KYOTO UNIVERSITY - UTC JOINT SUMMER SCHOOL

SEPTEMBER 25 - 27, 2007

UNIVERSITY OF TRANSPORT AND COMMUNICATIONS

HANOI, VIETNAM

Road Infrastructure Asset Management Course

JOINTLY ORGANIZED BY:

KYOTO UNIVERSITY

UNIVERSITY OF TRANSPORT AND COMMUNICATIONS

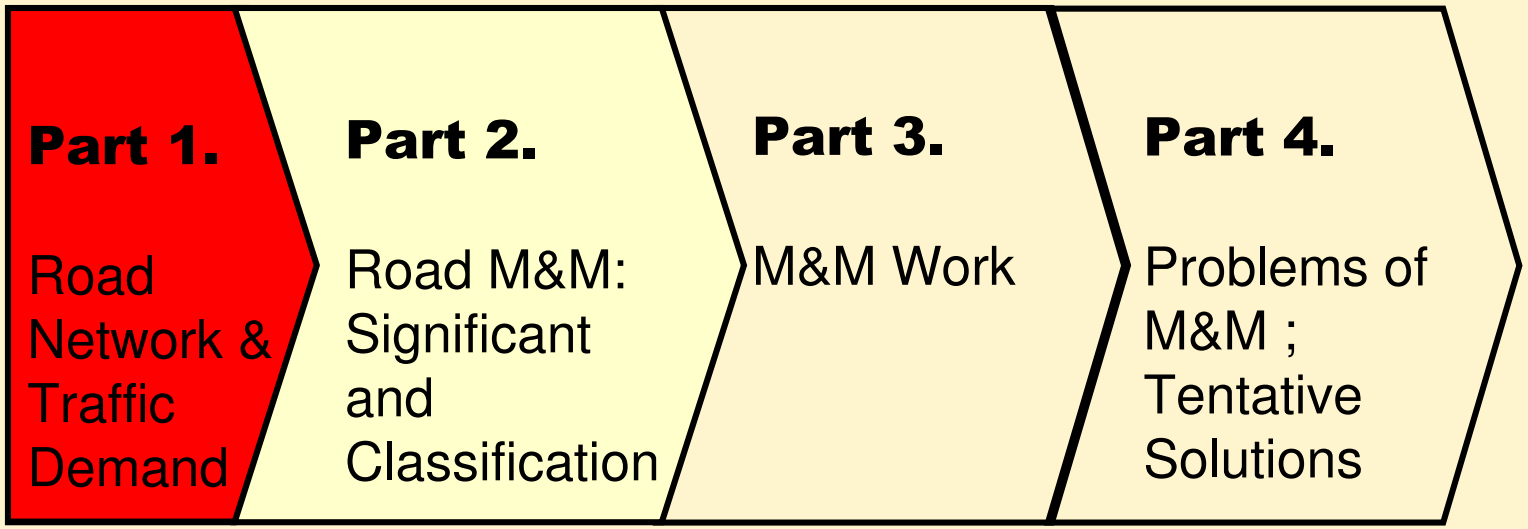
Chaired by Prof. Kiyoshi Kobayashi, Kyoto University

INTRODUCTION

ROAD INFRASTRUCTURE ASSET MANAGEMENT AND MAINTENANCE IN VIETNAM

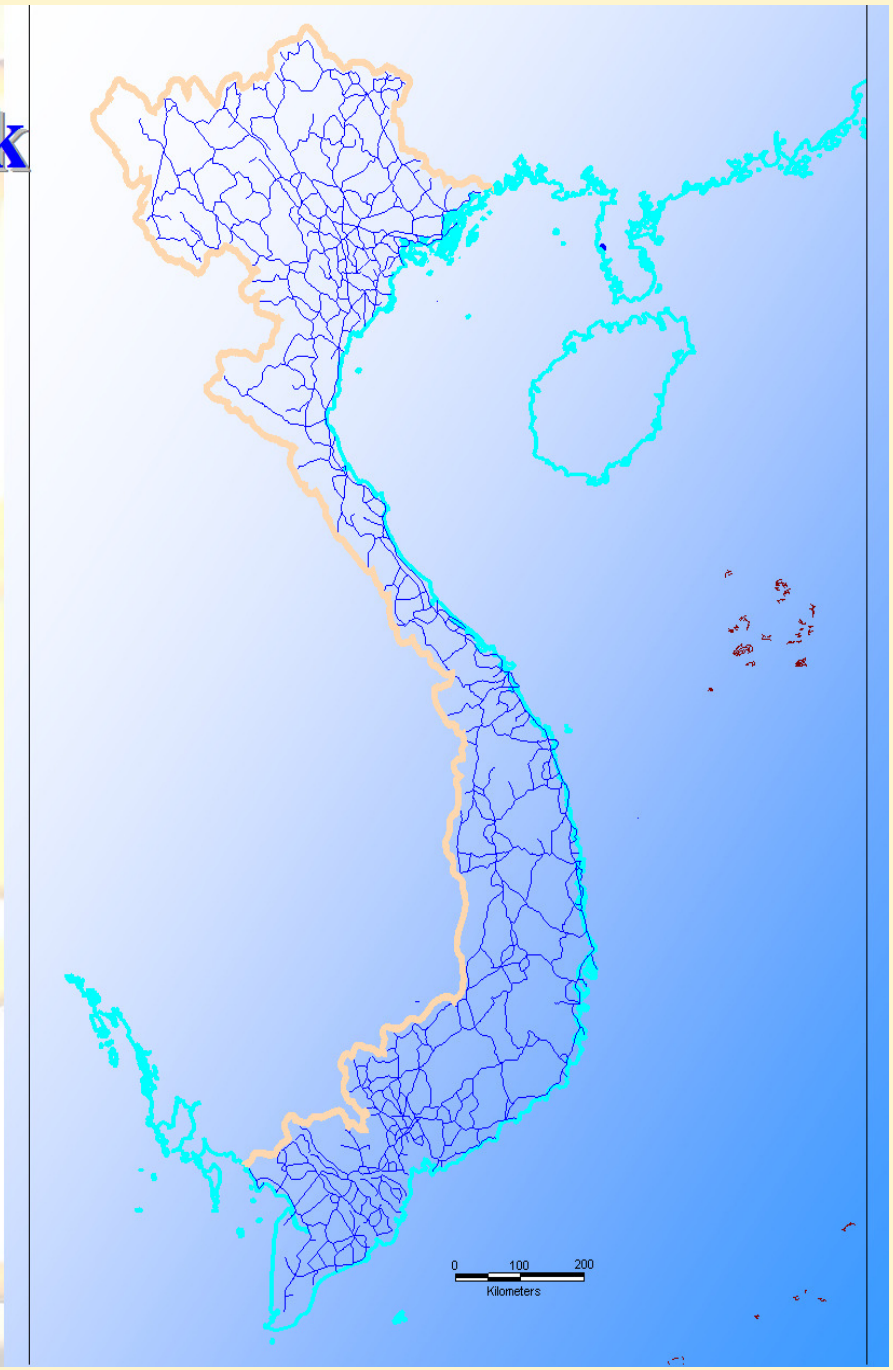
Nguyen Dinh Thao
Highways and Airfields Engineering Laboratory
Civil Engineering Department
University of Transport and Communications
E-mail : dinhthao200277@yahoo.com

Contents

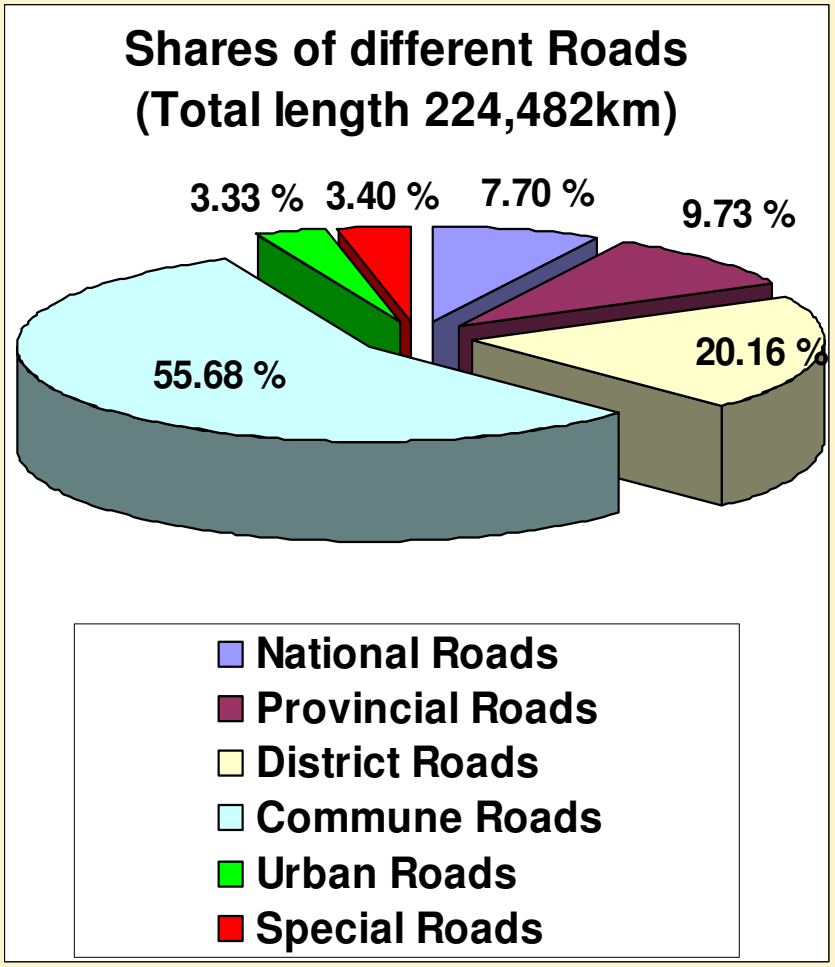

Part 1.
Road Network & Traffic Demand
Part 2.
Road M&M: Significant and Classification
Part 3.
M&M Work
Part 4.
Problems of M&M ; Tentative Solutions

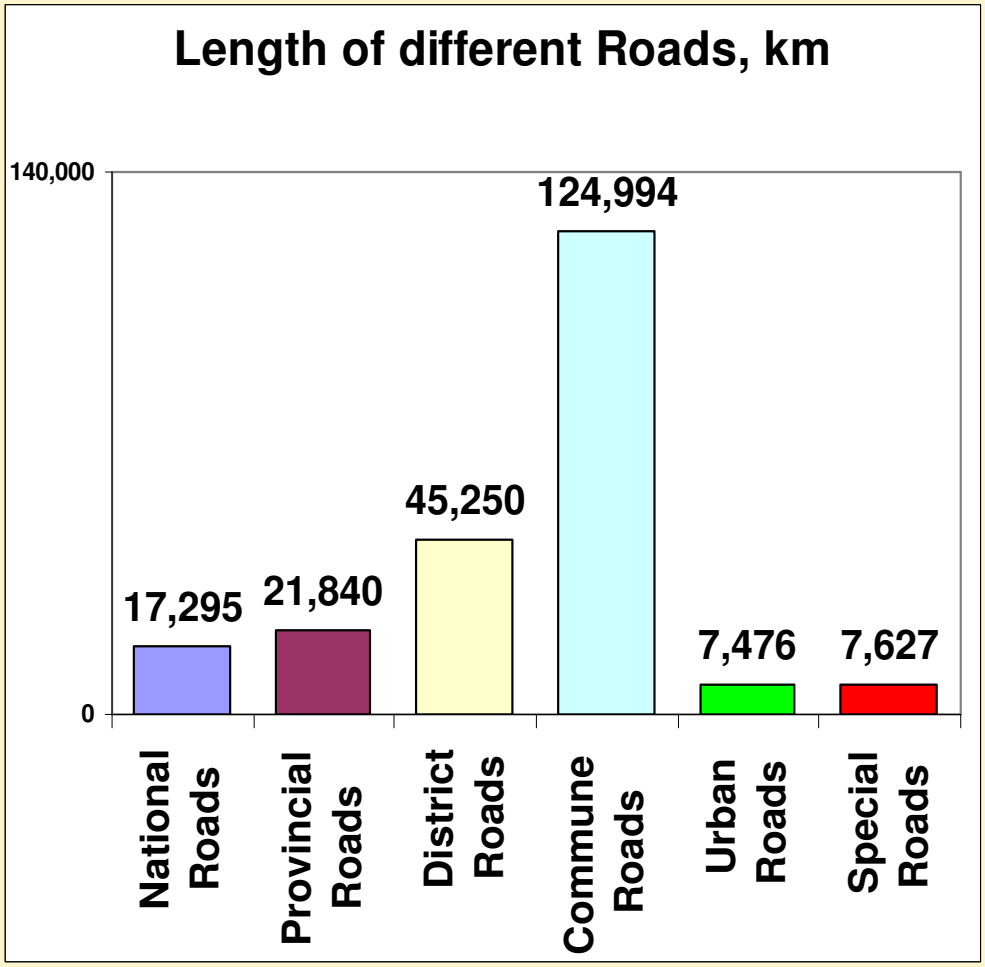
Vietnam Road Network

Total length: 224,483 km



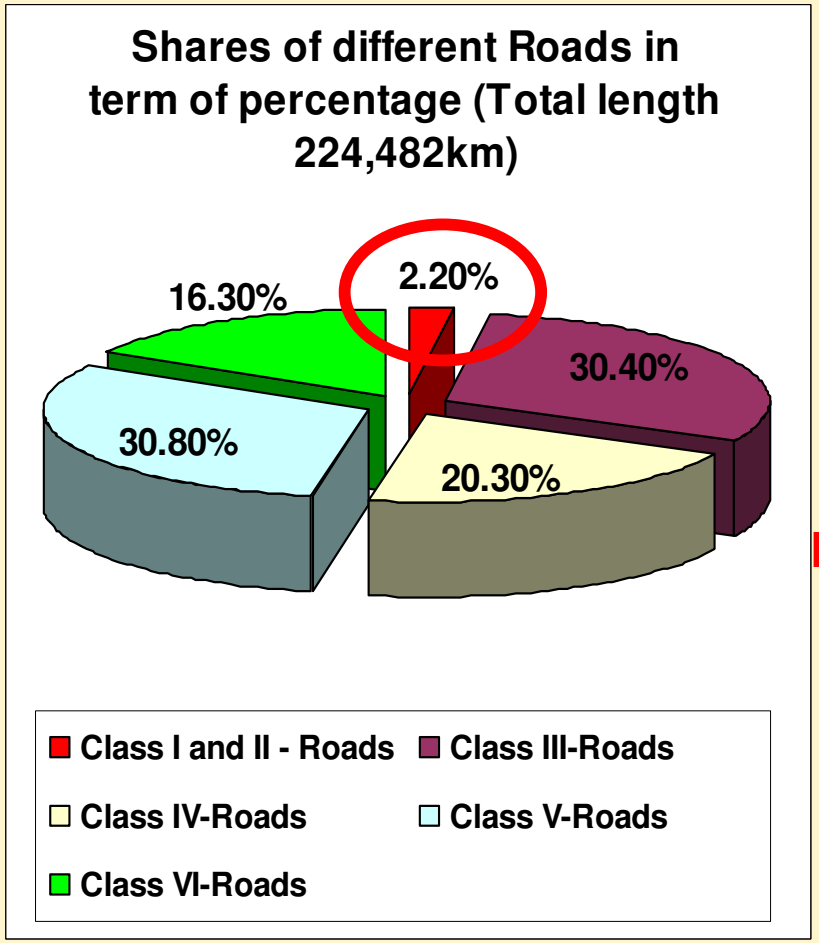
Shares of different Roads in the networks

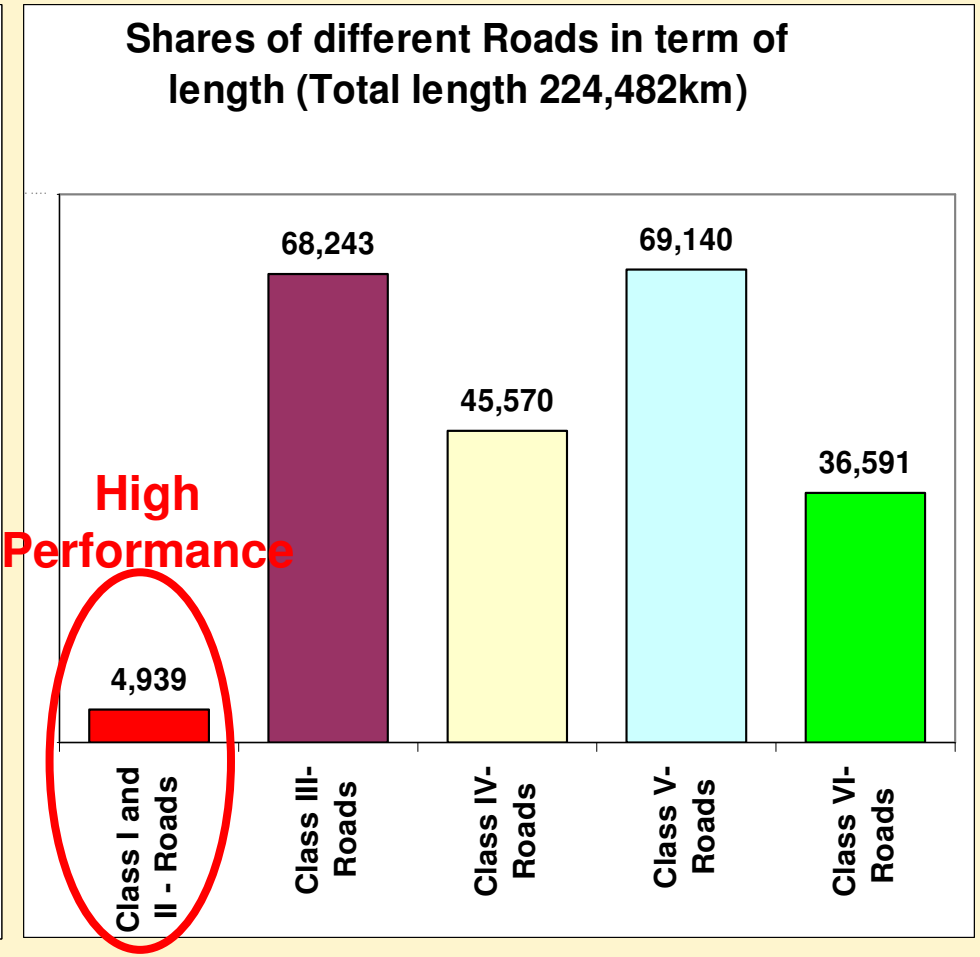




The total number of bridges were 34,933 with the total length of approximately 606,915m.

