Comité
C 4.3
Committee

Seminar on Urban Pavements

Association mondiale de la route

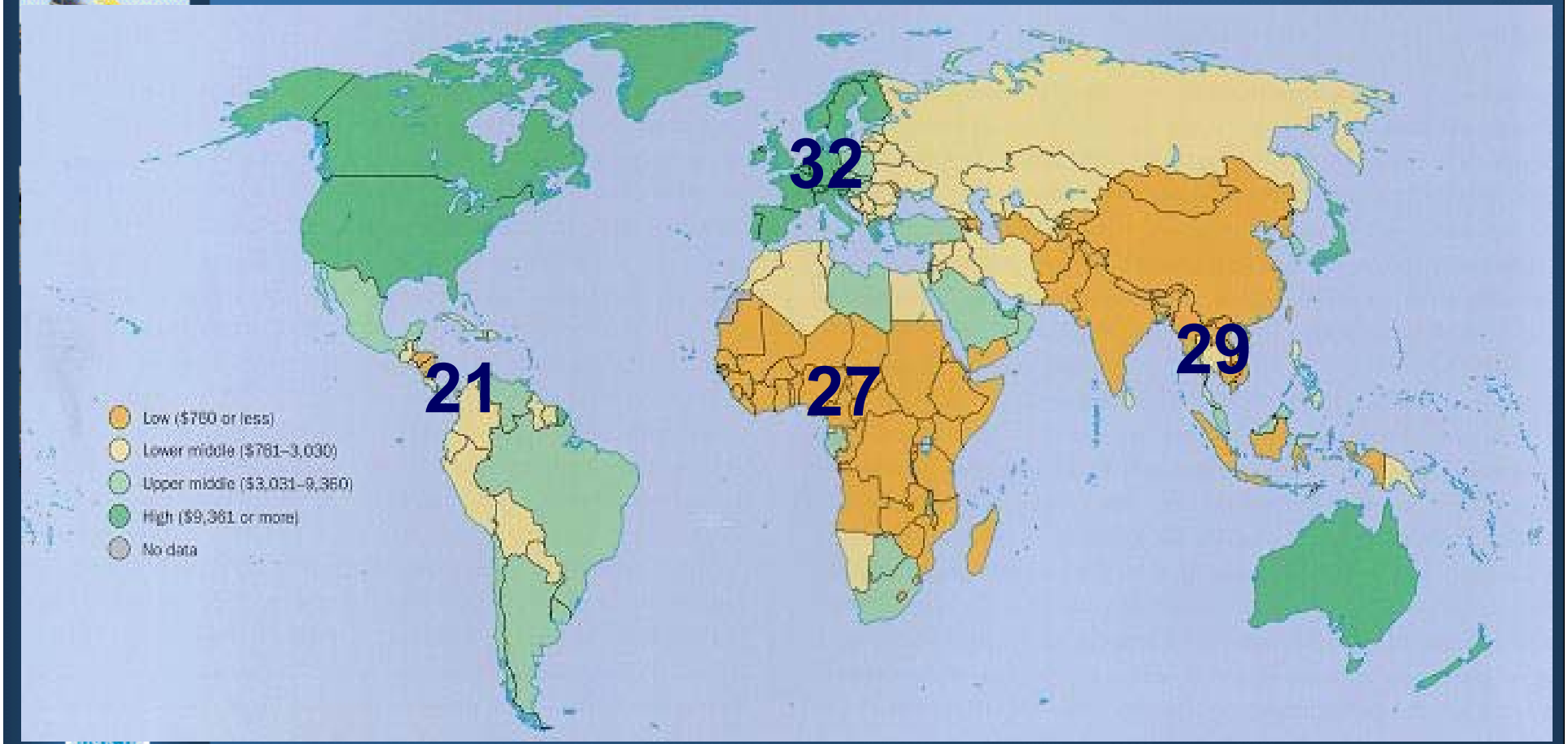
World Road Association

Seminar on Urban Pavements

World Road Association (PIARC)

Comité
C 4.3
Committee

PIARC Member Countries



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Vision

Being the World leading forum in exchange of knowledge on roads, road transport policy and practices within an integrated sustainable transport context.

A Strategic Plan

A Strategic Plan guides PIARC activities every four years.

For the 2004-07 period

- **4 strategic themes**
- **18 Technical Committees**
- **Committee on Terminology**

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AIPCR 2002 PIARC
XIIth INTERNATIONAL WINTER ROAD CONGRES
28-31 JANUARY 2002 - SAPPORO (JAPAN)
XIe CONGRES INTERNATIONAL DE LA VIABILITE HIVEF
28-31 JANVIER 2002 - SAPPORO (JA
Bulletin 3
HDM-4
Version pre-release
Association mondiale de la Route
AIPCR
PIARC
World Road Association
TRANSPORT ET DÉVELOPPEMENT URBAIN
TRANSPORT AND URBAN DEVELOPMENT
Association mondiale de la Route
World Road Association
World Road Association
... Via ...
A large range of publications
ROUTES ROADS
LA QUALITÉ DE SERVICE DES ROUTES
ÉVALUATION, PERCEPTION ET COMPORTEMENTS INDUITS AUX USAGERS
THE QUALITY OF ROAD SERVICE
EVALUATION, PERCEPTION AND RESPONSE BEHAVIOUR OF ROAD USERS
MALAYSIA 30
MALAYSIA 50
MALAYSIA
LA VIE EN TRANSPORTS
LIFE ON THE MOVE
TERMINOLOGIE : DU NOUVEAU
TERMINOLOGY: NEW DEVELOPMENTS
OBSERVATION CONTINUE
CONTINUOUS OBSERVATION
N° 307
III - 2000
ROUTES ROADS
PROGRAMME DE TRAVAIL DES COMITÉS TECHNIQUES 2000-2003
WORK PROGRAMME OF TECHNICAL COMMITTEES 2000-2003
TERMINOLOGIE AIPCR
PIARC TERMINOLOGY
Programme et données
2000
Software and Data

Comité
C 4.3
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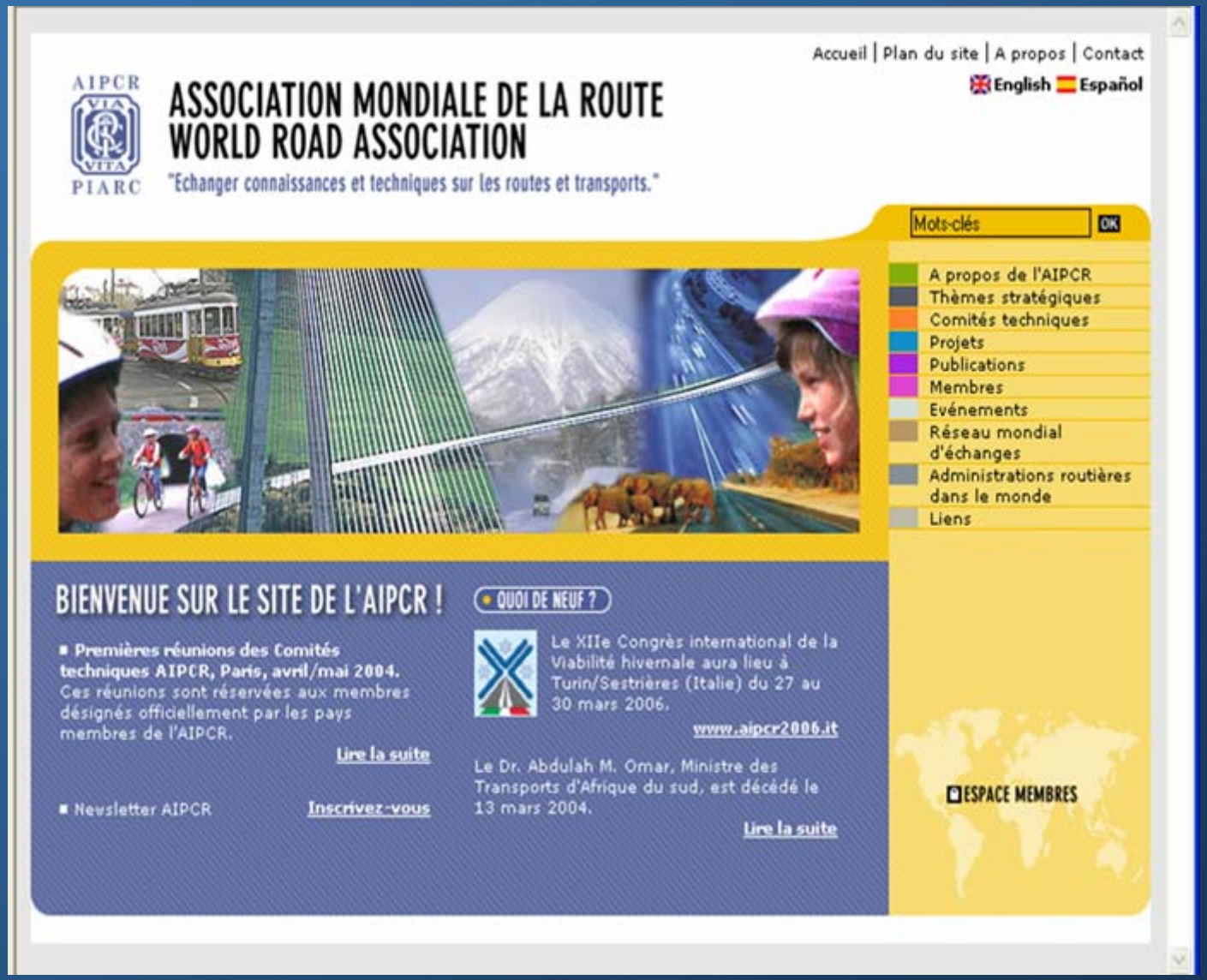
PIARC Website

