

**Sétra**  
Service d'études  
des transports,  
des routes et des  
aménagement

# Australian study tour

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Division in charge of road asset management  
Sétra

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

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## Summary

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

Contracts → Pascal ROSSIGNY  
RAP → Anthony MATYNIA  
WMA → Pauline SAINTE

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## 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.

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## Sétra

4 technical departments :

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

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## 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.

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## Structural design of pavements



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## Structural design of pavements

4 iterative phases :

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



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## 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 :



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## 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 :



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## 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 :
  - Number of standard axles during life of pavement,
  - Service level,
  - Strain or stress for 1 000 000 standard axles,
- Frost/thaw verification :



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



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### Structural design of pavement

Road owners choices :

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




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### 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).




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### 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.




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### 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.




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### 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 %

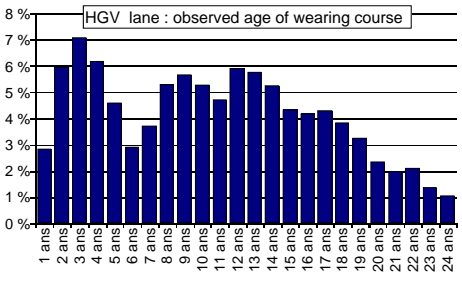


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### National Roads Network (non toll roads)

HGV lane : observed age of wearing course



Age (ans)	Percentage (%)
1	2.8
2	6.0
3	7.0
4	6.2
5	4.5
6	3.0
7	3.8
8	5.2
9	5.5
10	5.0
11	4.8
12	6.0
13	5.8
14	5.2
15	4.2
16	4.0
17	4.2
18	3.8
19	3.2
20	2.5
21	2.2
22	2.0
23	1.5
24	1.2



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