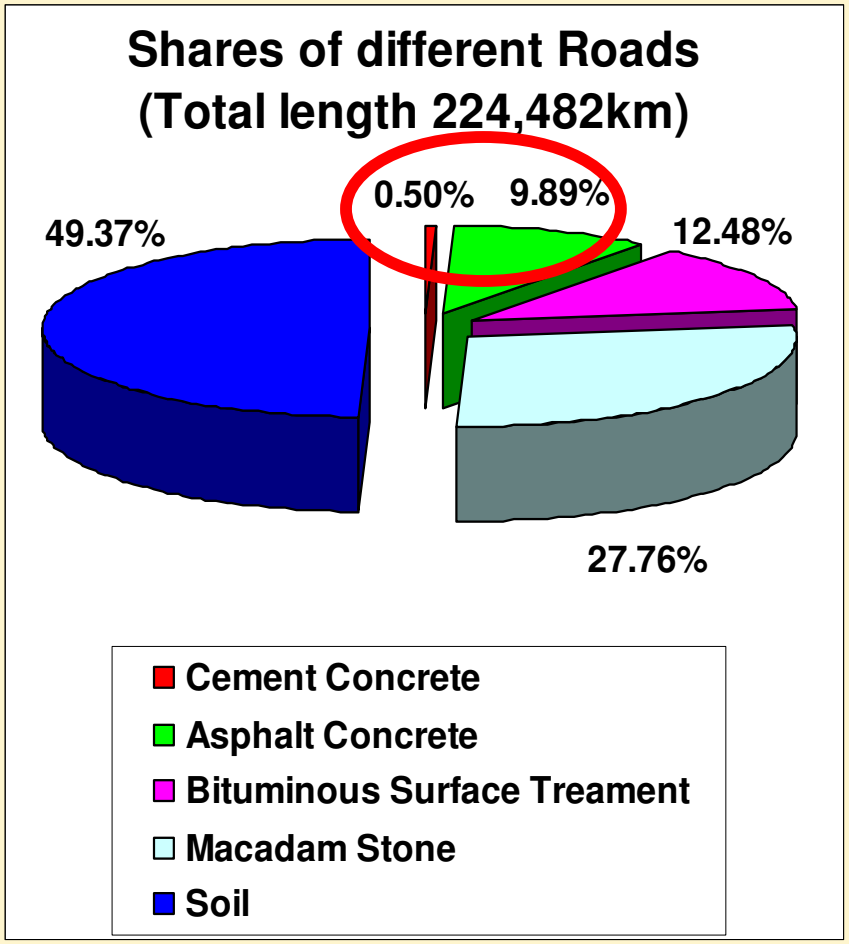
Shares of different Roads in the networks

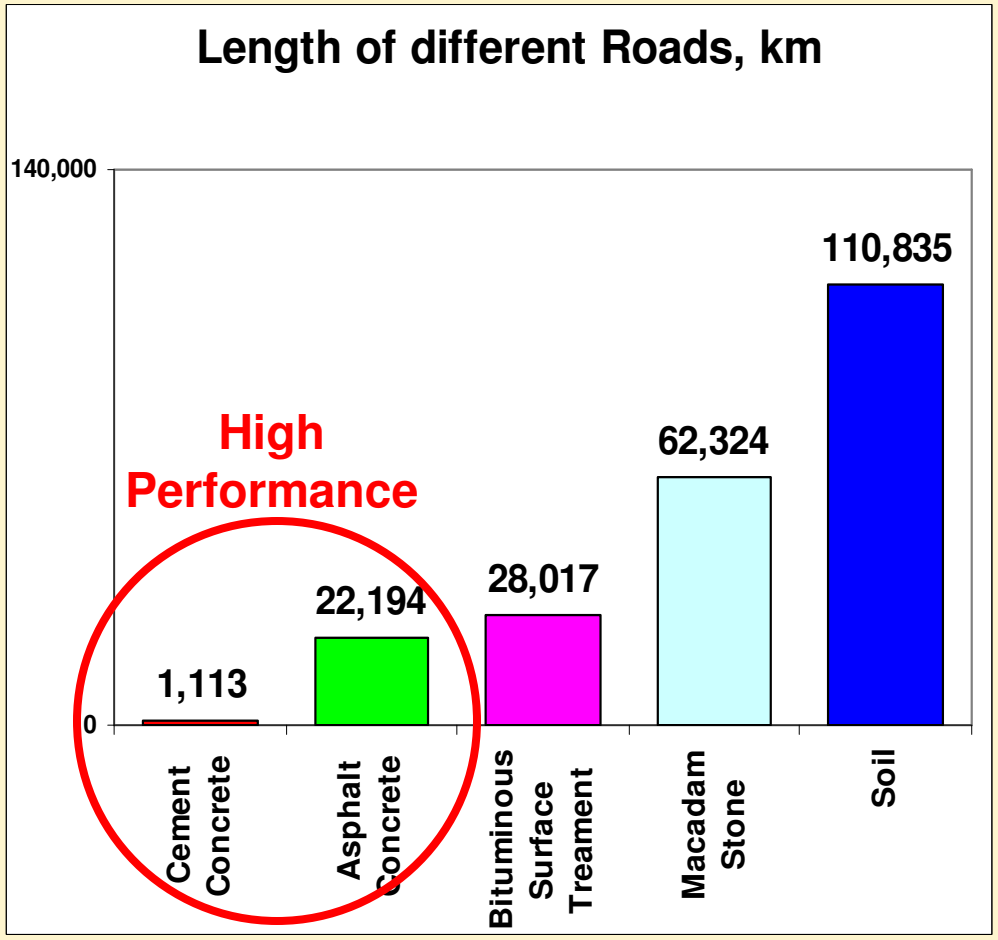




(Classes of roads are defined according to Highway Specification for Design, code TCVN 4054-1998)

Shares of different Roads in the networks based on types of pavement



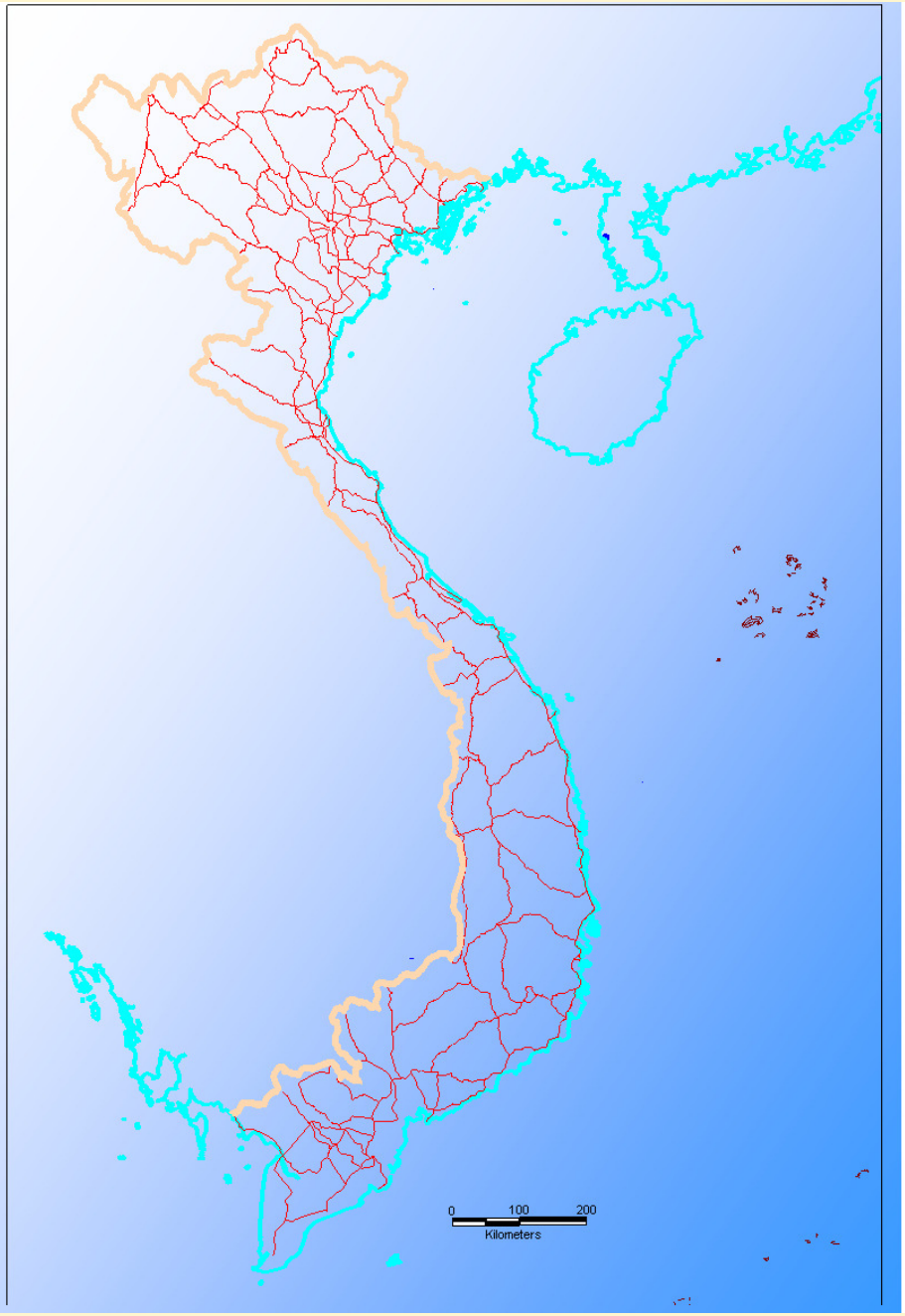


National Road

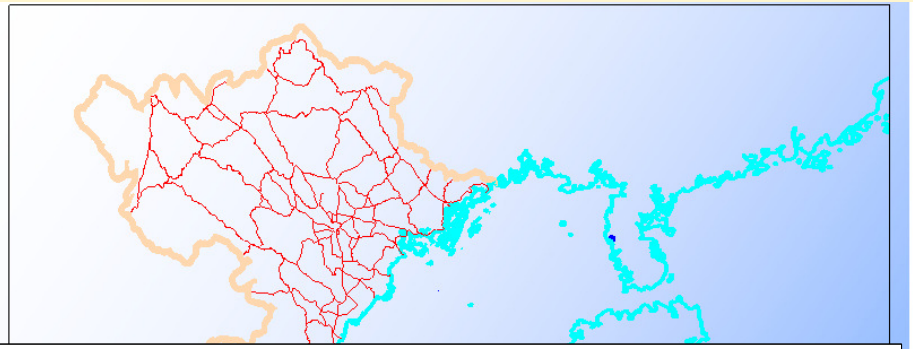
Total Length: 17,295 km

No.1, HoChiMinh Route
No.2, No.3, No.5, No.6, No.10,…

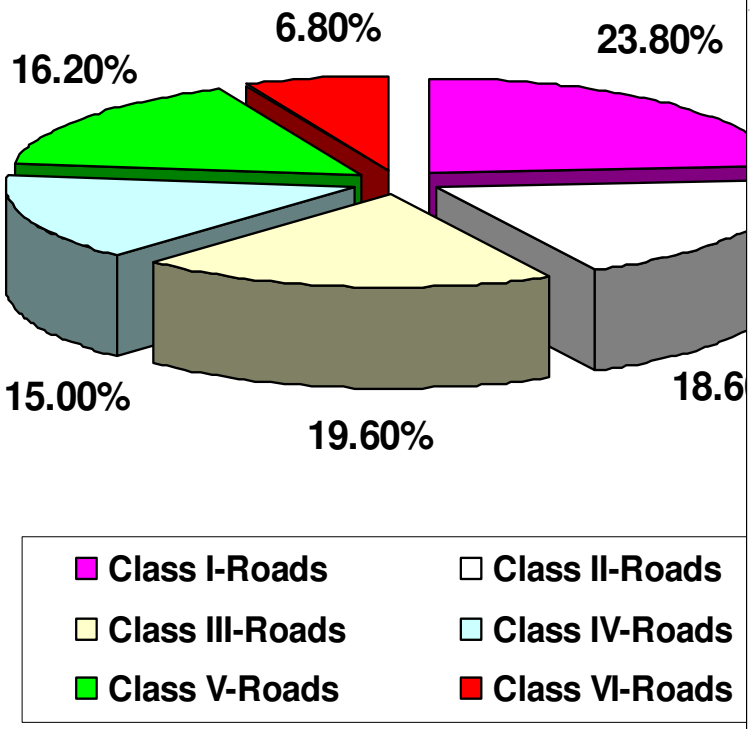
4.78km/100km2
0.2km/1000 inhabitants



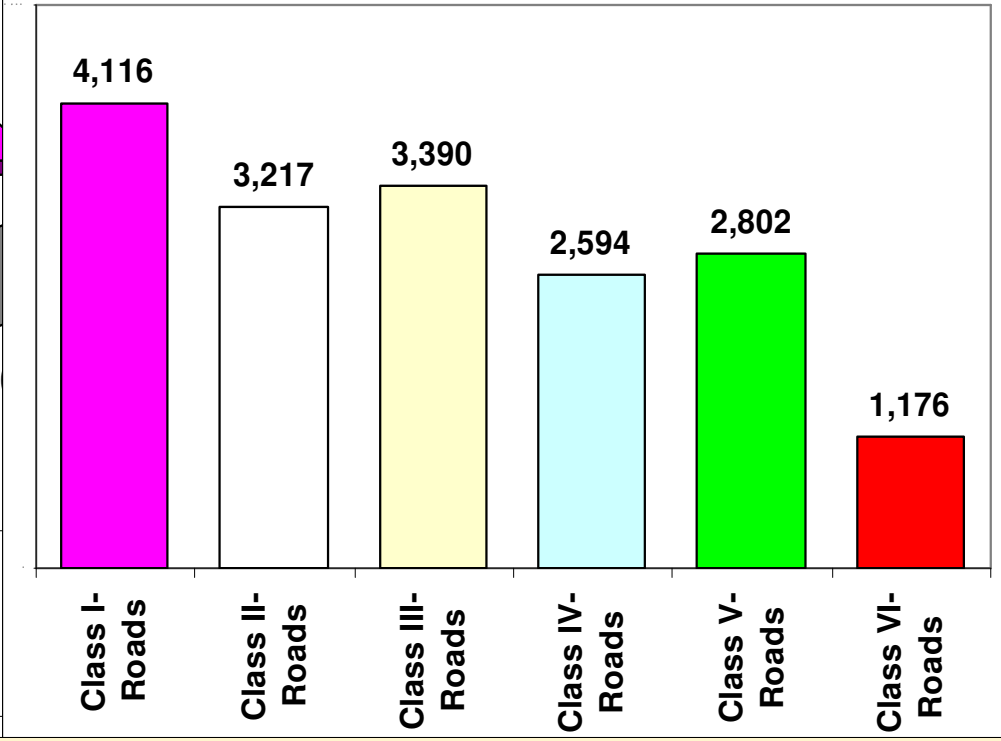
National Road



Share of different National roads in term of percentage
(Total length 17,295km)



Share of different National roads in term of length
(Total length 17,295km)