http://www.piarc.org



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Strategic Theme ST-1

Governance and Management of the Road System

1.1 - Road Systems Economics

1.2 - Financing Road System Investment

1.3 - Performance of Road Administrations

1.4 - Management of Network Operations

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Strategic Theme ST-2

Sustainable Mobility

2.1 - Sustainable Development and Road Transport

2.2 - Interurban Roads and Integrated Interurban Transport

2.3 - Urban Areas and Integrated Urban Transport

2.4 - Freight Transport and Intermodality

2.5 - Rural Roads and Accessibility

Comité
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Committee

Strategic Theme ST-3

Safety and Road Operations

3.1 - Road Safety

3.2 - Risk Management for Roads

3.3 - Road Tunnels Operation

3.4 - Winter Maintenance

Comité
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Committee

Strategic Theme ST-4

Quality of Road Infrastructure

4.1 - Management of Road Infrastructure Assets

4.2 - Road Vehicle Interaction

4.3 - Road Pavements

4.4 - Bridges and Related Structures

4.5 - Earthworks, Drainage and Subgrade

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C 4.3
Committee

PIARC / AIPCR

Committee C 4.3
Road Pavements

Comité
C 4.3
Committee

AIPCR
PIARC

Committee 4.3 on Road Pavements

Topics

1. Long Life Pavements

2. Recycling techniques

3. Impact of Road Works

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Committee 4.3 on Road Pavements

Outputs planned

Long Life Pavements

Guidelines for design, construction and maintenance of LLP

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AIPCR
PIARC

Committee 4.3 on Road Pavements

Outputs planned

Recycling techniques

Technical report on
"Overcoming the obstacles to recycling"
Series of papers in Routes/Roads on Recycling

Comité
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Committee 4.3 on Road Pavements

Outputs planned

Impact of Road Works

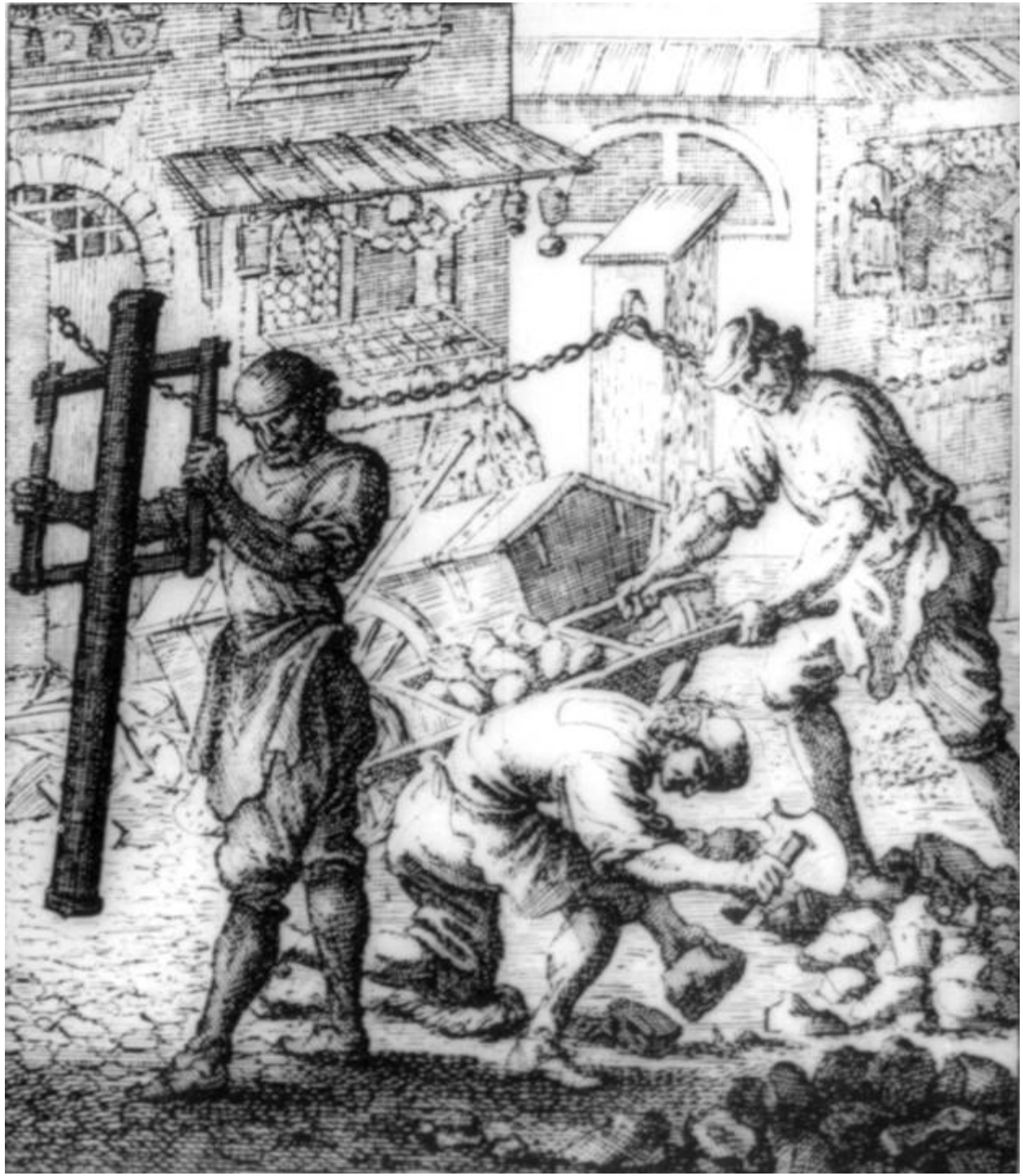
Report on review of practices and recommendations

Seminar on Urban Pavements

Séminaire sur les Chaussées urbaines

Association mondiale de la route

World Road Association




Gérard fin. et fecit.


QUINTANA
QUINTANA
Le Petit Mob
PHARMAC
VIA DOMITIA

UPGRADING OF GRAVEL ROADS TO SURFACED ROADS 2002-2005

City of Johannesburg

JH van der Schyff

21 September 2005

THE PROBLEMS


We convert this...

