

Sétra

Service d'études
sur les transports,
les routes et leurs
aménagement

Australian study tour

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Division in charge of road asset management
Sétra

Ressources, territoires et habitats
Énergie et climat
Prévention des risques
Développement durable
Infrastructures, transports et mer

**Présent
pour
l'avenir**



Ministère
de l'Écologie,
du Développement
durable,
des Transports
et du Logement

Service d'études sur les transports, les routes et leurs aménagements

www.setra.developpement-durable.gouv.fr

Summary

Sétra, CSEP and DGPI,
Structural design of pavement,
Performances of national road pavements

Contracts → Pascal ROSSIGNY

RAP → Anthony MATYNIA

WMA → Pauline SAINTE

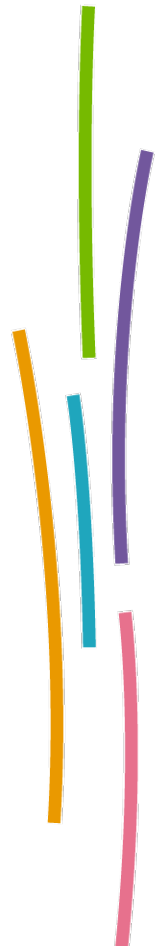


Sétra

Technical service of the french Ministry of sustainable development for :

- Transport,
- Roads and bridges engineering
- Road safety.

It provides expertise, methodologies, guidelines as well as software and information systems.



Sétra

4 technical departments :

- CTOA, bridges,
- CSEP, infrastructures : safety, environmental issues, asset management,
- CSTM, transport and transport systems,
- CITS, computer science.



DGPI (1/2)

Road asset management division

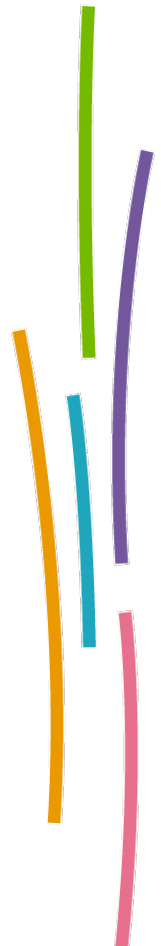
Objects :

- Road water management,
- Earthworks,
- Pavements.

Issues :

- Pavement design, techniques for construction, reinforcing or maintenance,
- Asset management : assessment, auscultation, programming, continued viability,
- Materials (components, processing, implementation),
- Surface performances (skid resistance, evenness, noise, ...).

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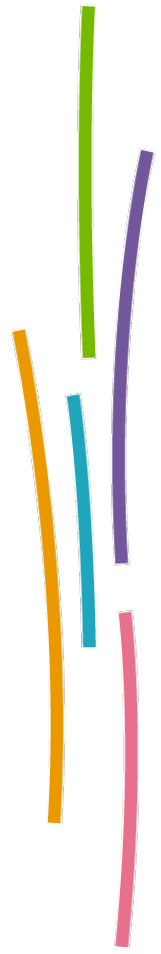
DGPI (2/2)

Transversal tasks :

- Assessment of national road network (without toll roads),
- Innovative techniques : check of performances,
- Reducing environmental impacts of road works,
- New one : sanitary impacts of road works.



Structural design of pavements



Structural design of pavements

4 iterative phases :

- Subgrade and capping layer,
- Modeling effect of standard axle on entire structure,
- Fatigue behavior,
- Frost/thaw verification.



Structural design of pavements

4 iterative phases :

- Subgrade and capping layer :
 - Bearing capacity,
- Modeling effect of standard axle on entire structure :
- Fatigue behavior :
- Frost/thaw verification :



Structural design of pavements

4 iterative phases :

- Subgrade and capping layer :
 - Bearing capacity,
- Modeling effect of standard axle on entire structure :
 - Strain (bituminous) / stress (hydraulic) of base layers,
 - Vertical strain of subgrade,
- Fatigue behavior :

- Frost/thaw verification :



Structural design of pavements

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 - Strain (bituminous) / stress (hydraulic) of base layers,
 - Vertical strain of subgrade,
- Fatigue behavior :
 - Number of standard axles during life of pavement,
 - Service level,
 - Strain or stress for 1 000 000 standard axles,
- Frost/thaw verification :



Structural design of pavements

4 iterative phases :

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 - Service level,
 - Strain or stress for 1 000 000 standard axles,
- Frost/thaw verification :
 - °C*jours of a chosen winter.



Structural design of pavement

Road owners choices :

- Life,
- Service level,
- Reference winter,
- Minimum bearing capacity of capping layer.



National Roads Network (non toll roads)

Road owners choices :

- Life : 30 years
- Service level : very high (risk ~2%),
- Reference winter (exceptional),
- Minimum bearing capacity of capping layer (>120Mpa).



National Roads Network (non toll roads)

Historic goals in sixties/seventies :

- Traffic under all conditions :
 - Winter protection,
 - Good behavior under heavy goods vehicles,
- Huge amount of road works in a small time :
 - Use of available aggregates and binders,
 - Efficient industry.



National Roads Network (non toll roads)

Historic choices in sixties/seventies :

- Bound layers with low rate of binders and high compactness,
- → high bearing capacity upon capping layer in order to have high compactness,

- → high stiffness of the entire structure.



National Roads Network (non toll roads)

HGV Lane, date of the last reinforcing.

Average 26 years (1986)

Renforcement	Pourcentage
Sixties	3 %
Seventies	35 %
Eighties	19 %
Nineties	26 %
After 2000	17 %

National Roads Network (non toll roads)