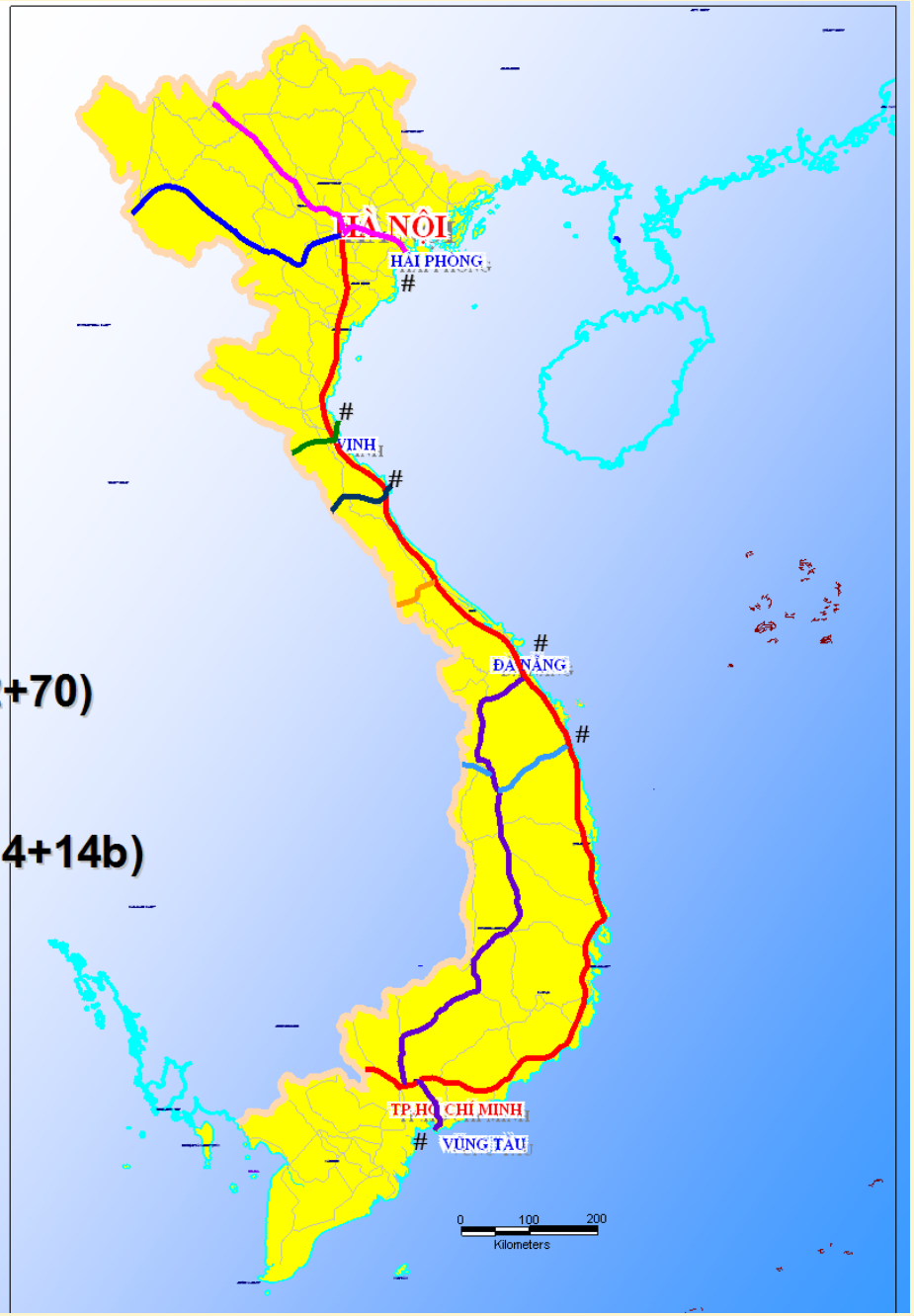
International Roads in Vietnam

ASEAN routes

Total length: 4237 km

There are eight routes:

- **AH-1 : 1786 km (QL:1+22)**
- **AH-13 : 504 km (QL:6+279)**
- **AH-14 : 428 km (QL:5+1+3+2+70)**
- **AH-15 : 82 km (QL:8)**
- **AH-16 : 82 km (QL:9)**
- **AH-17 : 1018 km (QL:51+13+14+14b)**
- **AH-131 : 147 km (QL:12A)**
- **AH-132 : 190 km (QL:24+40)**



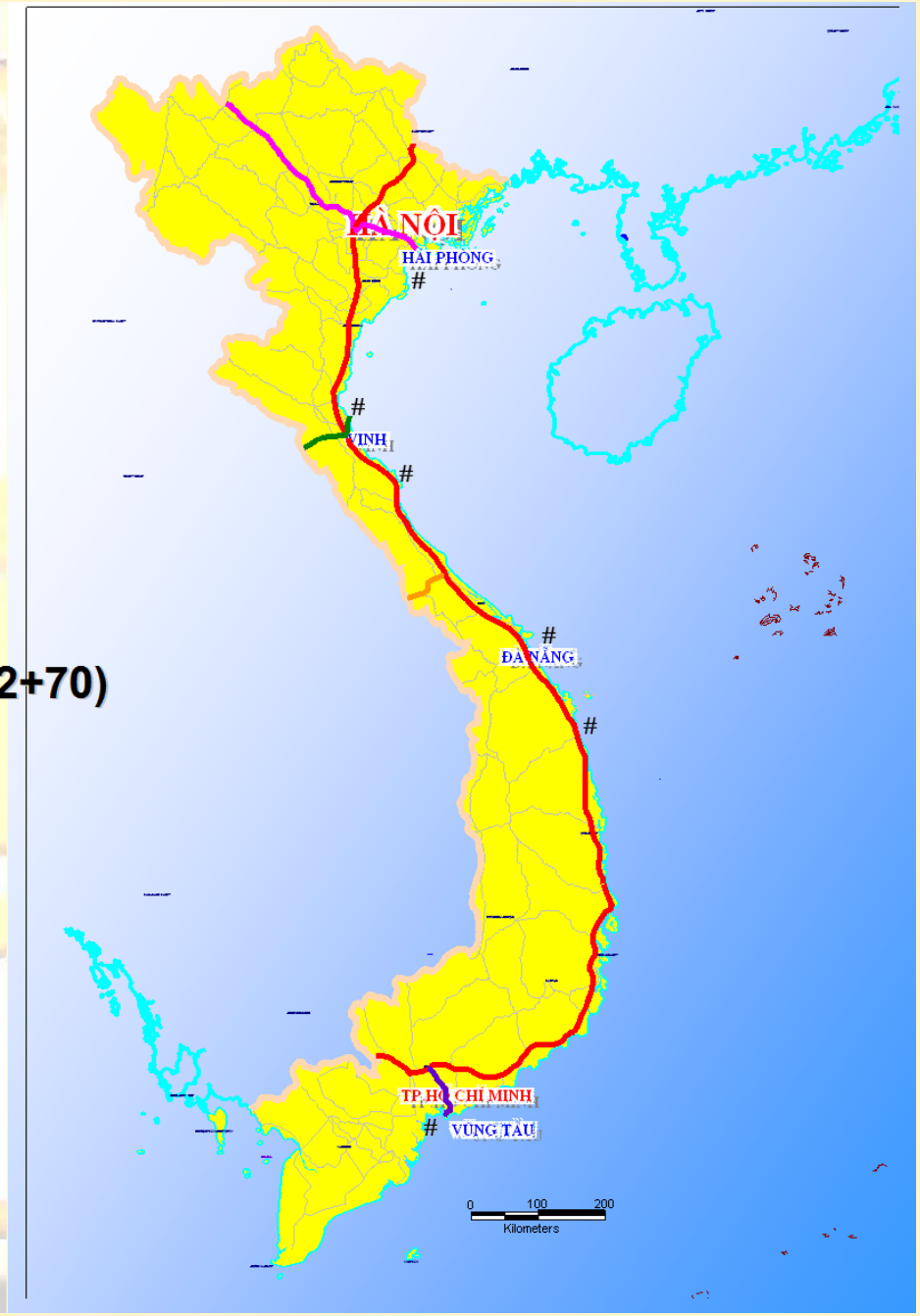
International Roads in Vietnam

Asian routes

Total length: 2570 km

There are five routes:

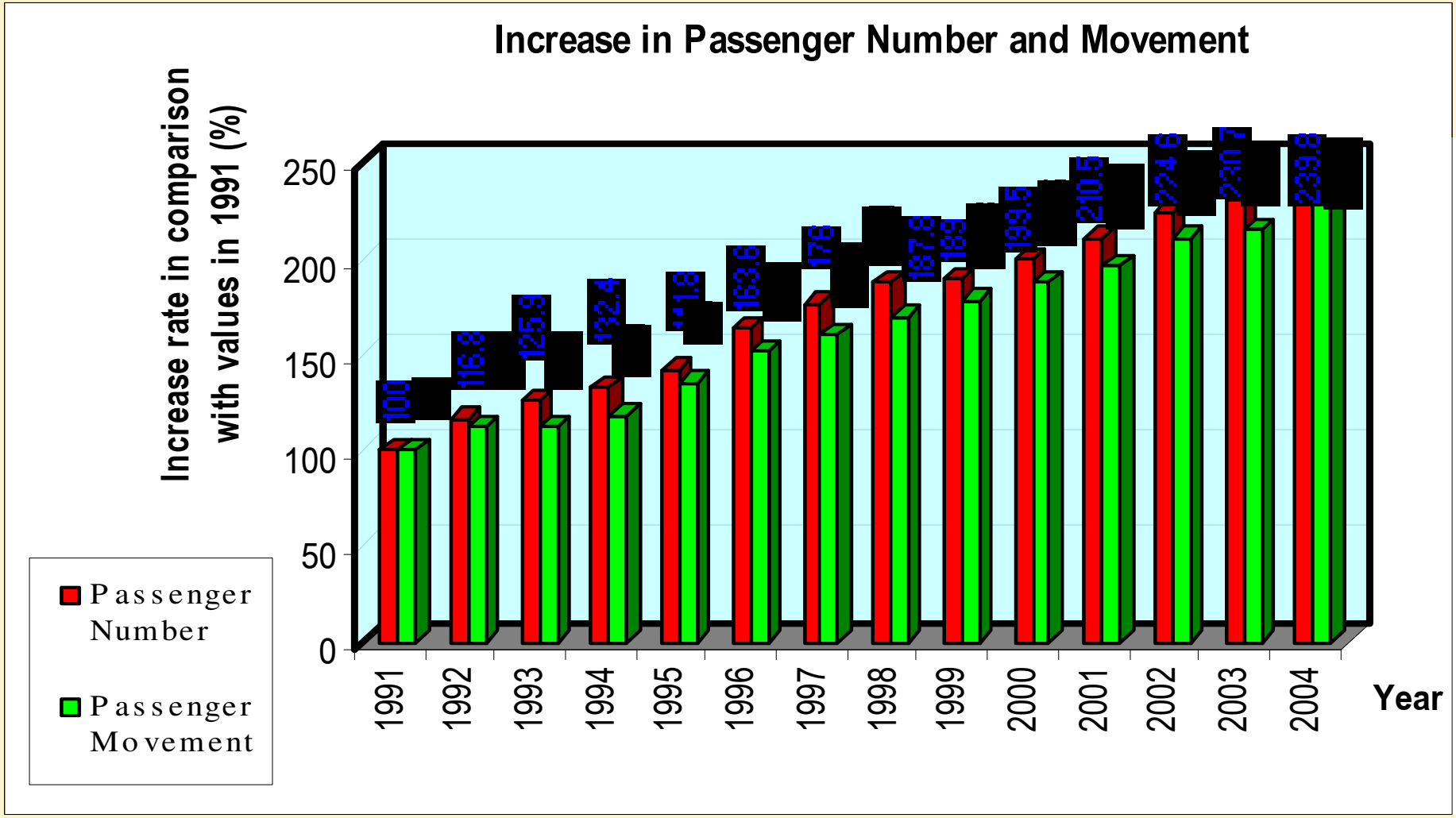
- **AH-1 : 1905 km (QL:1+22)**
- **AH-14 : 428 km (QL:5+1+3+2+70)**
- **AH-15 : 82 km (QL:8)**
- **AH-16 : 82 km (QL:9)**
- **AH-17 : 73 km (QL:51)**



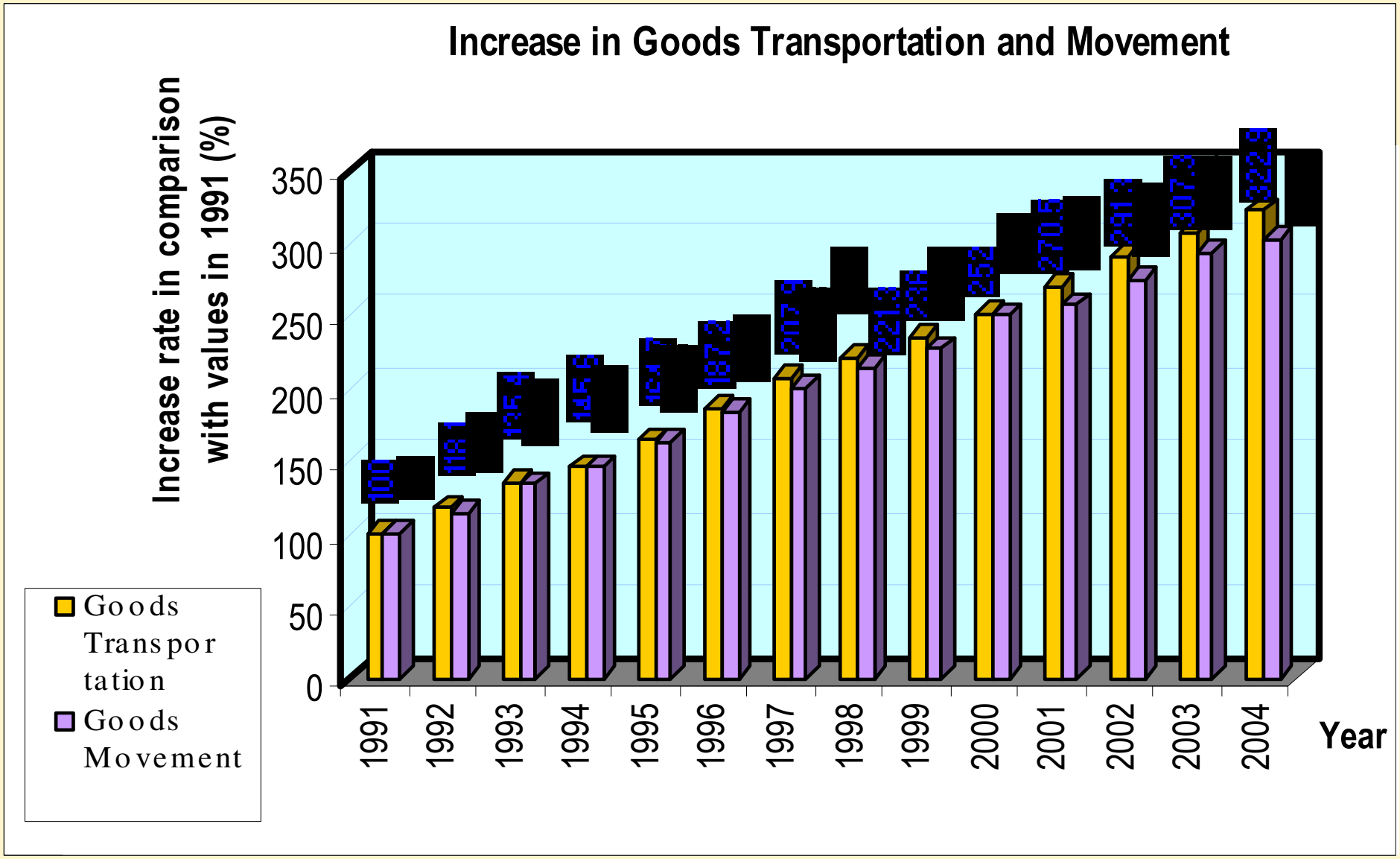
Conclusion about the road system ...

and traffic demand ?