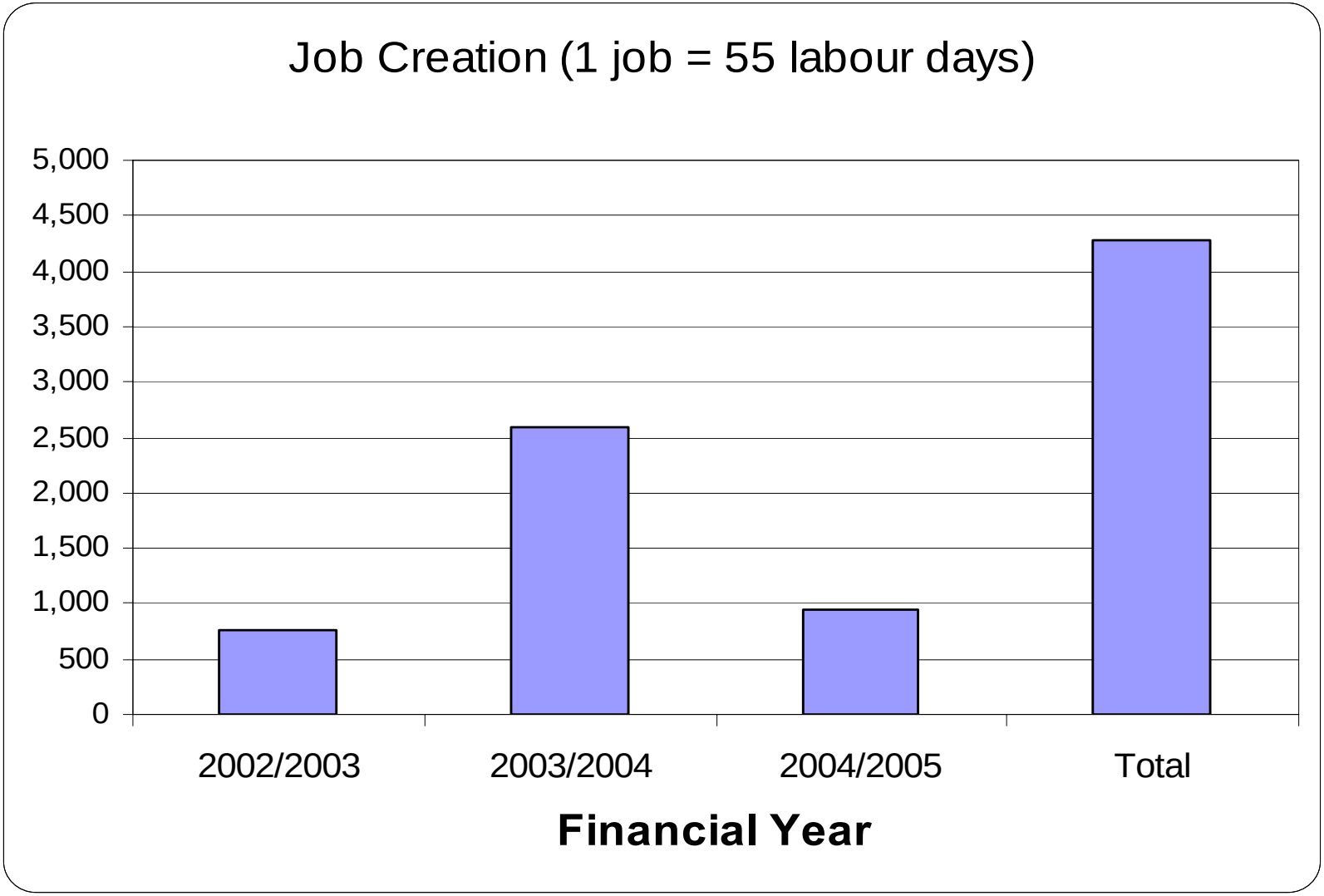

Into this !!!

SUMMARY –
Expenditure & Delivery

ITEM / YEAR	2002/2003	2003/2004	2004/2005	TOTAL
TOTAL EXPENDITURE	89,680,578	280,220,360	115,305,190	485,206,128
TOTAL KILOMETERS CONSTRUCTED	65.53	168.67	79.91	314.11

Jobs Created

Labourers employed by main contractor only



Training

- **Typical Training Under Taken**
  - Kerb Laying
  - Stormwater Infrastructure Construction
  - CLO Training
  - Life Skills
  - First Aid
  - Safety
  - Survey Skills
  - Laboratory Skills
  - Flagmen
  - Business Skills
  - Tendering

Financial Year	Total Number of Persons Trained			
	Male	Female	Youth	Total
2002/2003	187	66	150	403
2003/2004	458	124	579	1,161
2004/2005	317	176	177	670
Total	**962**	**366**	**906**	**2,234**

