- High Performance Surfacings properties – Road Safety





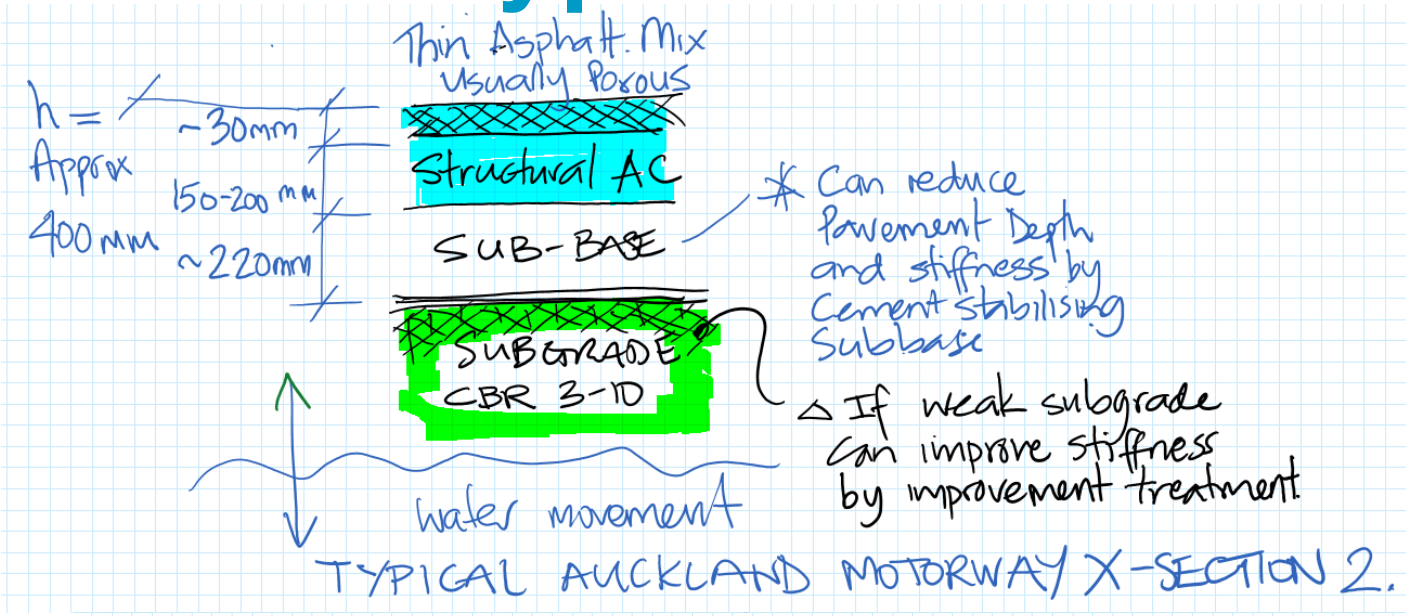
Typical NZ Pavement types

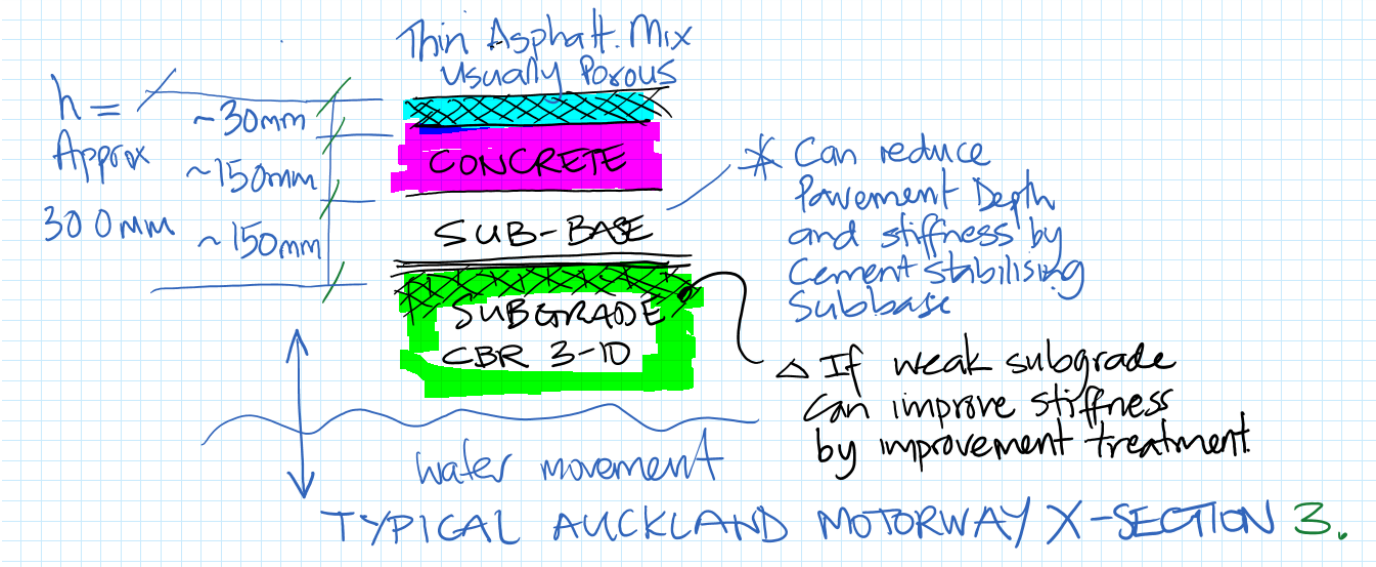




Typical NZ Pavement types

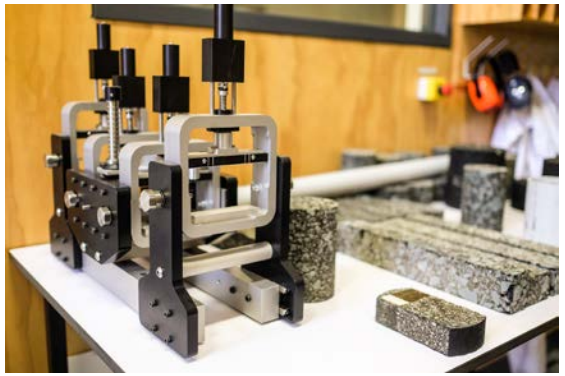
THE UNIVERSITY OF AUCKLAND
Te Whare Wananga o Tamaki Makaurau
NEW ZEALAND
ENGINEERING





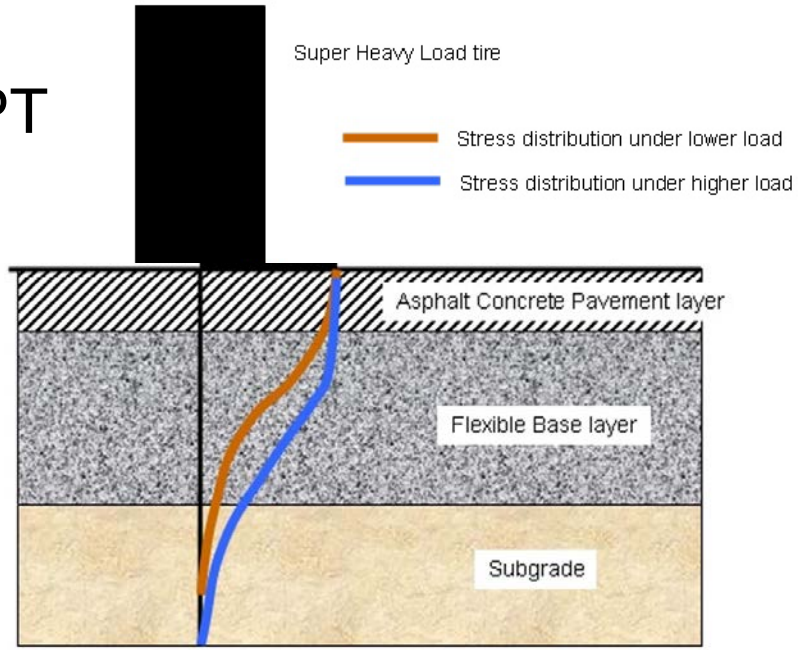
Construction of Electric Roadways

- Surviving the construction process
  - Compaction and temp ranges
  - Post construction - cutting into bound pavements
  - Specialist contractors / installers
- New and novel materials balanced against cost
- Perpetual pavement bases with modified binders
- Microsurfacing with highly modified polymer binders



Operating & Maintaining ERs

- Performance / durability of IPT pads
- Performance / durability of pavement over life cycle
  - Pavement 25-50yrs
  - Fatigue structures
  - Surfacings 5-10yrs
- Access for maintenance of pads
- Pavement Maintenance treatments (mill and replace)
- Road Surface materials – safety – natural aggregates and artificial (melter slag)



Summary Points

THE UNIVERSITY OF AUCKLAND
Te Whare Wananga o Tamaki Makaurau
NEW ZEALAND

ENGINEERING

- New ways of planning, designing, constructing and maintaining pavements with IPT pads are required
- Economics will drive solutions, so greater value in appraisal methods must be allowed
- Policy makers will need to be convinced of the benefits
- New highly durable materials are required
- Construction & Maintenance techniques critical
- New specialist Industry skills are required

Thank you and Questions?

THE UNIVERSITY OF AUCKLAND
Te Whare Wananga o Tamaki Makaurau
NEW ZEALAND

ENGINEERING