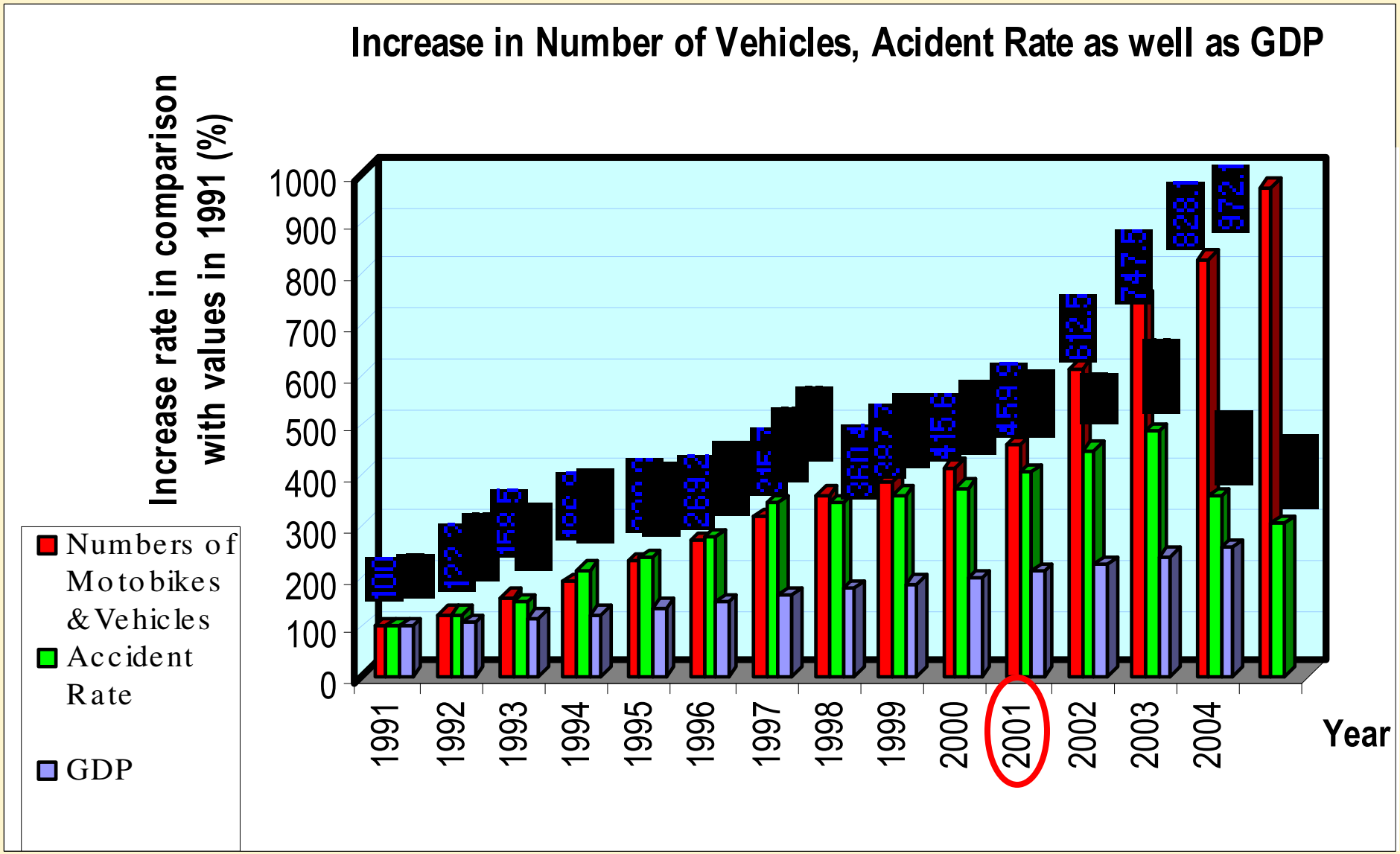
INCREASE IN PASSENGER NUMBER AND MOVEMENT



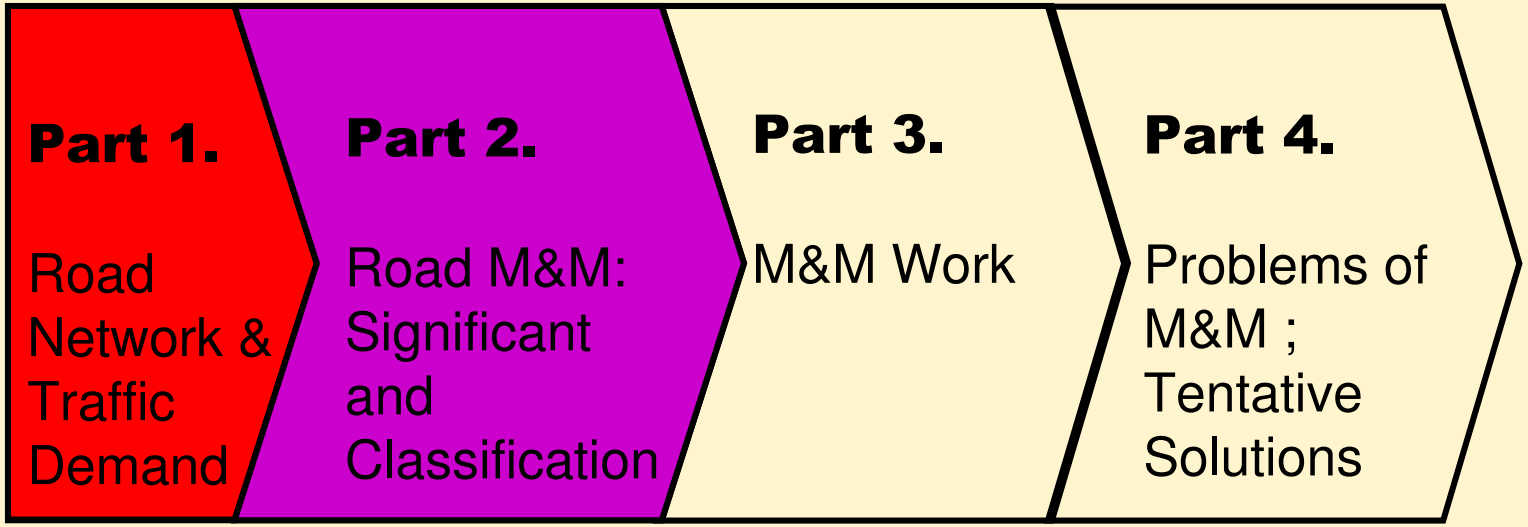
INCREASE IN GOODS TRANSPORTATION AND MOVEMENT



INCREASE IN NUMBER OF VEHICLES, ACIDENT RATE AS WELL AS GDP



Contents


Part 1.
Road Network & Traffic Demand
Part 2.
Road M&M: Significant and Classification
Part 3.
M&M Work
Part 4.
Problems of M&M ; Tentative Solutions

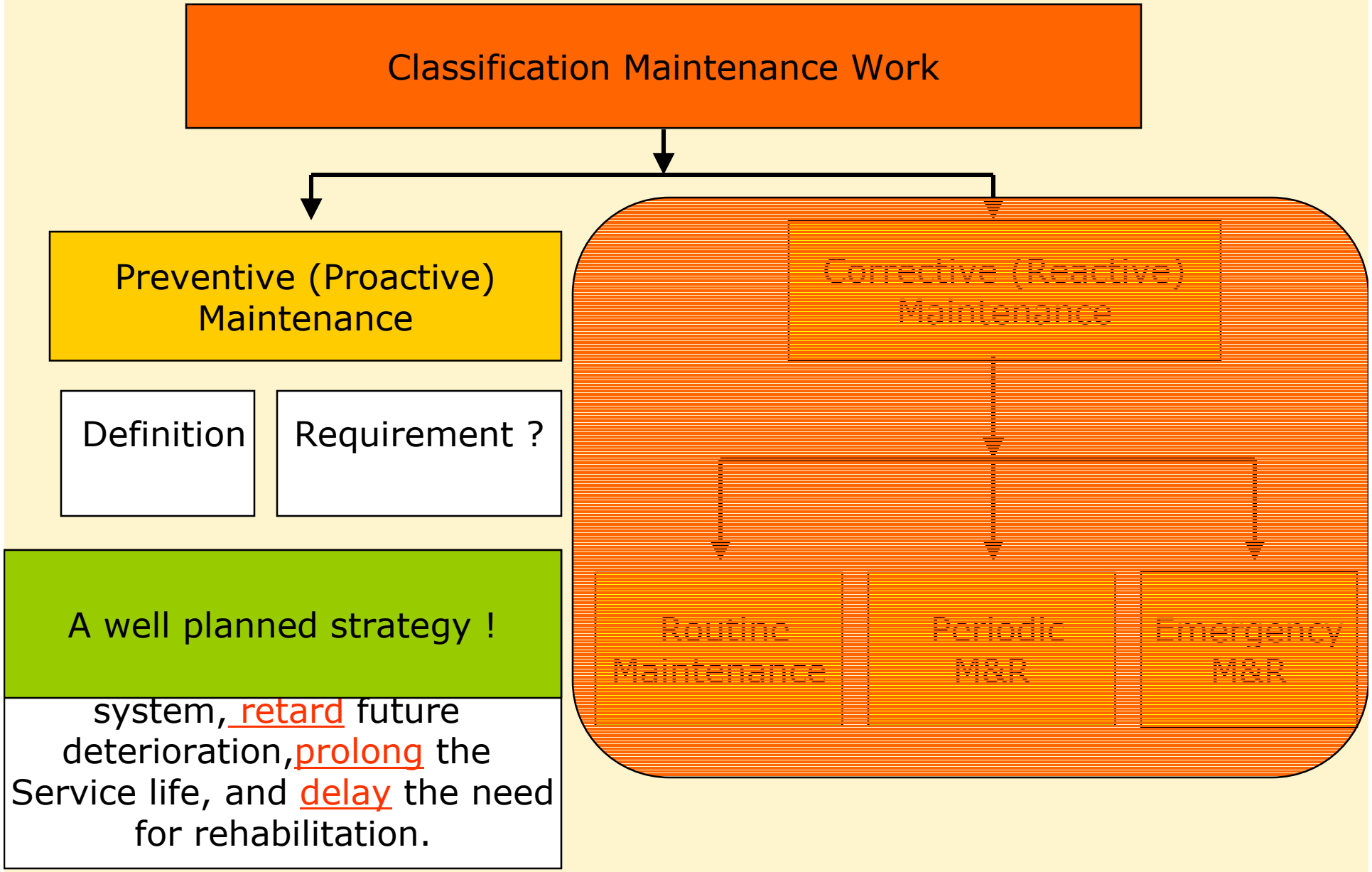
Part 2-1. Definition for Road Mainteance

* Road maintenance comprises “activities to keep pavement, shoulders, slopes, drainage facilities and all other structures and property within the road margins as near as possible to their as-constructed or renewed condition” (PIARC 1994).

* Work that preserves the riding qualities, safety characteristics, functional serviceability, and structural integrity of the facilities that comprise the roadways on the highway system.

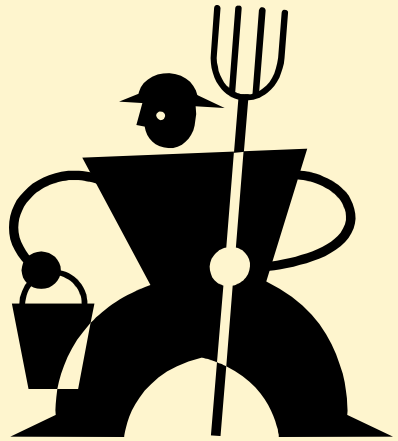
  Maintenance comprises of only the work necessary to preserve the road asset in an acceptable operating standard. It does not add or extend the asset (SMEC 2002).

Part 2-2. Classification of Road Mainteance



Corrective maintenance/ Routine maintenance

Routine maintenance, which comprises small-scale works conducted regularly, aims "to ensure the daily pass-ability and safety of existing roads in the short-run and to prevent premature deterioration of the roads" *(PIARC 1994).*



For Pavement, RM covers such activities as:

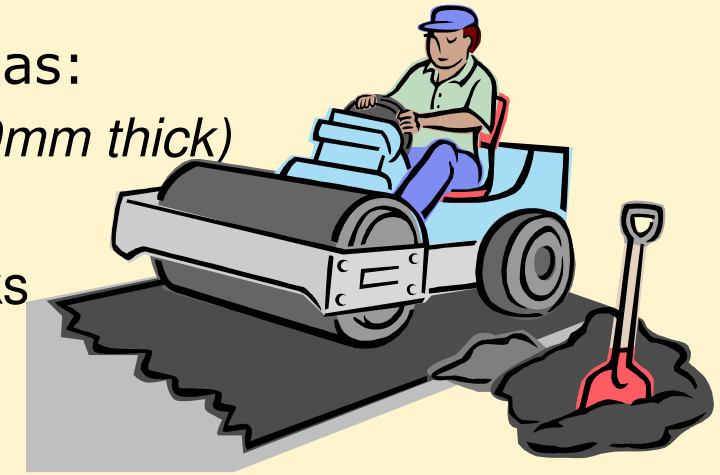
1. Patch potholes and local failures;
2. Seal cracks in bituminous surfaces;
3. Patch broken pavement edges;
4. Regulate sharp depressions and rutting;
5. Repair spalled concrete;
6. Seal cracks in concrete with grout or bitumen;
7. Pothole patch & restore camber in gravel pavements;
8. Restore shape of shoulder; restore shape and grade of drains

Corrective maintenance/ Periodic maintenance

Activities carried out on a regular basis and relatively long intervals to restore the integrity of the existing road facility, to prolong its service life and/or to ensure the safety of the road users.
The activities are cyclic, predictable, the work planned and tend to be large scale, requiring specialized equipment and skilled personnel.

For Pavement, PM covers such activities as:

1. Thin asphalt overlays *(usually less than 50mm thick)*
2. Surface dressings *(SBST, DBST, TBST)*
3. Replace joint sealant; grout concrete cracks
4. Replace failed concrete slabs;
5. Re-gravel (up to 100 mm thick)



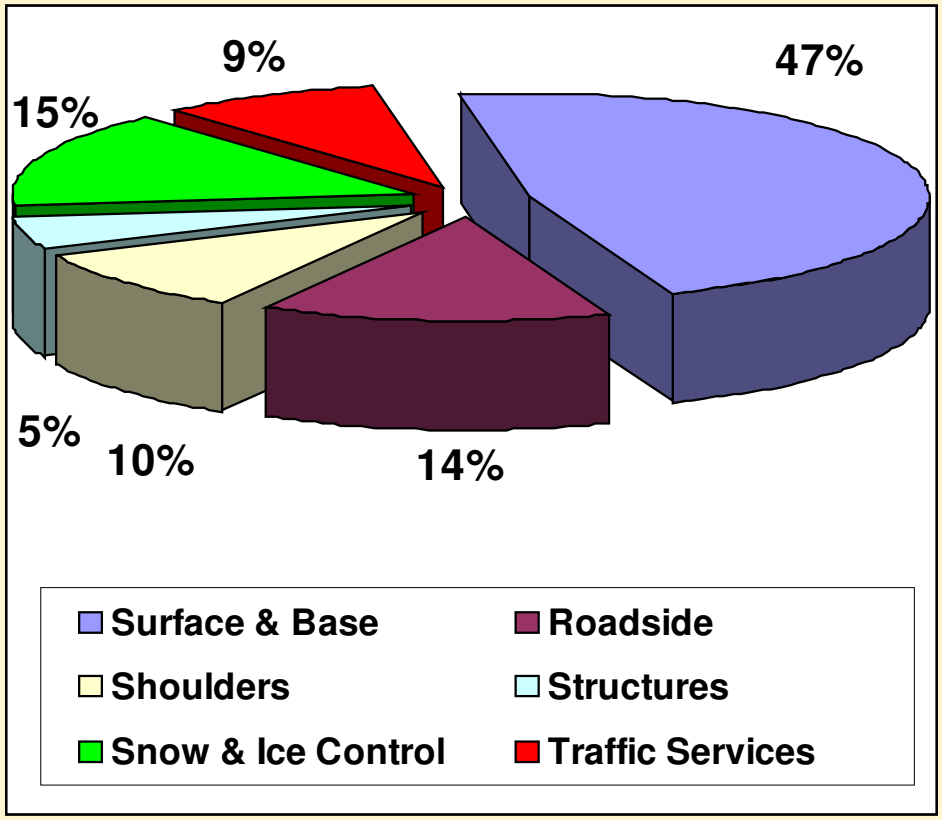
Lack of application new M&R technologies: Cheaper, more durable, faster,… (VTO, Micro Surfacing, Slurry Surfacing, Fog seal, Chip seal, etc).

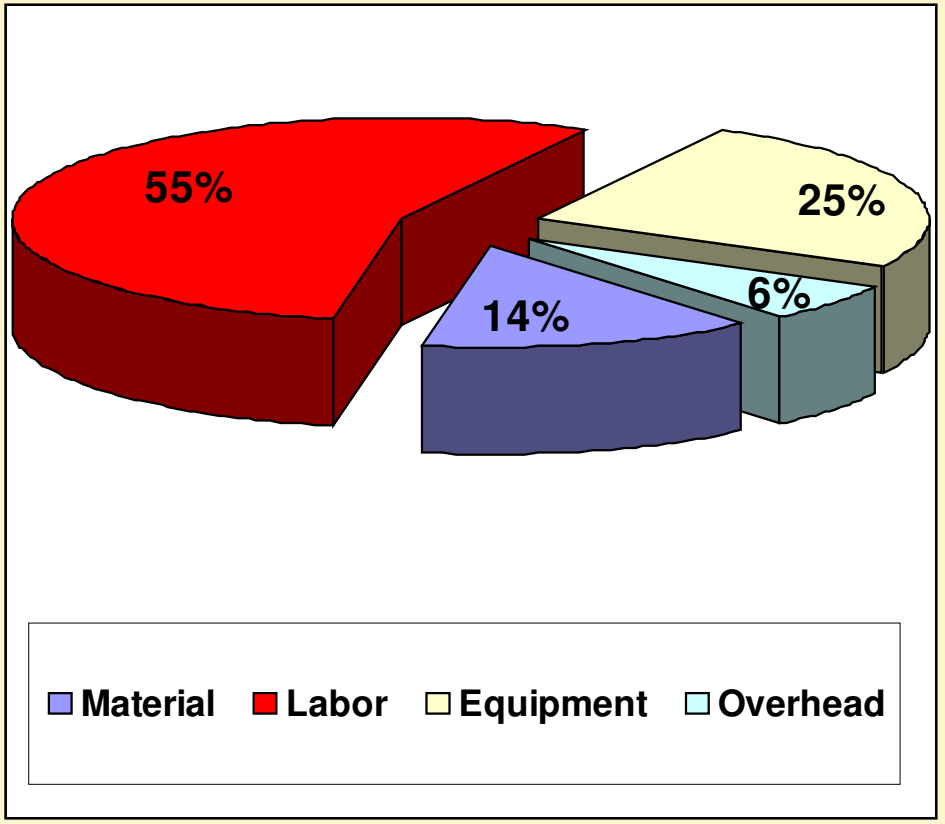
Corrective maintenance/ Emergency maintenance

Activities requiring rapid response to restore the asset to keep it open and make safe for the user. Emergency maintenance generally results from crashes, floods and landslides, etc.