THE STREET OF THE FUTURE

Social evolutions – Technological innovations

LONG-TERM VISION

SHORT-TERM ACTION





LIBRE SERVICE


M1 302


STOP

A NEW SHARING OF URBAN ROAD USE

To promote alternative travel modes to car

Consider pedestrians and cyclists first

Extensive allowance for public transport traffic

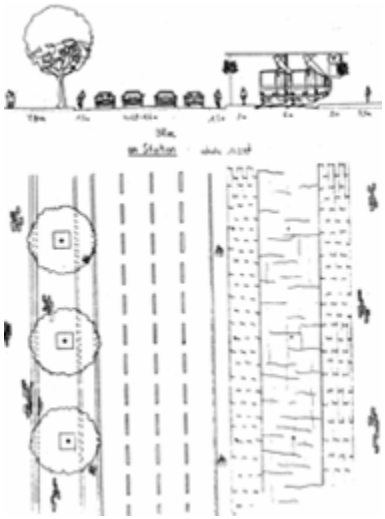
Control automobile traffic speed

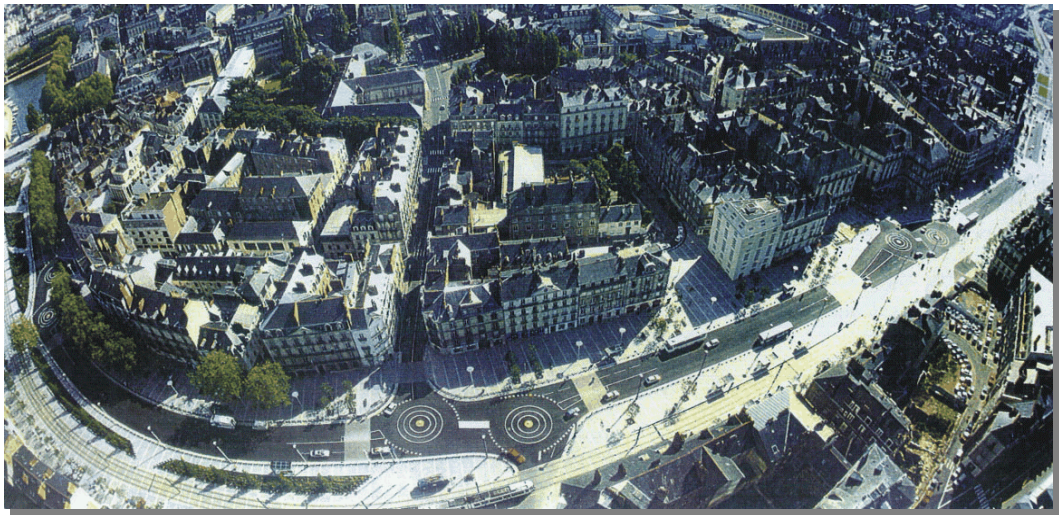
Better regulated street parking

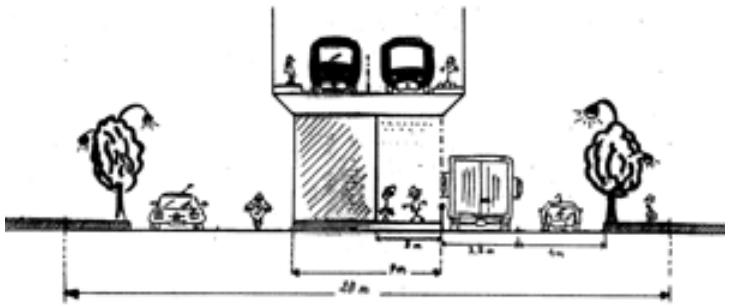
Strive for quality in public spaces

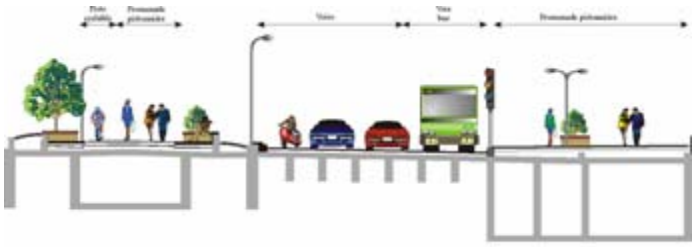

esco

New sharings within urban public space







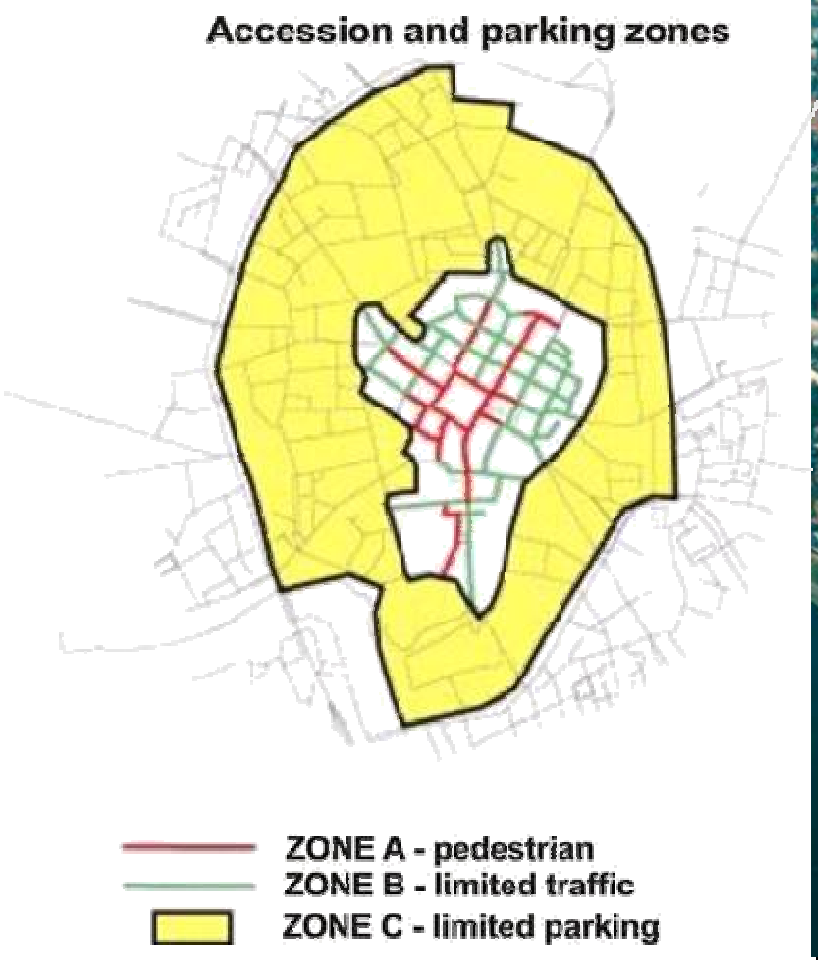


La rue du futur : la rue ouvrage d'art

The north-west intercommunal link

Pacification of adjacent streets

SOLUTIONS


Accession and parking zones
ZONE A - pedestrian
ZONE B - limited traffic
ZONE C - limited parking

SOLUTIONS

Pedestrian zone

SOLUTIONS

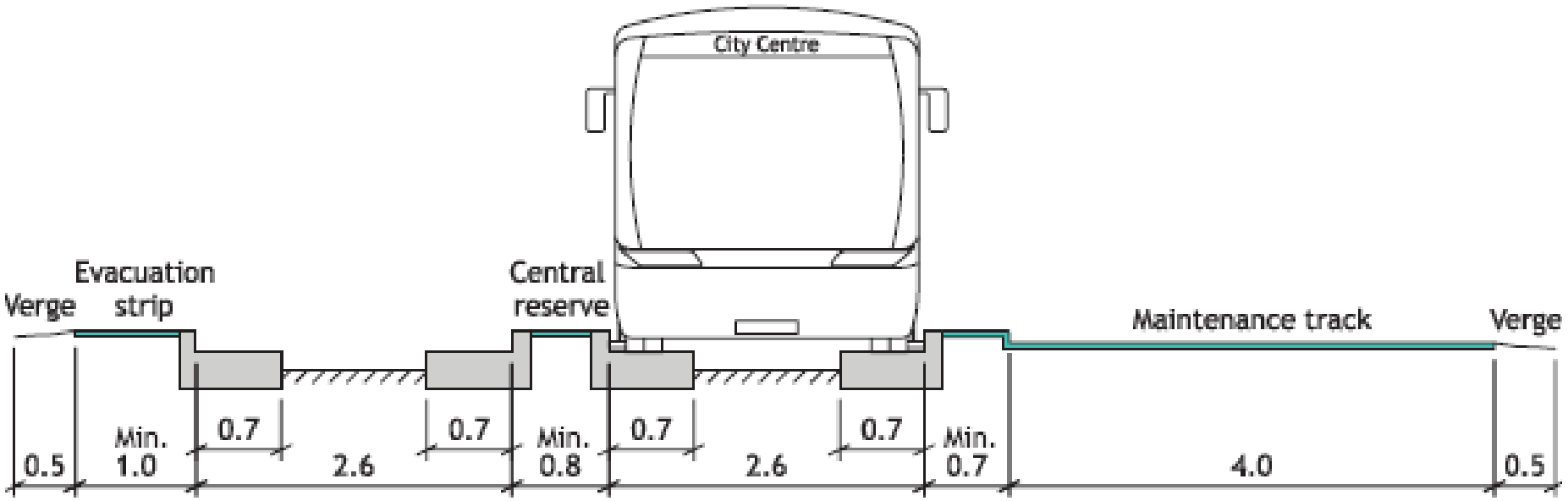
Limited traffic zone

SOLUTIONS

Priorities for public transport

Guideway crossing, Essen, Germany

Cross Section



Typical at-grade with maintenance track

Car trap at a guideway entrance, Ipswich, UK

Essen, Germany

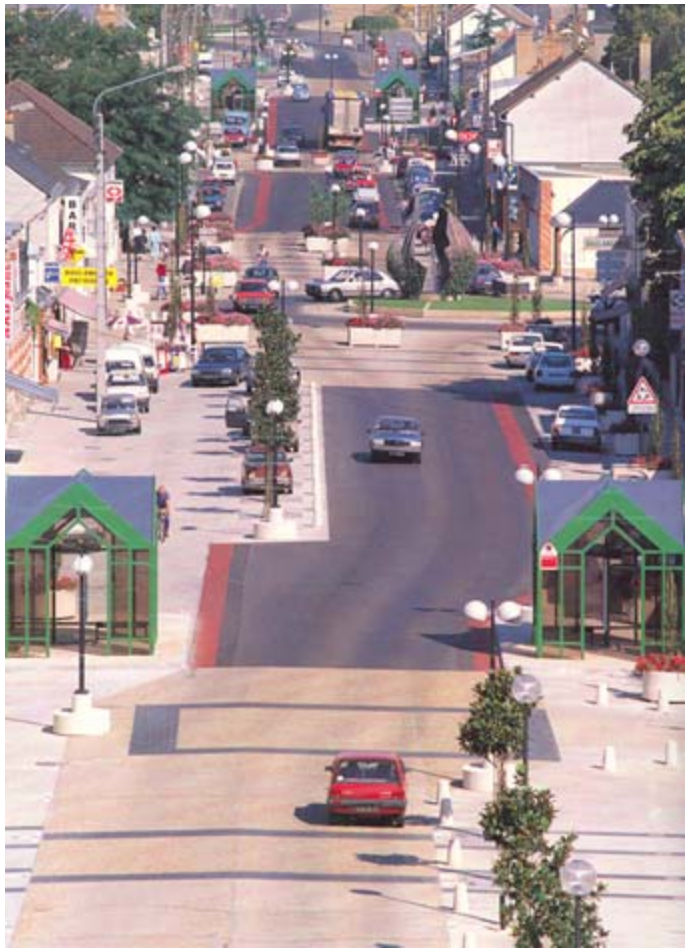
SOLUTIONS

New investments

Improved road safety

Roundabout in continuously reinforced concrete (Belgium)

Concrete surfacing in tunnel (Belgium)



Requalification of urban segment of heavy traffic highway (France)

Pavement surface materials used in urban areas

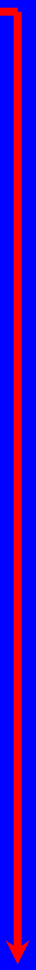
-The range of urban materials-

Egbert Beuving, Technical Director
European Asphalt Pavement Association (EAPA)

PIARC - International seminar on Urban Pavements
CRACOW (Poland) - September 21-22, 2005

Requirements

User demand	Surface characteristic
Safety	Texture
	Horizontal (hydraulic) drainability
	Photometry
	Evenness
Comfort	Texture
	Horizontal drainability
	Photometry
	Evenness
Durability	Integrity
Environment	Recyclability
	Leaching / emissions
Construction - maintenance	Construction time
	Maintenance time



Performance Requirements for Pavement

Additional requirements for urban areas

In urban areas people live, work, recreate, meet, relax and shop

- Pavement should be nice and attractive
- In urban areas also utility infrastructures as water, gas, electricity, telephone, tv-cable, internet, etc.