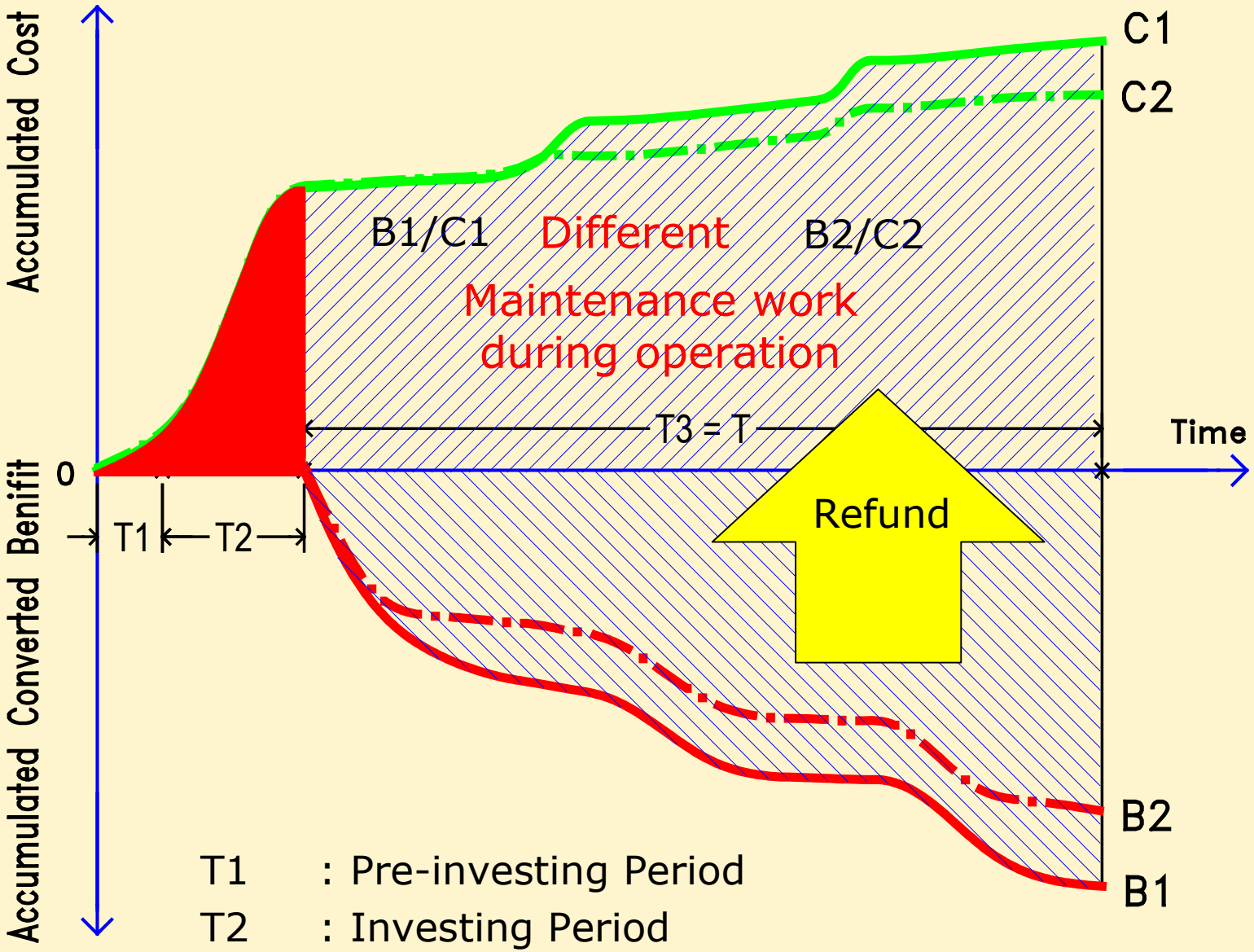
Part 2-2. Classification of Road Mainteance

Services and cost distribution for Road maintenance (Data of USA)





Part 2-3. Signification of Road Mainteance



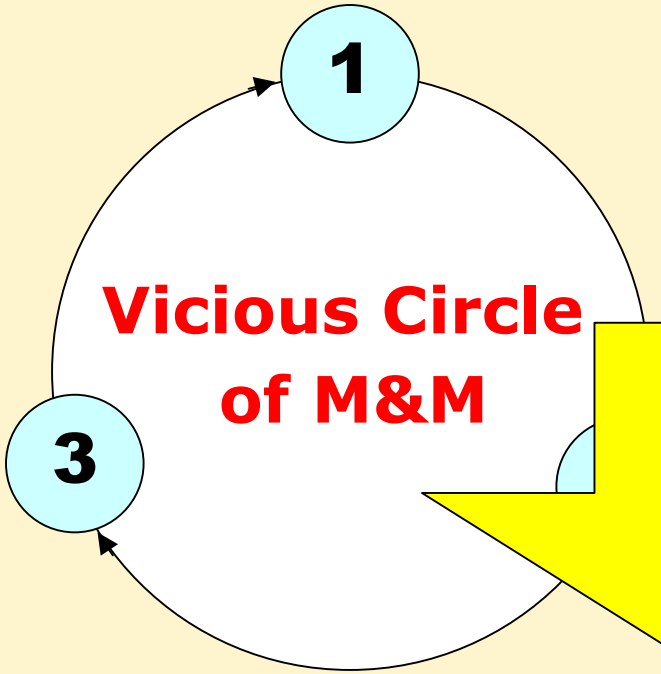
T1 : Pre-investing Period

T2 : Investing Period

T3=T : Operating Period = Planed Life Cycle

Part 2-3. Signification of Road Mainteance

Planned and timely maintenance will minimize the deterioration of the road and help to prevent expensive rehabilitation. *(MOT 2003)*



1. Borrow money for new construction or Rehabilition roads.

2. Poor M&M cause fast deterioration of s and reduce the quality of the e system.

money for repair the critical rated roads.

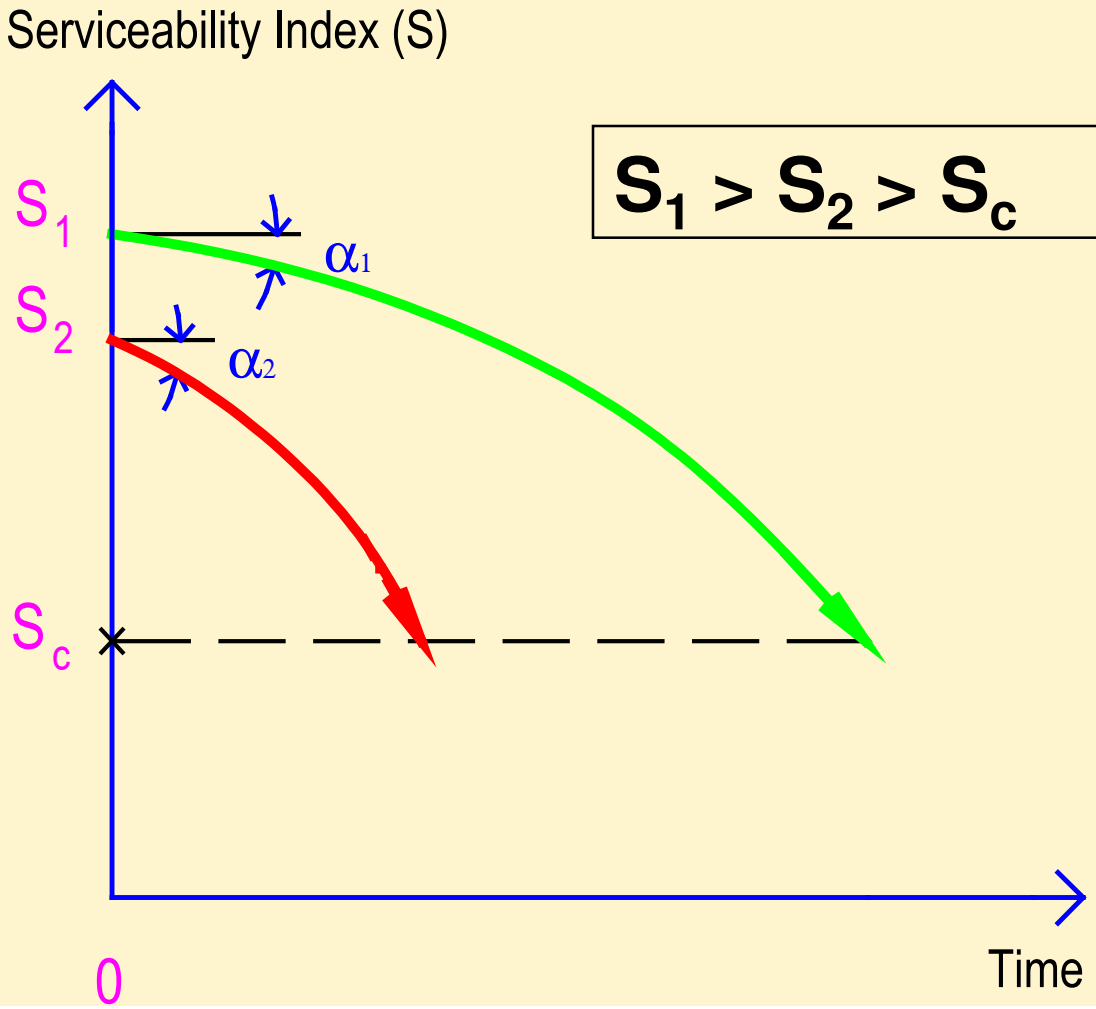
Vietnamese enance, rehabilitatio long term for the com

For the whole Roads network:
The more investment, the less effective !

Part 2-3. Signification of Road Mainteance

Retard the deterioration process of the road especially for low capacity roads.

The capacity of Vietnamese roads netwrork: Low => The deterioration rate is high.

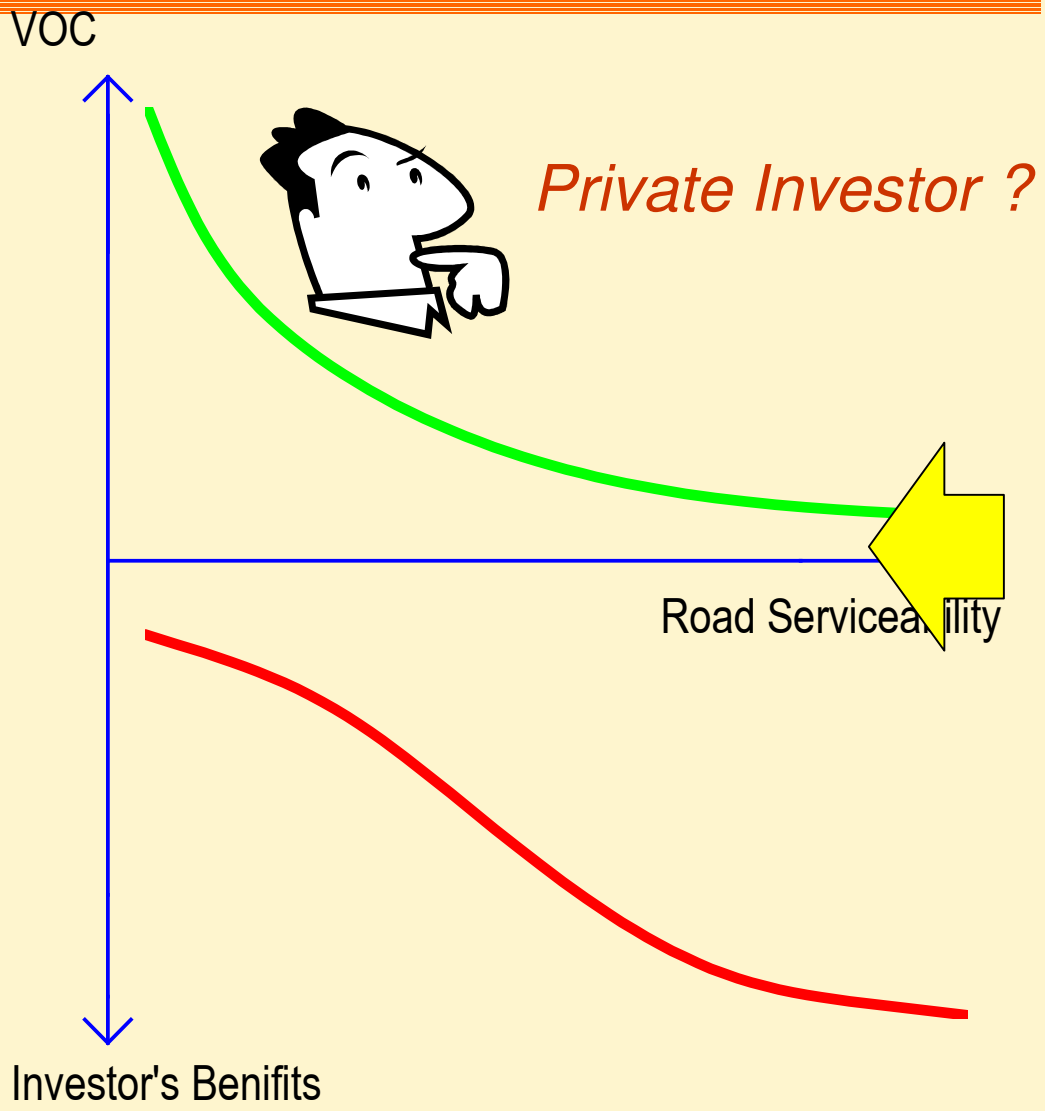


$S_1 > S_2 > S_c \quad => \quad \alpha_2 > \alpha_1$

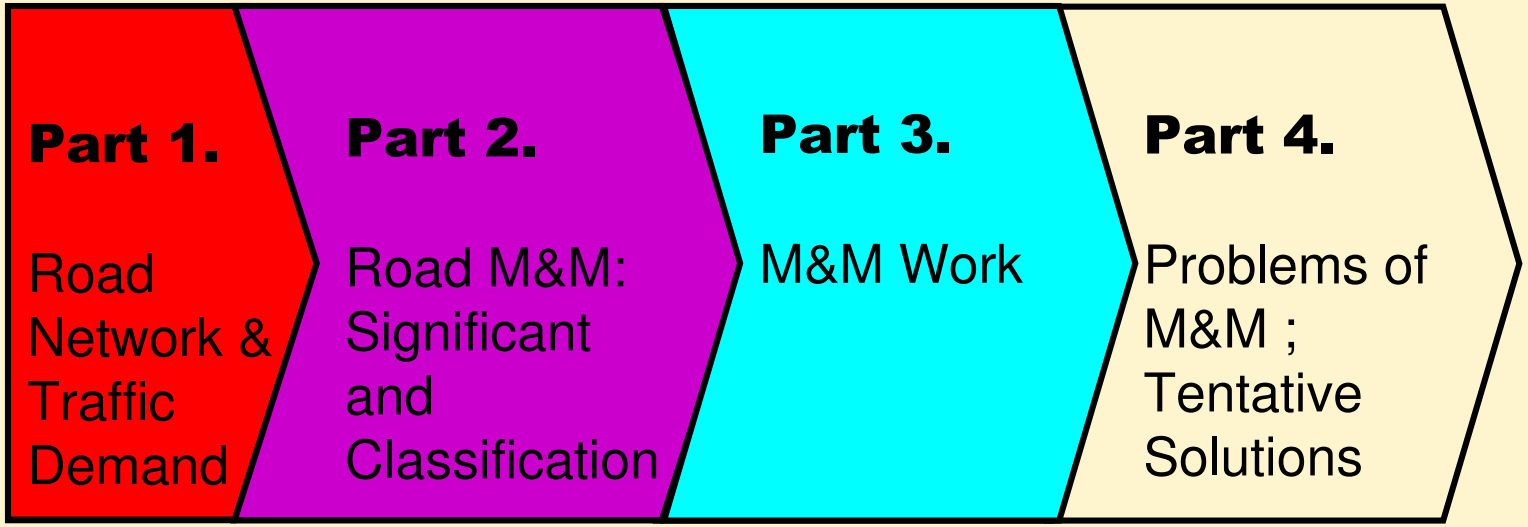
Part 2-3. Signification of Road Mainteance

Delayed and poor maintenance have indirect costs and loose potential benefits for influence area of roads.

Resulting in increased Vehicle Operating Costs and a reluctance by transport operators to use the roads.
This imposes a heavy burden on the economy: as passenger and freight services are curtailed, there is a consequent loss of economic and social development opportunities.