EAPA

Additional requirements

- Additional comfort requirements
- Smooth to avoid vibrations in buildings

- Requirements for trees and plants (water infiltration & air)
- Maintenance utility works
- (Additional) safety issues (high heels)

Materials available

Constructing materials

- Bituminous bound materials
- Cement bound materials
- (Small) paving elements
- Composite pavements
- Unbound granular materials

Bituminous bound materials

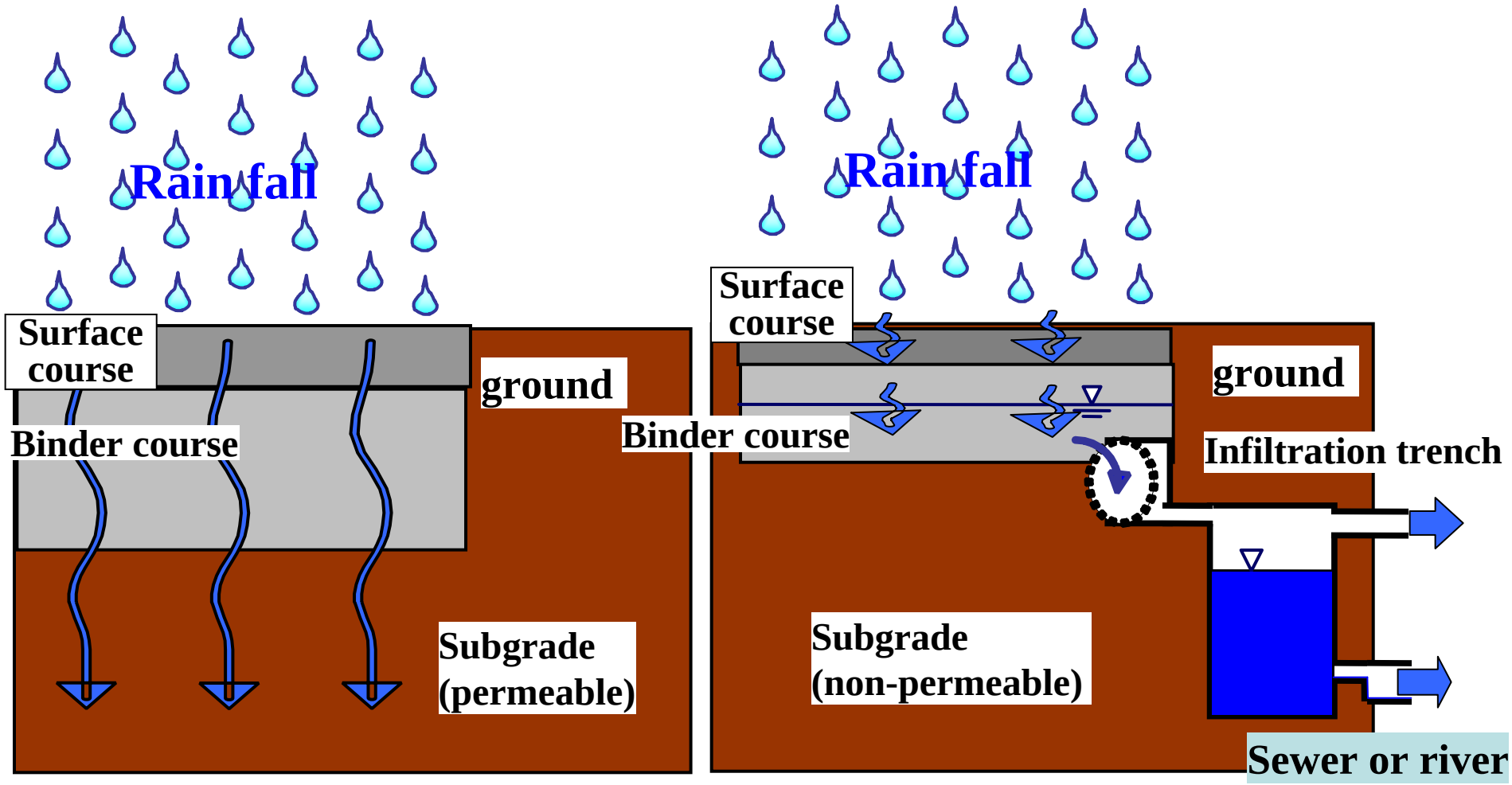
- Asphalt concrete
- Coloured asphalt concrete
- Asphalt concrete with a print
- Asphalt concrete with pieces of mirror
- Mastic asphalt
- Coloured mastic asphalt
- Stone Mastic Asphalt
- Thin and Ultra thin asphalt concrete layers
- Double layered porous pavements
- Pervious pavements

EAPA

Bituminous bound materials

Ultra Thin AC

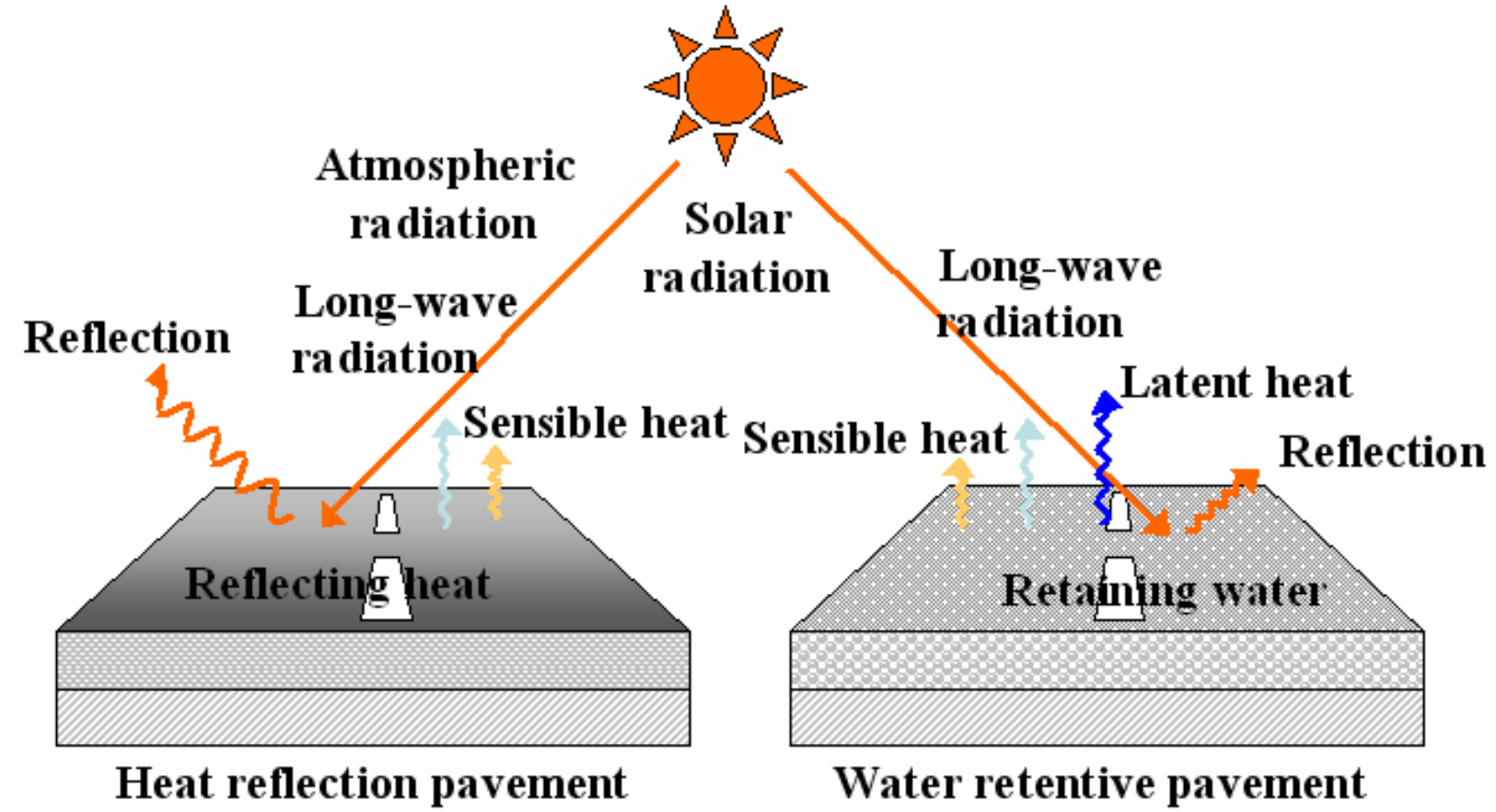
Two Types of Permeable Pavement



Permeable subgrade (ex. sand)

Non-permeable subgrade (ex. clay)