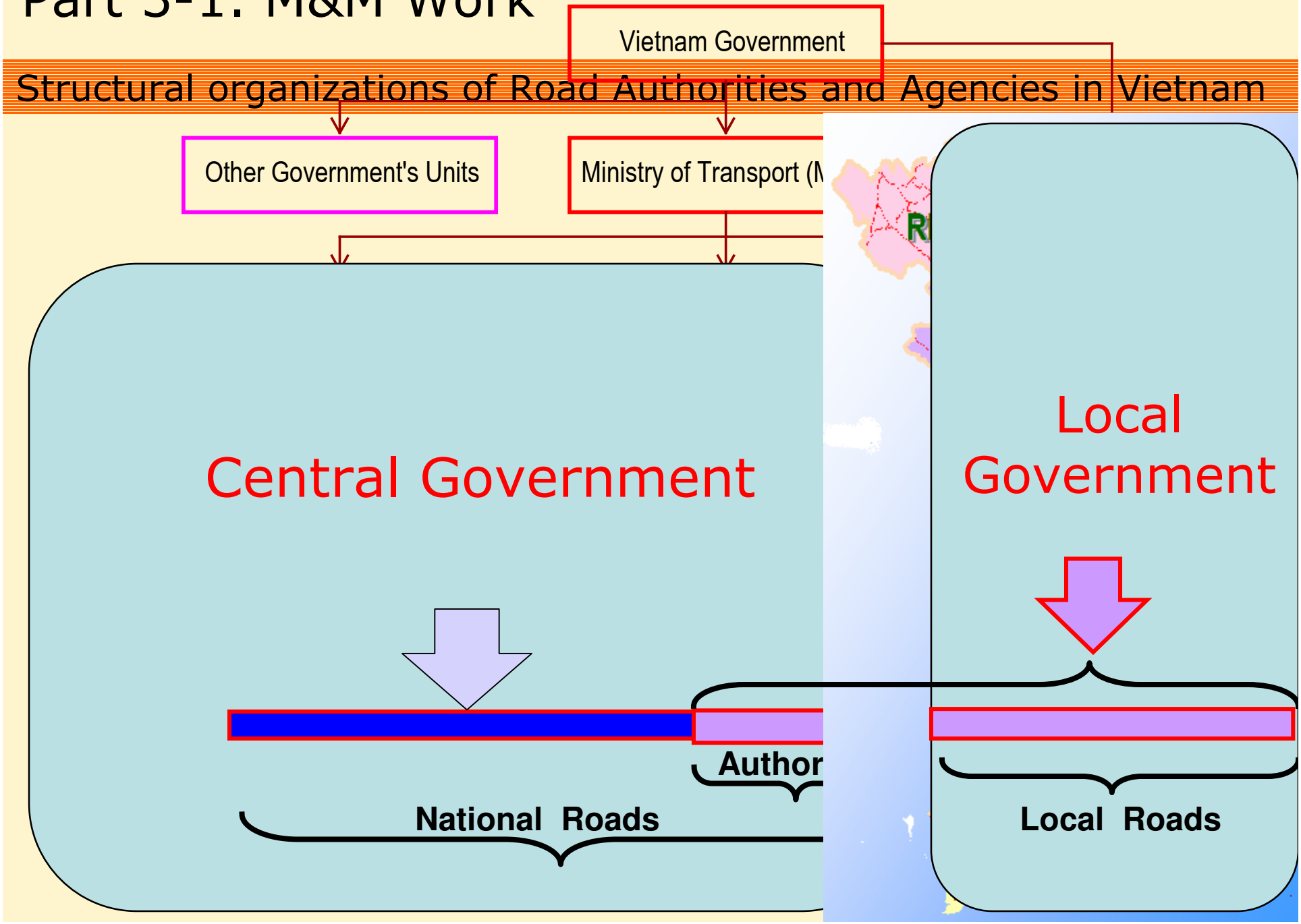


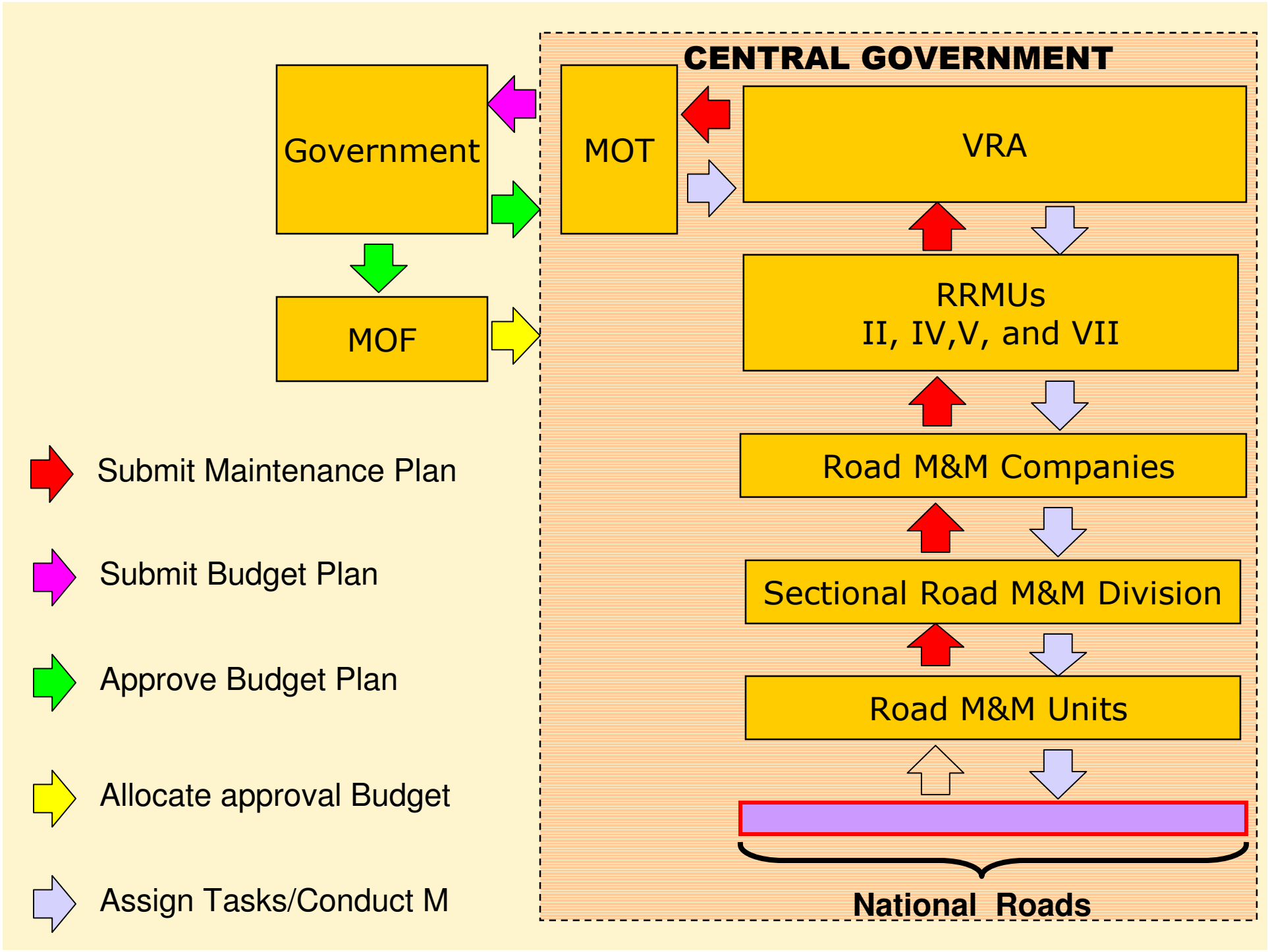
Contents

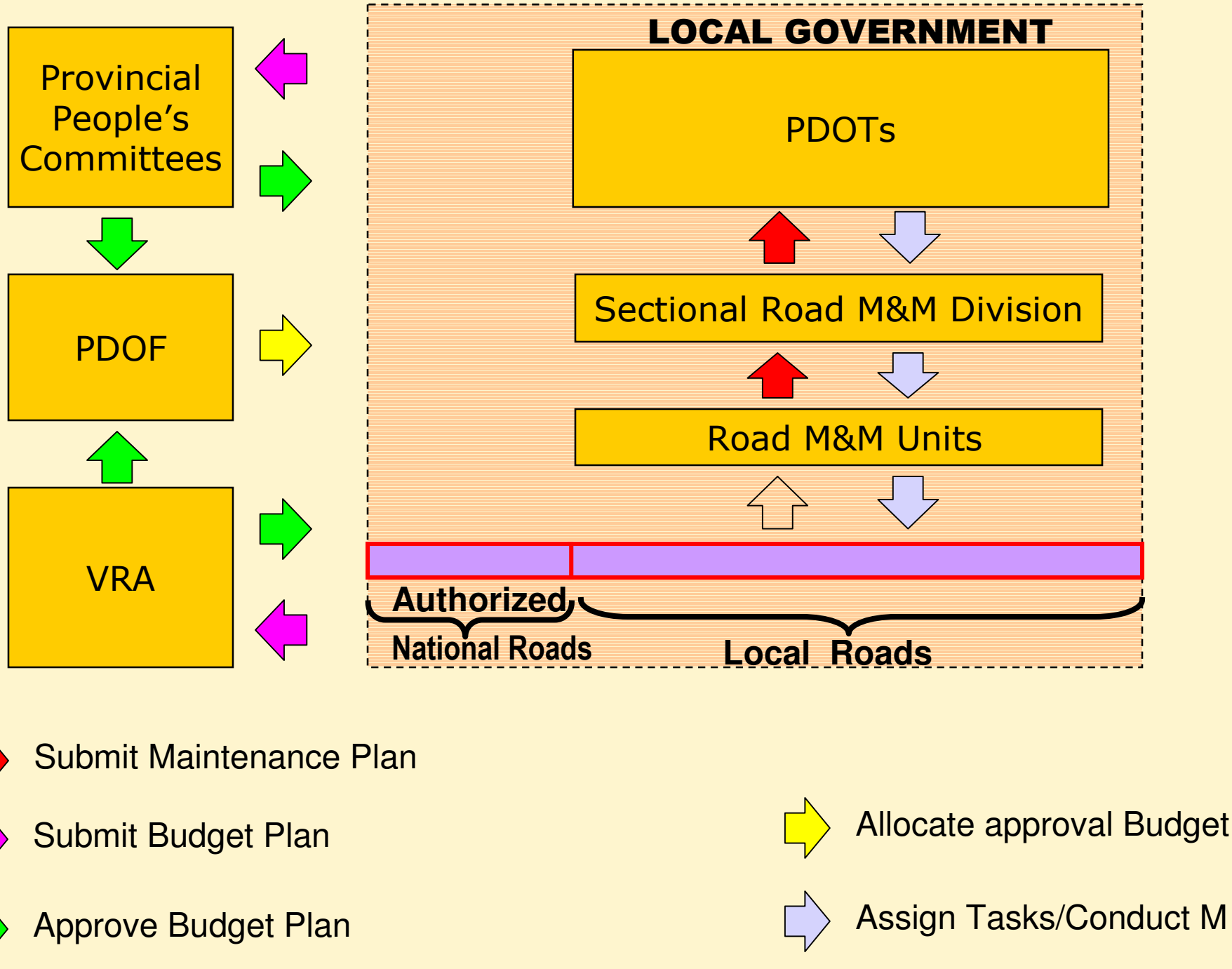

Part 1.
Road Network & Traffic Demand
Part 2.
Road M&M: Significant and Classification
Part 3.
M&M Work
Part 4.
Problems of M&M ; Tentative Solutions

Part 3-1. M&M Work

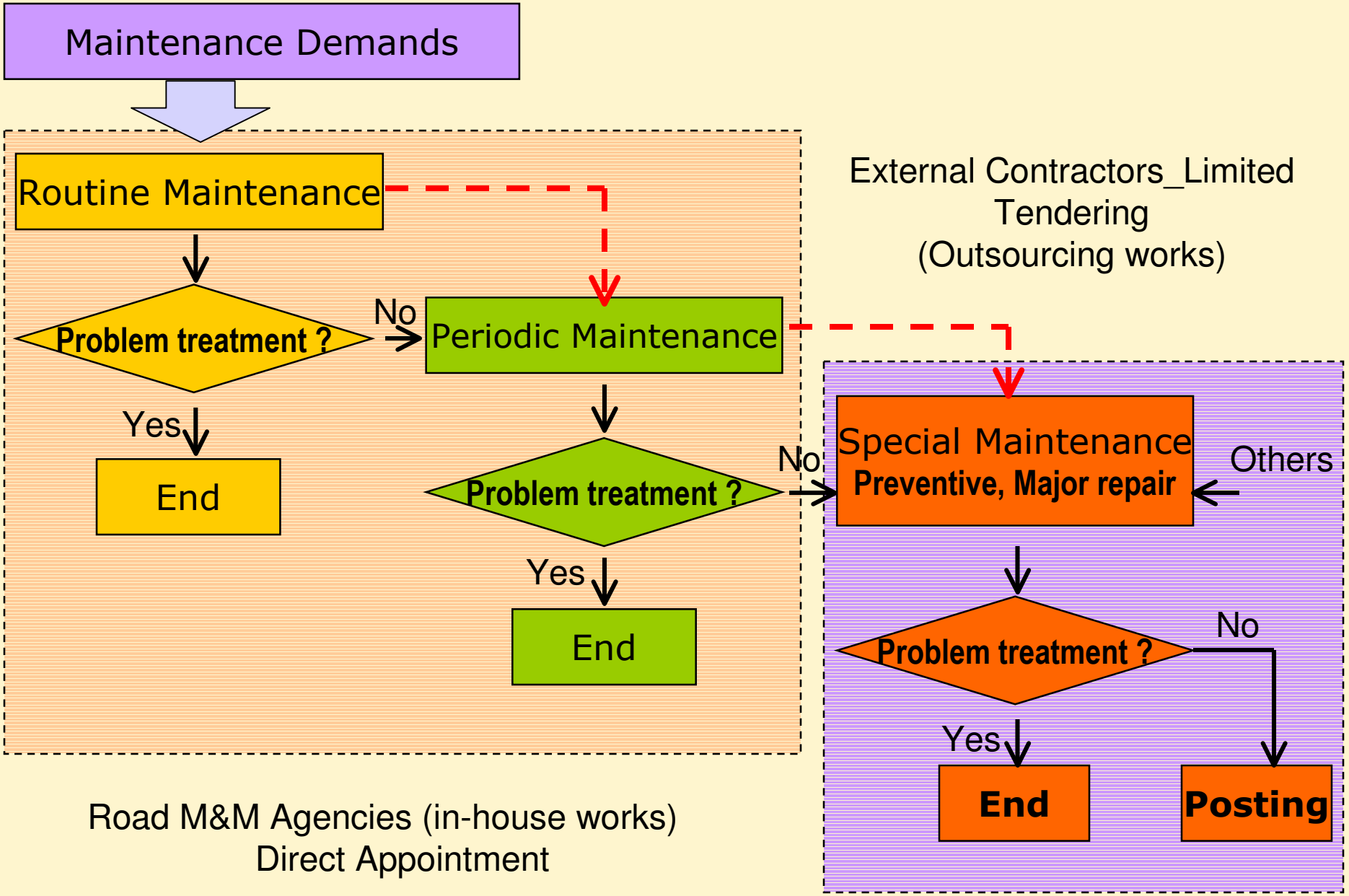
Structural organizations of Road Authorities and Agencies in Vietnam



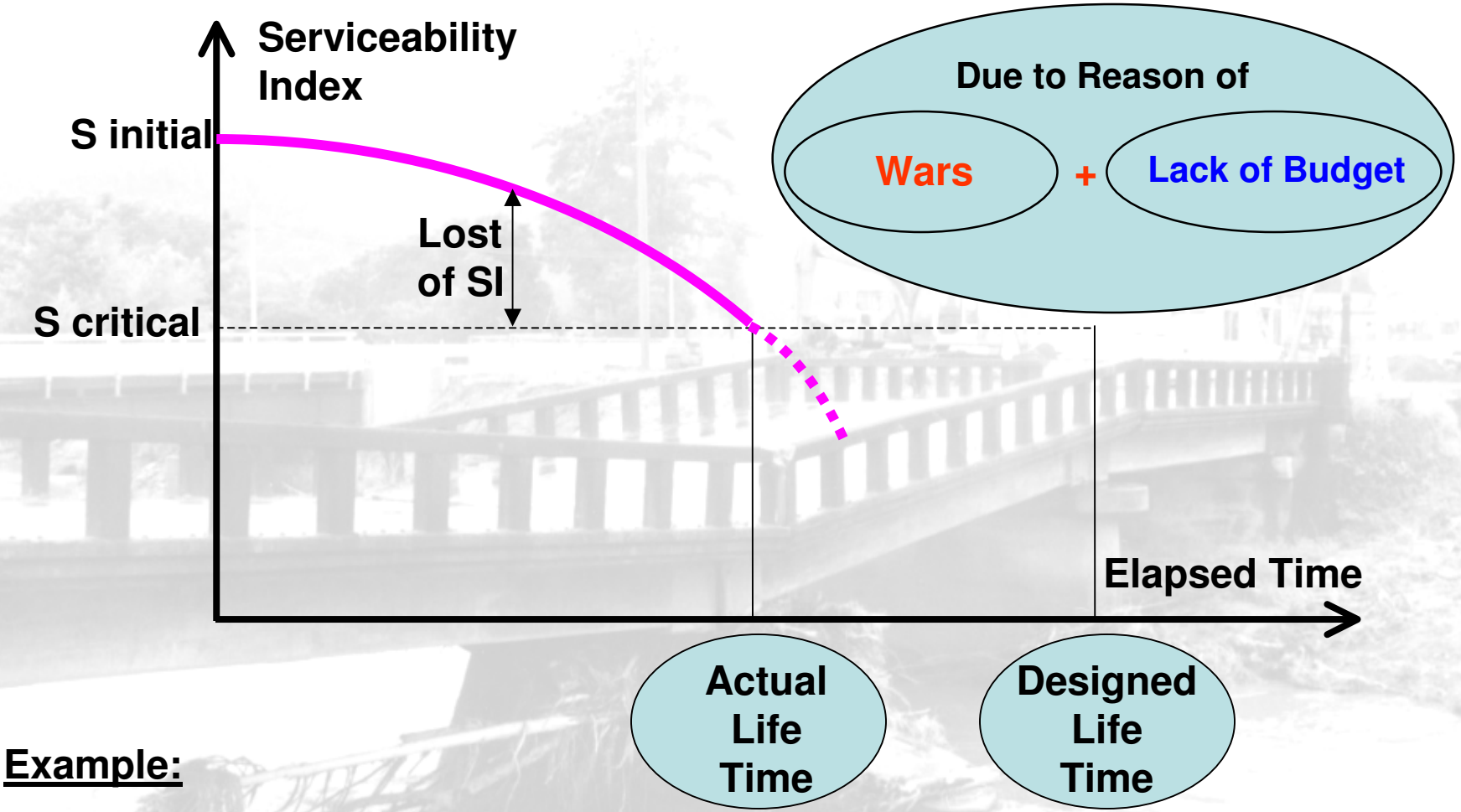

CENTRAL GOVERNMENT
Government
MOT
VRA
MOF
RRMUs
II, IV,V, and VII
Road M&M Companies
Sectional Road M&M Division
Road M&M Units
National Roads
Submit Maintenance Plan
Submit Budget Plan
Approve Budget Plan
Allocate approval Budget
Assign Tasks/Conduct M