Schematic diagram of heat-controlling pavement



Controls heat by reflecting infrared radiation (heat) from the sun

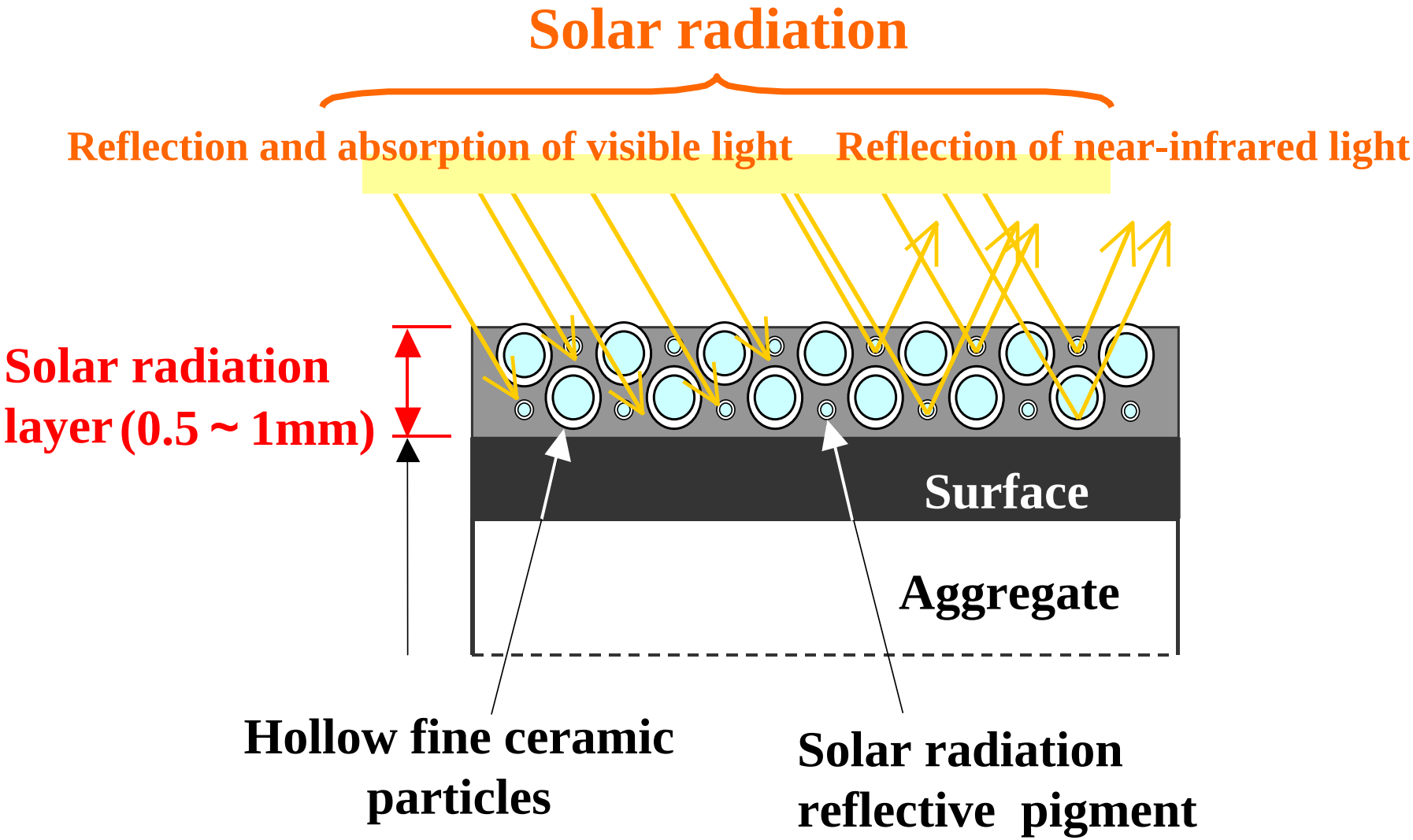
Controls heat by retaining water and using the evaporation heat of water

Surface of water-retentive pavement

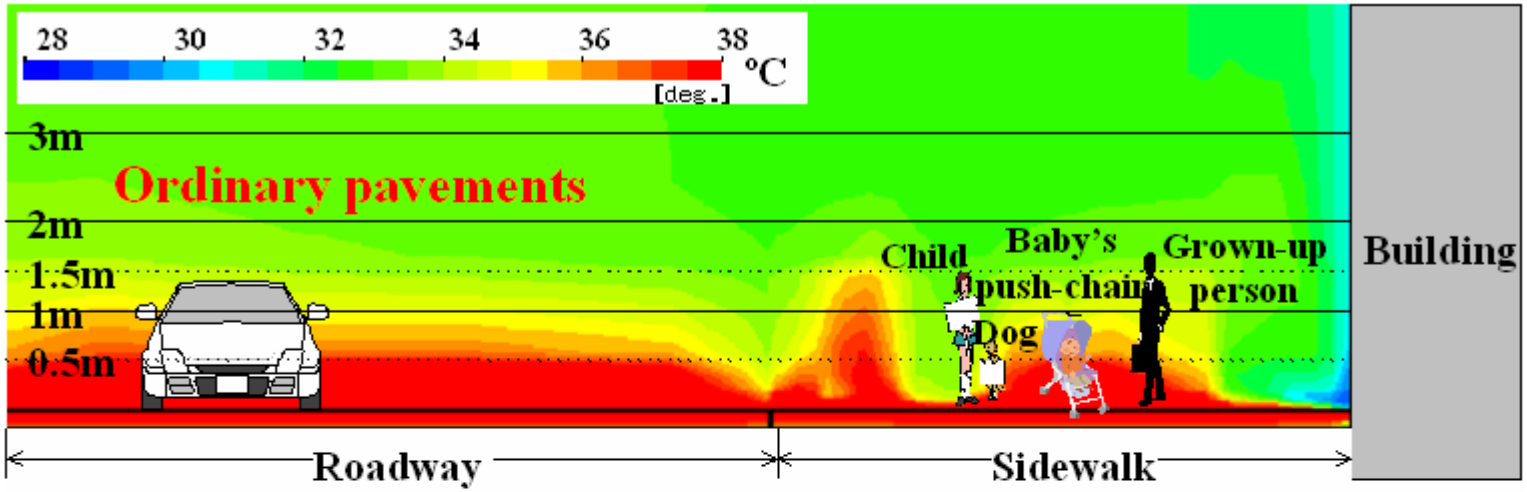
Injection of cement milk into water-retaining material

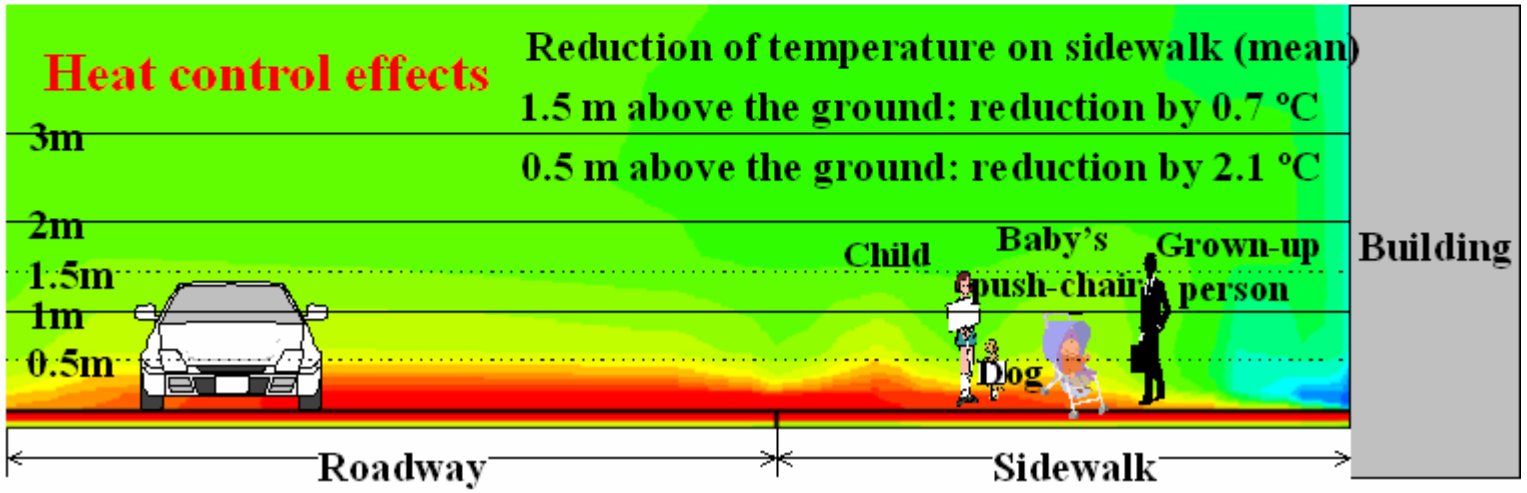
Surface of water-retentive pavement [Open graded AC (Va=23%)]