Provincial People's Committees
PDOF
VRA
LOCAL GOVERNMENT
PDOTs
Sectional Road M&M Division
Road M&M Units
Authorized
National Roads
Local Roads
Submit Maintenance Plan
Submit Budget Plan
Approve Budget Plan
Allocate approval Budget
Assign Tasks/Conduct M

Part 3-1. M&M Work/Produce of maintenance



Roads Operation without Maintenance

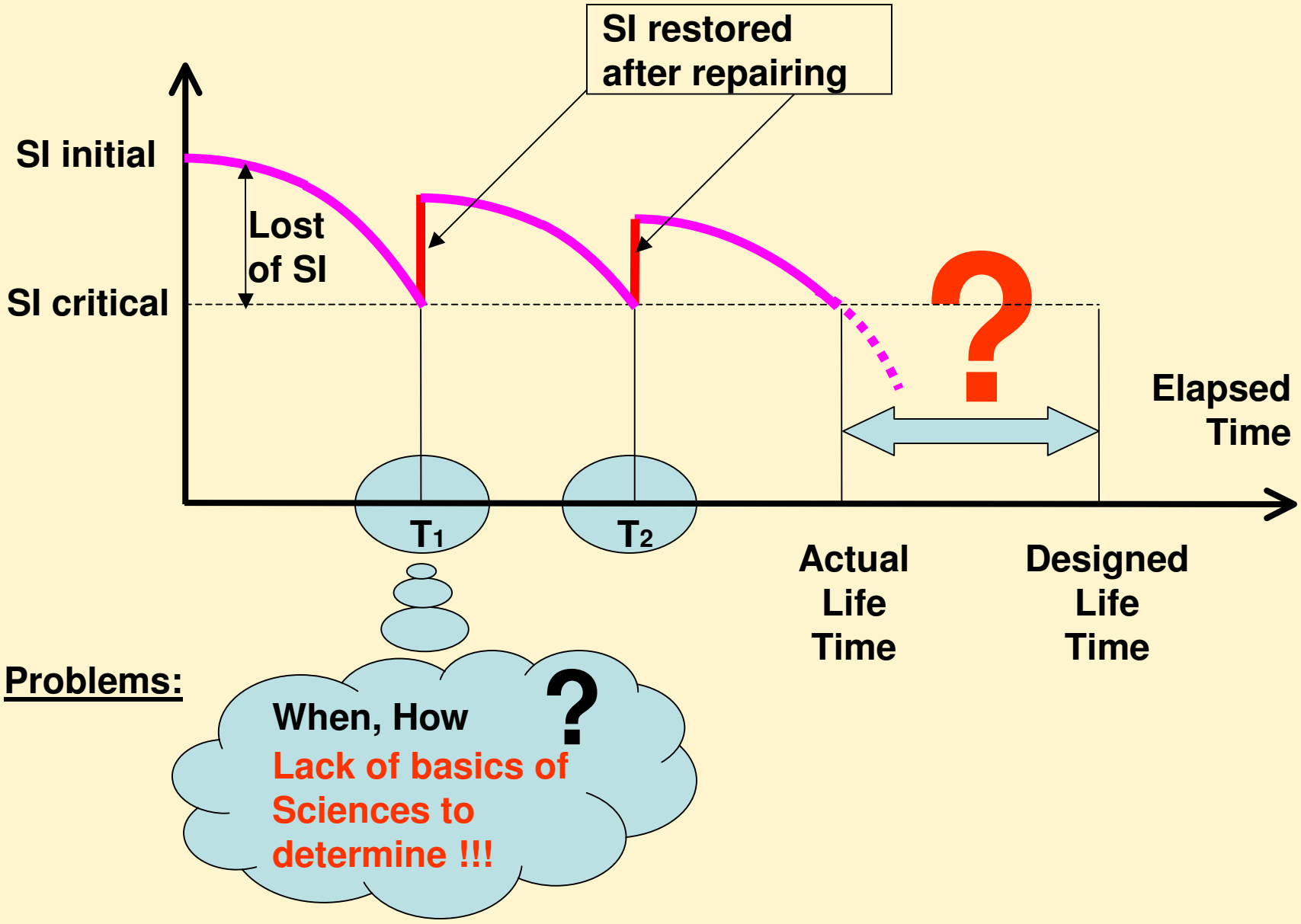


Example:

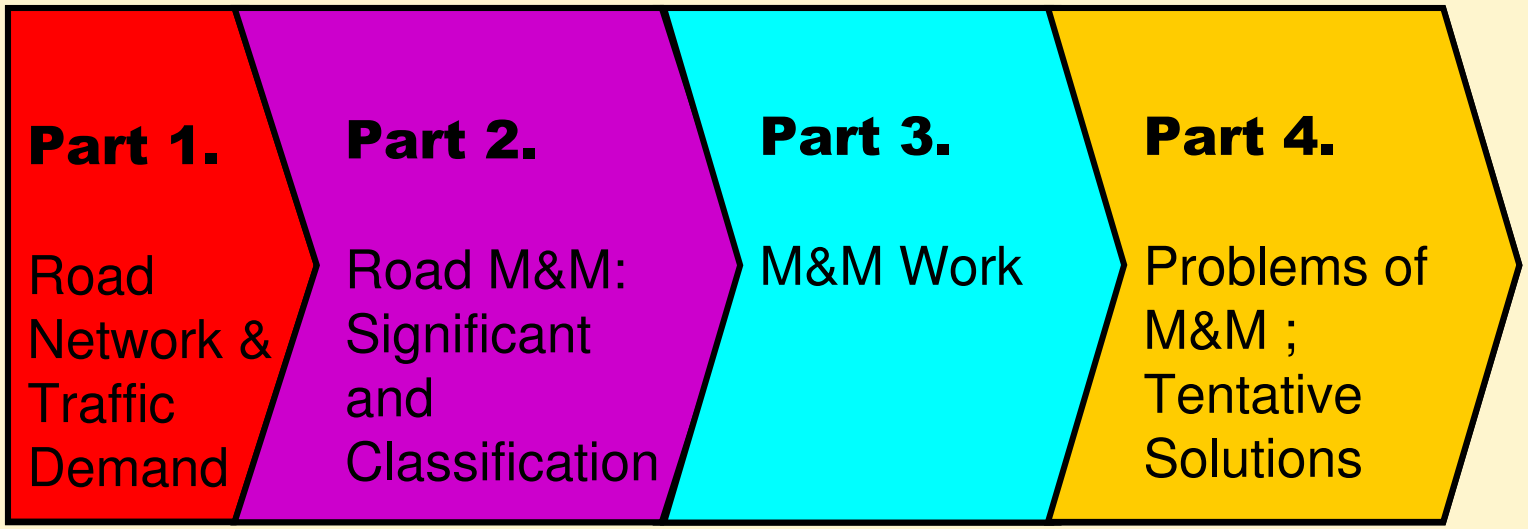
Rao Bridge in HaiPhong Province: Operated without any maintenance, so collapsed in 1987 with Life Time of 7 years 4 months.

Railway Tunnels System: built by French in 1920's, very poor maintenance for 70 years, so in 1993 Tunnel No.7 through HaiVan Pass collapsed.

Roads Operation with Maintenance
(Remarkable Progress)



Contents

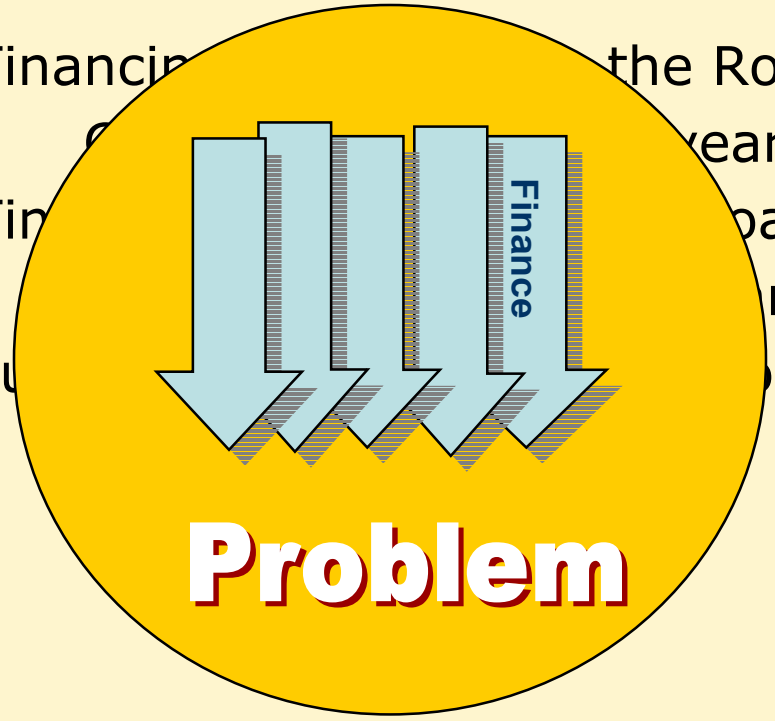

Part 1.
Road Network & Traffic Demand
Part 2.
Road M&M: Significant and Classification
Part 3.
M&M Work
Part 4.
Problems of M&M ; Tentative Solutions

Part 4-1… /Lack of Budget

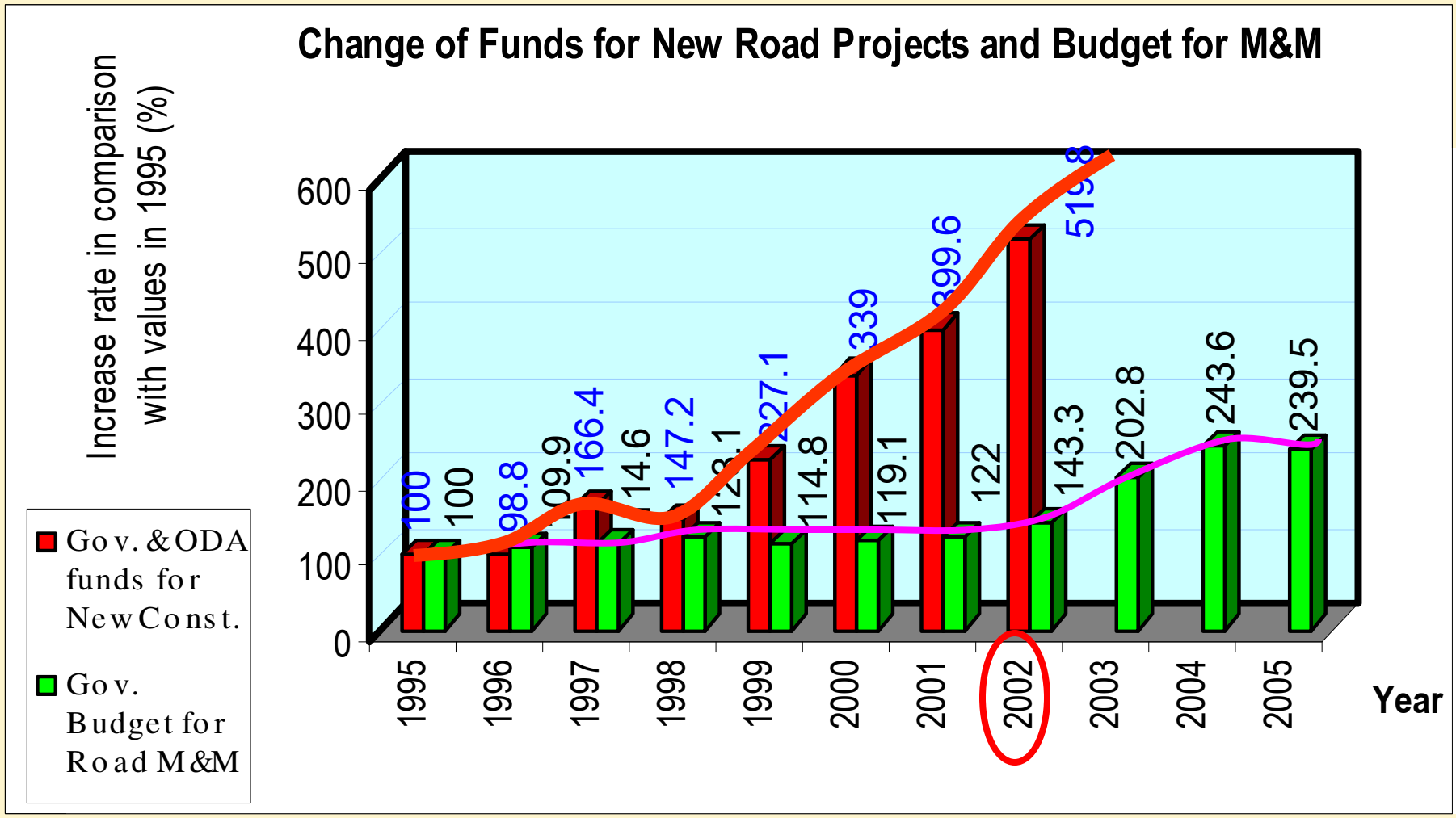
Government Budget ! But Insufficient !!!

Vietnam Road Infrastructure Master Plan up to 2010 and Orientation to 2020:

+ Financi… the Road System:
  C… …ear
+ Fin… …oad System:
  …r (20% C1) in need
  bu… …ve 950 bil.VND in 2005



CHANGE OF FUNDS FOR NEW ROAD CONSTRUCTION AND BUDGET FOR M&M

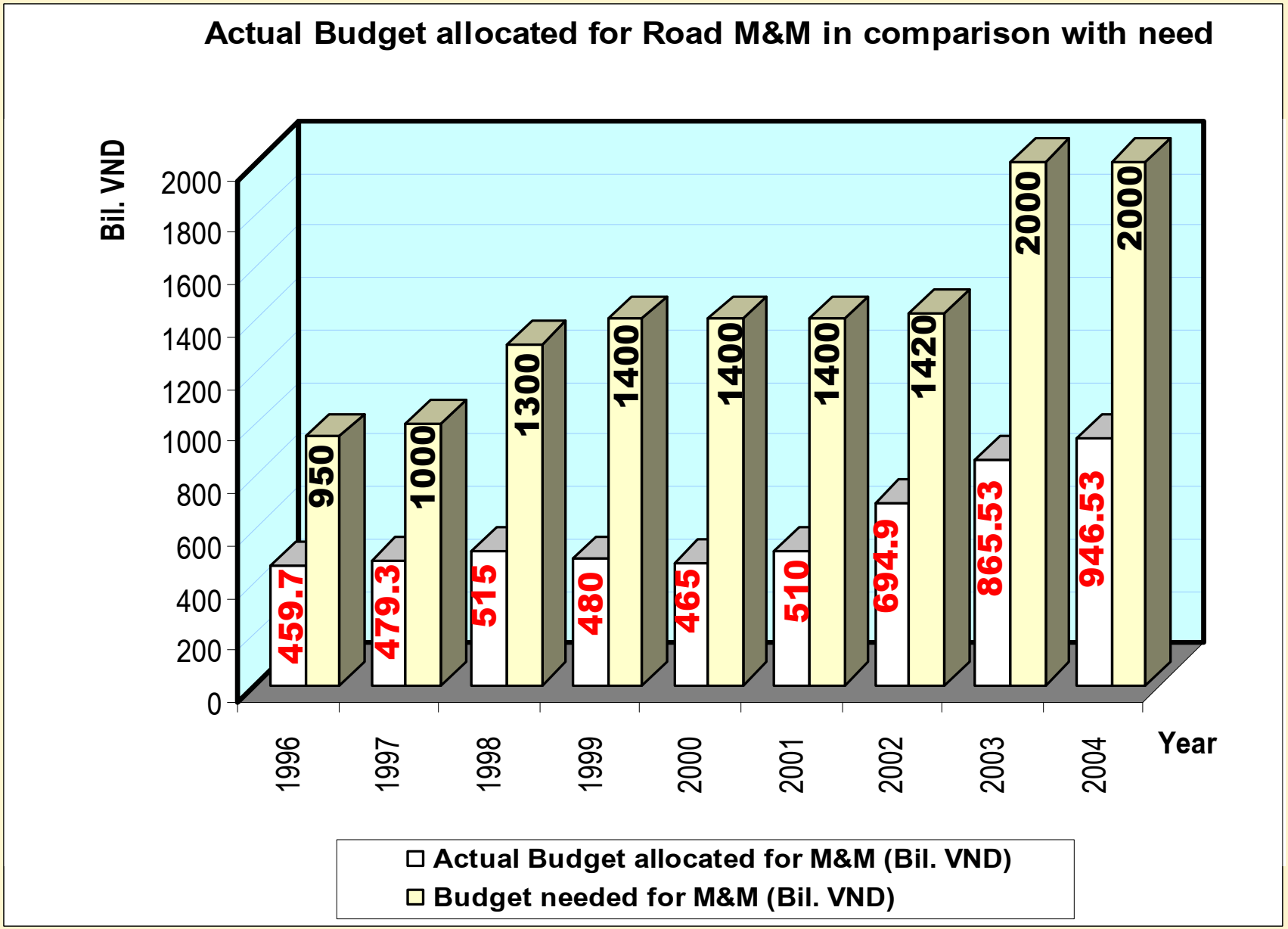


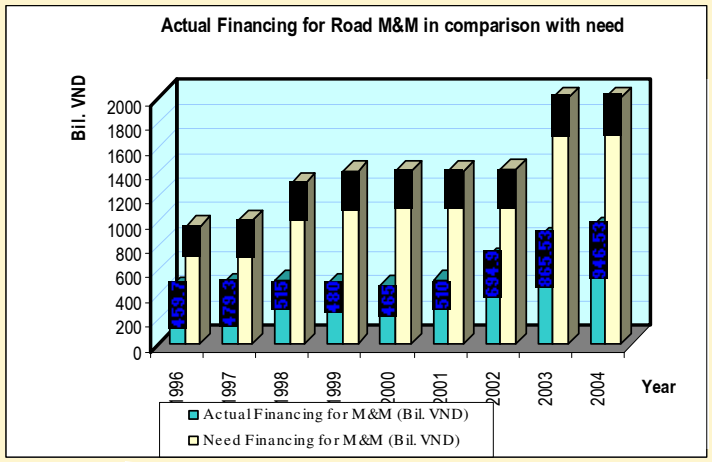
New Const. N.H: approx. 1 mil. USD/km (Average: 300,000 USD/km)

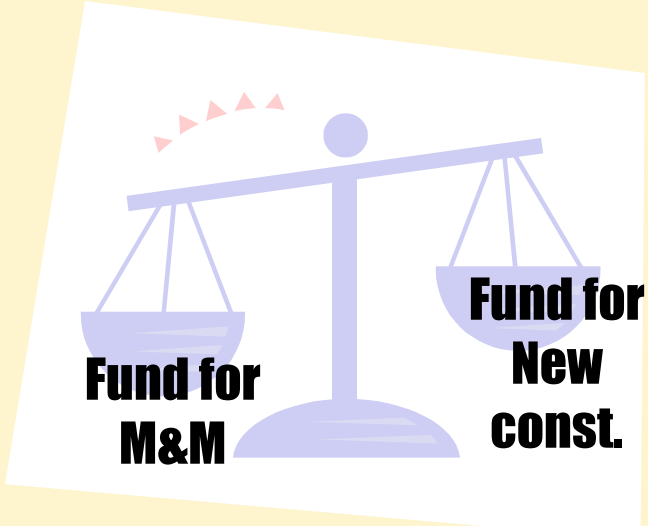
Maintenance: N.H: approx. 1,300 USD/km.year

L.R: approx. 500 USD/km.year

ACTUAL BUDGET ALLOCATED FOR ROAD M&M IN COMPARISON WITH NEED







1. Properly Financing Roads Improving Projects (new const.) and M&M activities

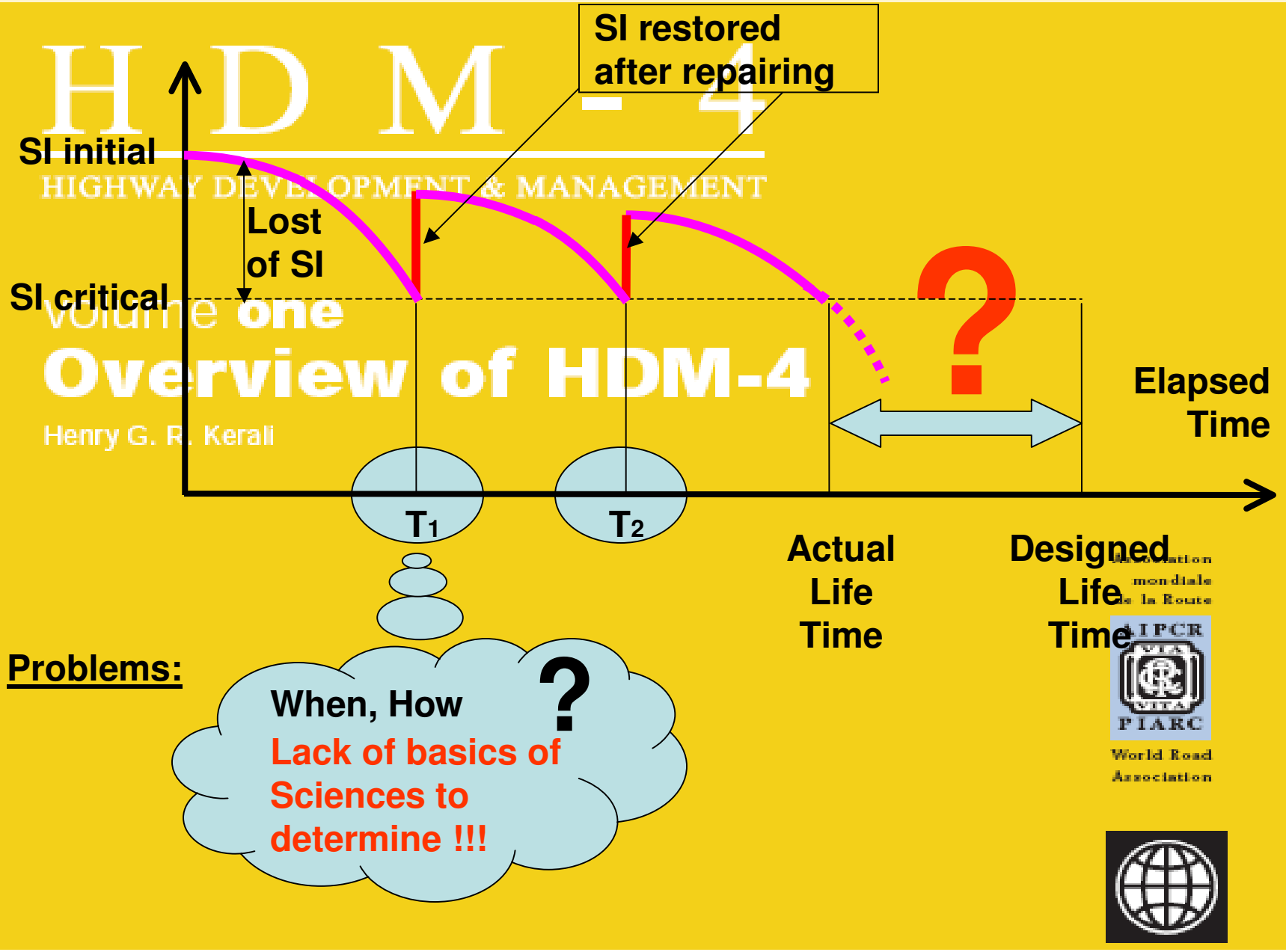
2. Establishing "Road Maintenance FUND"

Vietnam Road Administration has submitted the Proposal of "Road Maintenance FUND" to Government for approving.

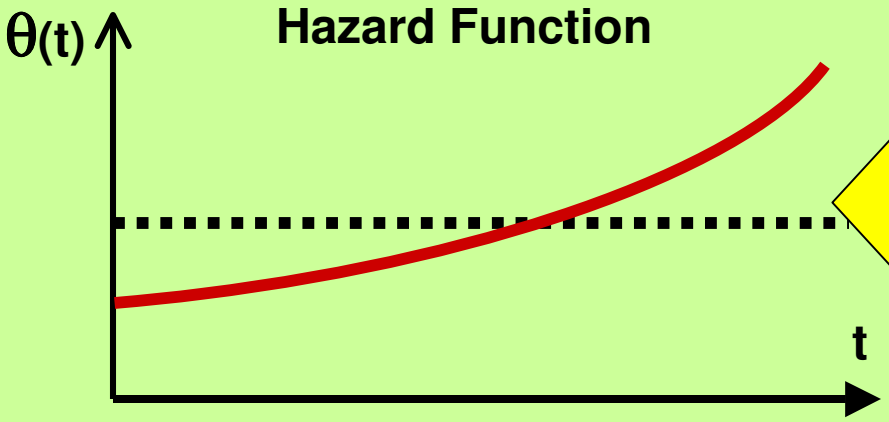
7 Main Sources for "Road Maintenance FUND" :

1. **Fuel charges: 2,500 bil. VND/year.**
2. **Toll collection for improved Projects: 350 to 600 bil. VND/year.**
3. **Traffic fees for automobiles and newly registered motorbikes: 800 bil. VND/year.**
4. **Traffic fees collection through tyres and inner tubes of vehicles (10% of sale price): 400 bil. VND/year**
5. **Charges for getting driving licencses: after deducting all expenses for issuing.**
6. **Part of the vehicles inspection fees: after deducting all expenses for inspecting.**
7. **Support from organization, enterprises and individuals, etc.**

Part 4-1… /Management Tools

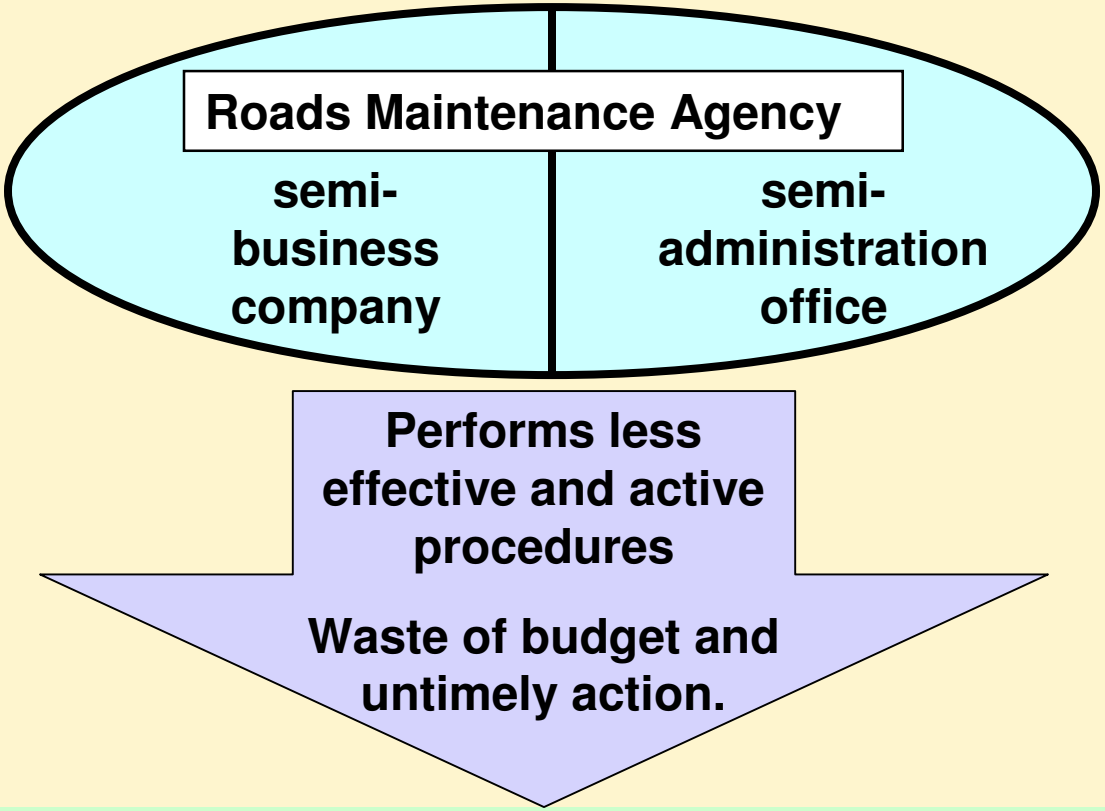


Applying HDM4, VRA has investigated road condition in 2001, 2004, 2007. Input data of each section consist of 159 column indices.



So it is necessary to develop the suitable management system and tools with suitable models regards to the actual condition in Vietnam.

Part 4-1… /Inactive Management Performance



Need to transfer maintenance activities from existing mechanism to a purely business mechanism with the participation of private companies.

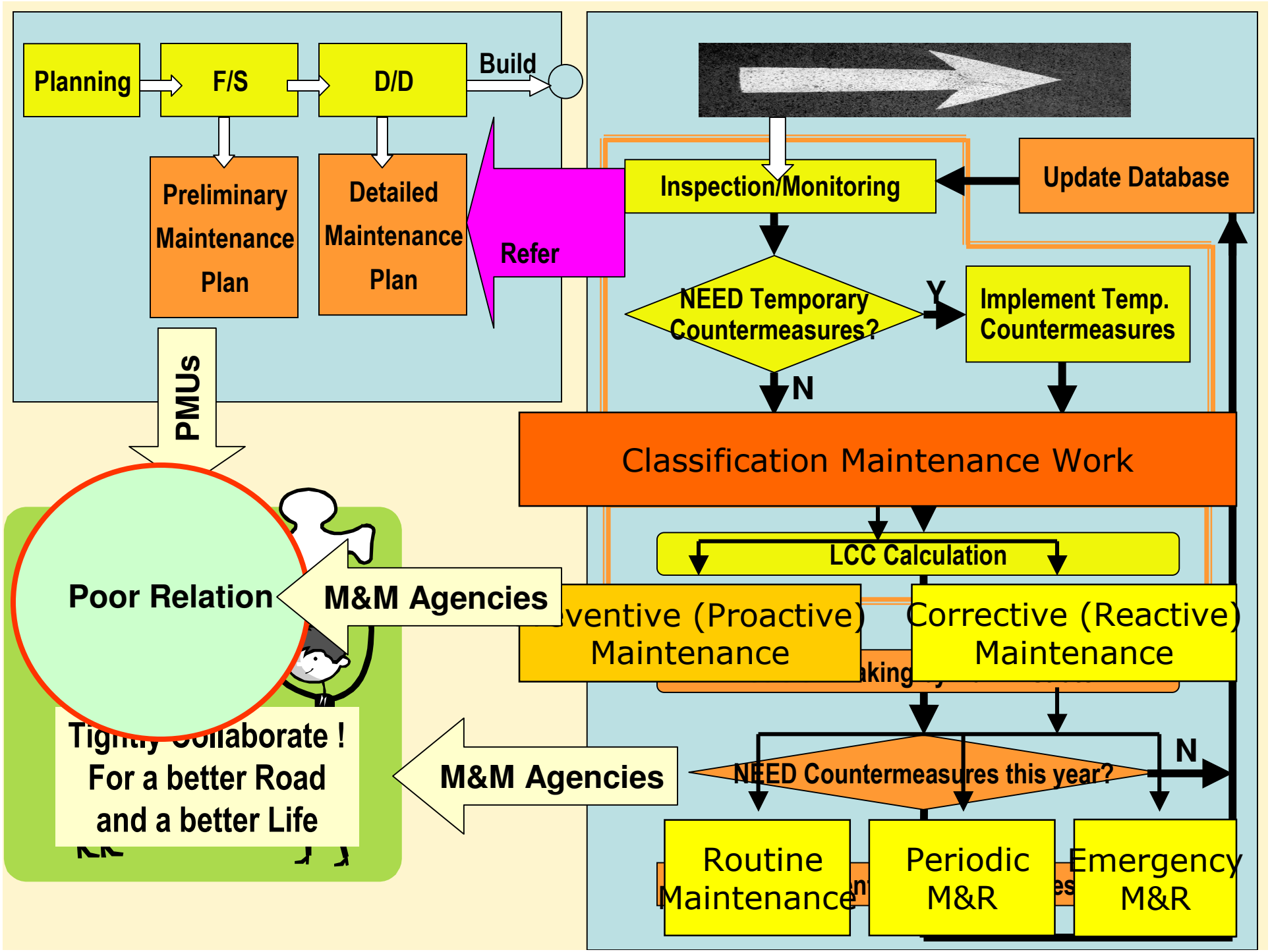
Private companies for Roads Maintenance

Purely business mechanism

Part 4-1… /Maintenance Technologies

Insufficient! Need more : Standards and technical Norms of application new technologies for periodical maintenance (VTO, Micro Surfacing, Slurry Surfacing, Fog seal, Chip seal, etc.)

Part 4-1… /Poor relationship between investment period and operating period


Planning
F/S
D/D
Build
Preliminary Maintenance Plan
Detailed Maintenance Plan
Refer
PMUs
Inspection/Monitoring
Update Database
NEED Temporary Countermeasures?
Y
Implement Temp. Countermeasures
N
Classification Maintenance Work
LCC Calculation
Poor Relation
M&M Agencies
Preventive (Proactive) Maintenance
Corrective (Reactive) Maintenance
Tightly Collaborate !
For a better Road
and a better Life
M&M Agencies
NEED Countermeasures this year?
N
Routine Maintenance
Periodic M&R
Emergency M&R

Q&A

Nguyen Dinh Thao, UTC
dinhthao200277@yahoo.com

Thank you very much for your attention!