Structure of Solar Radiation Pavement

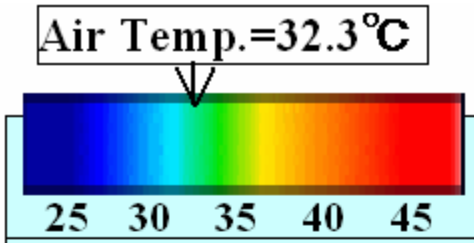


Simulation of improving the heat environment of sidewalk

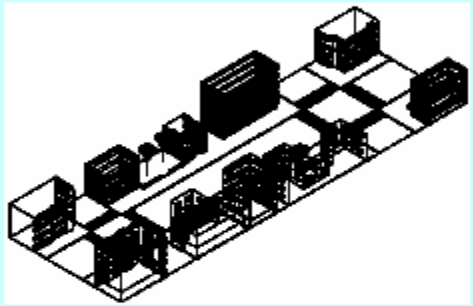
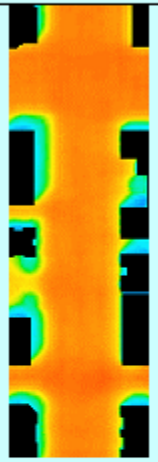
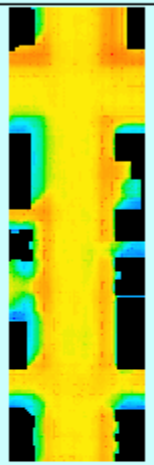
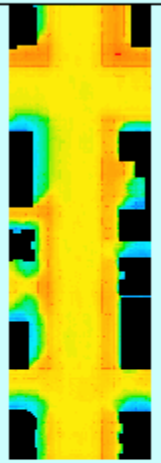
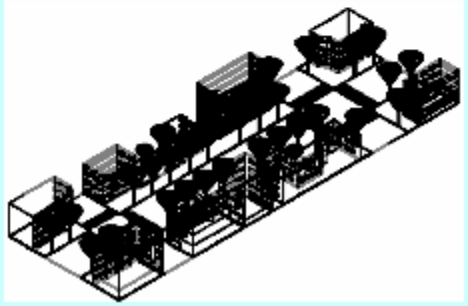
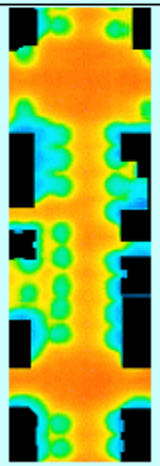
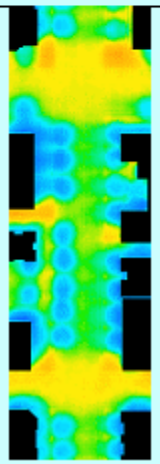
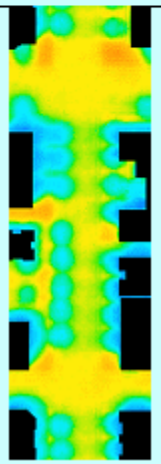




Simulation of MRT



MRT at 1.5m above pavements（13:00）

	Dense Graded AC	Water-retentive pavement	Heat reflection pavement
Case 1 No-Tree 			
Case 2 Trees on sidewalks 			

Cement bound materials

- Concrete slabs
- Reinforced concrete slabs
- Continuously reinforced concrete
- Concrete elements in different sizes
- Concrete with a (street) print
- Pervious pavements

Coloured exposed aggregate concrete surfaces in urban environments

Dinant

Saint-Hubert

Antwerp

Antwerp

Reinforced slabs

First layer – grey concrete

Second layer – coloured concrete

super-smoother

Setting retarder

Washing out of the surface

Antwerp

Particular care of the joints

(Small) paving elements

- Block pavers
- Cobblestones
- Terracotta pavers
- Pavers for porous pavements
- Pre-formed modular pavers of brick
- Pre-formed modular pavers of concrete

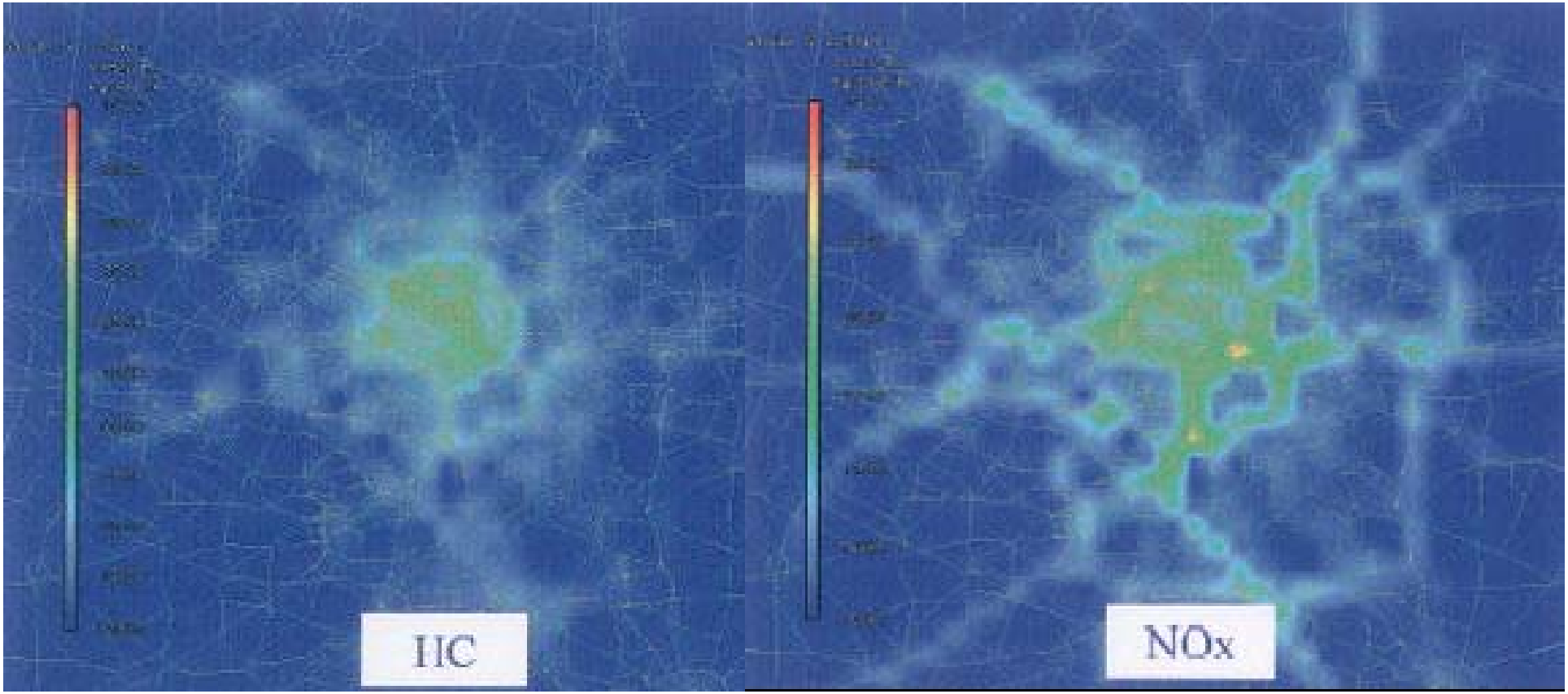
EAPA

(Small) paving elements

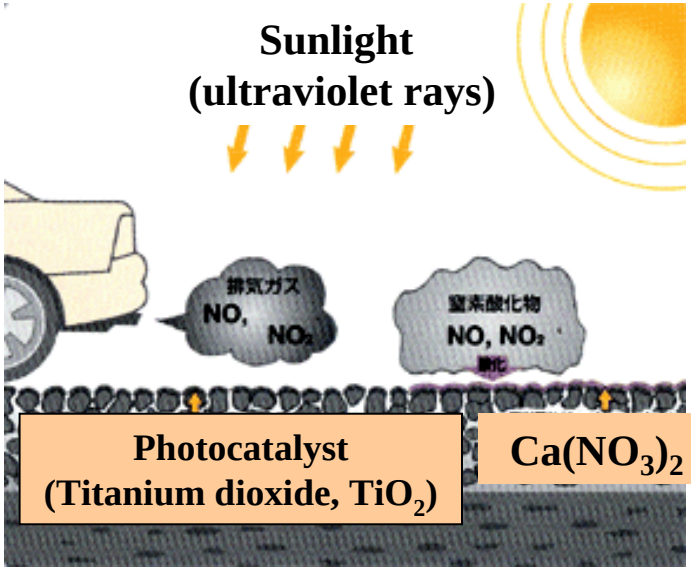
Air purifying pavement blocks: A solution for the air pollution?

Air pollution by traffic

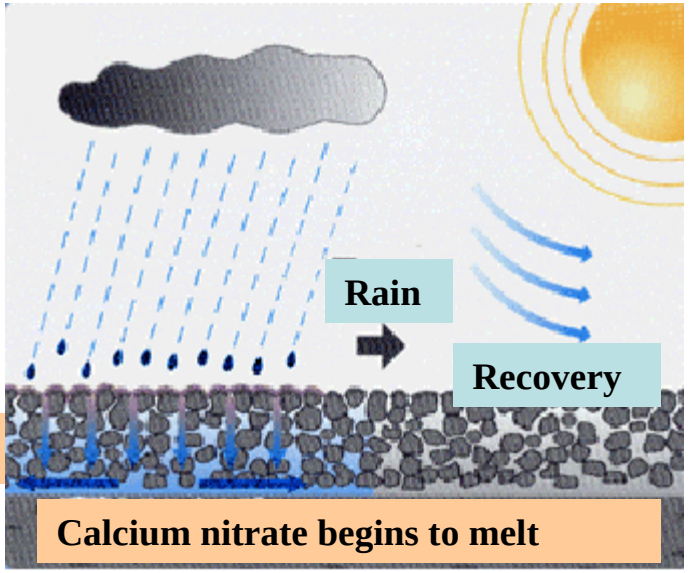
Exhaust of HC and NOx by traffic during rush hour in Paris



Absorbing and decomposing nitrogen oxides



It oxidizes with the photocatalyst (TiO_2) which sprinkled the nitrogen oxide (NO_x) in the exhaust gas which a car generates on the pavement surface, and becomes a neutral calcium nitrate[$Ca(NO_3)_2$].



A calcium nitrate is flushed as harmless nitric acid ion (NO_3^-) and calcium ion (Ca^{2+}) by rain, and the unclean pavement surface is recovered.

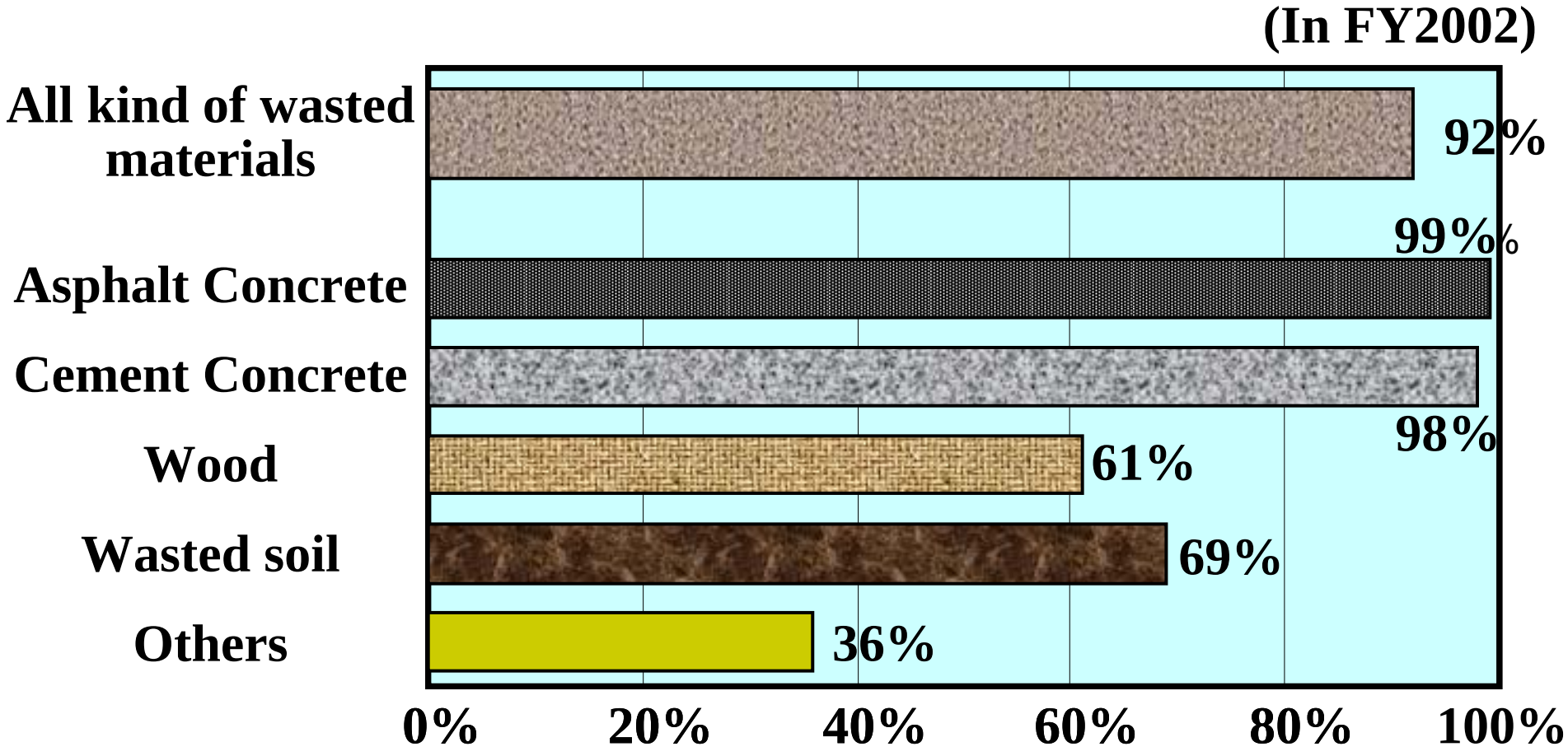
Photocatalyst (TiO_2) which decomposes pavement surface to which the nitrogen compound adhered.

Leien - Antwerp

Silent Concrete Block Pavers

EAPA

Percentage of Recycling of Wasted Materials in Japan



IMPACT OF ROAD CONSTRUCTION AND MAINTENANCE ACTIVITIES ON ROAD USERS AND THE ADJACENT LAND USE

Association mondiale de la Route

AIPCR VIA VITA PIARC

World Road Association

David Hein
Canada

CROSSROADS JEAN JAURES - TOULOUSE

Summary of Major Construction Impact

Noise

Safety

Summary of Major Construction Impact

Pollution

Vibration

Summary of Major Construction Impact

Roadway Availability

Nuisance

Preliminary Information Survey

- How important is each of the following issues to your agency?
  - Noise
  - Safety
  - Pollution
  - Vibration
  - Roadway Availability
  - Nuisance

Survey Results Summary

Item	Planning	Design	Production	Transportation	Placement	Maintenance
1) Noise	4	4	3	3	4	4
2) Safety						
User	5	5	5	5	5	5
Worker	4	4	5	5	5	5
3) Pollution						
Air	3	3	5	4	4	4
Water	4	3	4	4	4	4
Soil	3	3	4	4	4	4
4) Vibration	3	3	3	3	3	3
5) Availability						
Capacity	4	4	3	4	4	4
Working Hours	4	4	3	4	4	4
6) Nuisances						
Access	4	4	3	4	4	4
Aesthetics	3	3	2	2	2	2
Lighting	2	2	2	2	4	3
Odors	2	2	2	2	2	2

Planning Innovation

- Lane Rentals
- A + B (Cost Plus Time Bidding)
  - (Cost) + (B x Road User Cost / Day)
- Advanced public notification to reduce traffic congestion (FTMS)
- Traffic staging (median crossovers)
- Shoulder paving for traffic
- Speed limit enforcement (photo radar)

Construction Innovation

Pre-cast concrete slab replacement

Construction Innovation

Expanded Asphalt Stabilization

Construction Innovation

Moveable Construction Barrier

Transport by multi-bucket systems

PIARC TC 4.3.3

- Road Pavements Technical Committee
  - Developing guidance on the impact of road works on adjacent land use
  - Multi-national collaborative effort
  - Final work to be reported by December 2006