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LANAMME-UCR

Evaluation of the National Road Network of Costa Rica

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OUTLINE

- ✓ Costa Rica
- ✓ LANAMME's history
- ✓ The law 8114
- ✓ LANAMME nowadays
- ✓ Accomplishments of the law 8114
- ✓ The problems…
- ✓ The evaluation of the national road network…
- ✓ Results

COSTA RICA

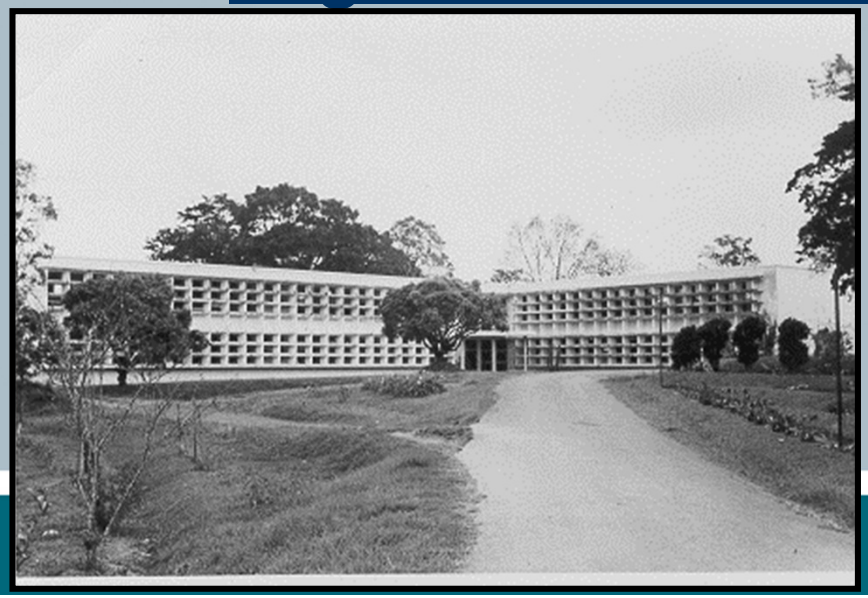
- Located in Central America.
- 52,000 km^2 (Texas is 700,000 km^2, Mexico is 2,000,000 km^2).
- 4,000,000 people.
- No army since 1948.
- 2 millions of tourists in 2008.

What is LANAMME?

National Laboratory of Materials and Structural Models of the University of Costa Rica

History

- **Established in 1952**
  - Located at the basement of the Civil Engineering school.
  - Provided basically QA/QC services for the government and the first Costa Rican' international airport.
  - Until **1996**, the personnel consisted of **two engineers and 4 technicians.**



History

- **Law 7099**
  - In 1996, **Law 7099** gave the status of **National Laboratory** in the field of the **construction materials**.
  - Therefore, all the **construction technologies** of the country must be **tested and evaluated** by LANAMME.
  - An agreement between the Iberoamerican Development Bank (BID) and UCR, provided funds up to **$1 million** to build the laboratory and pay for the initial equipment.

History

- LANAMME's pavement laboratory in 1997
  - 1 Marshall hammer.
  - 2 viscometers.
  - 1 penetrometer.

History

- The condition of the highway system of Costa Rica in 1997
  - Lack of government control (DOT).
  - Empiricism in the making-decision process.
  - Most of the projects failed some days after construction.

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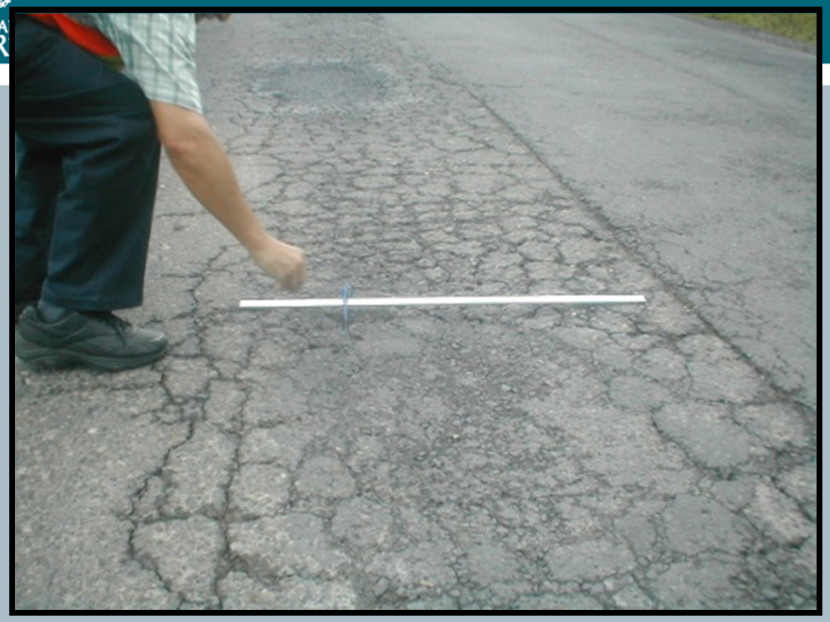
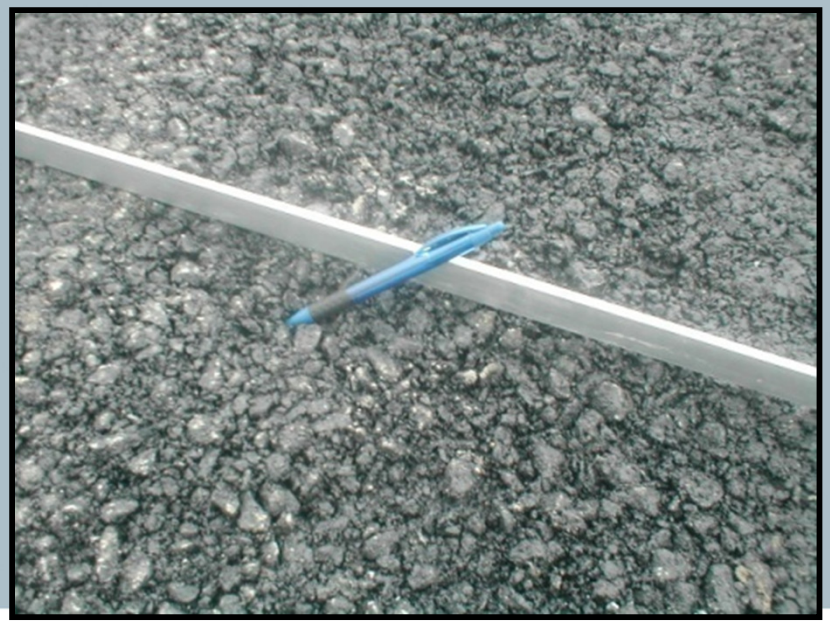
History

- **The condition of the highway system of Costa Rica in 1997**
  - Lack of knowledge on new pavement technologies (Penetration testing on asphalt binders, Marshall mix design were the predominant techniques).
  - Deficient QA/QC and construction practices.
  - No periodical evaluation of the national road system.





History

- Due to this road behavior, the congress created the

LAW 8114 in 2002

Law 8114

- **FUEL TAX**: 30% of the market price of fuels will be used to do rehabilitation of the Costa Rican' roads and highways.

- The congress assigned the 3% of the 30% to LANAMME for accomplishing various objectives.

- About **$3 millions a year.**

Law 8114

Objectives

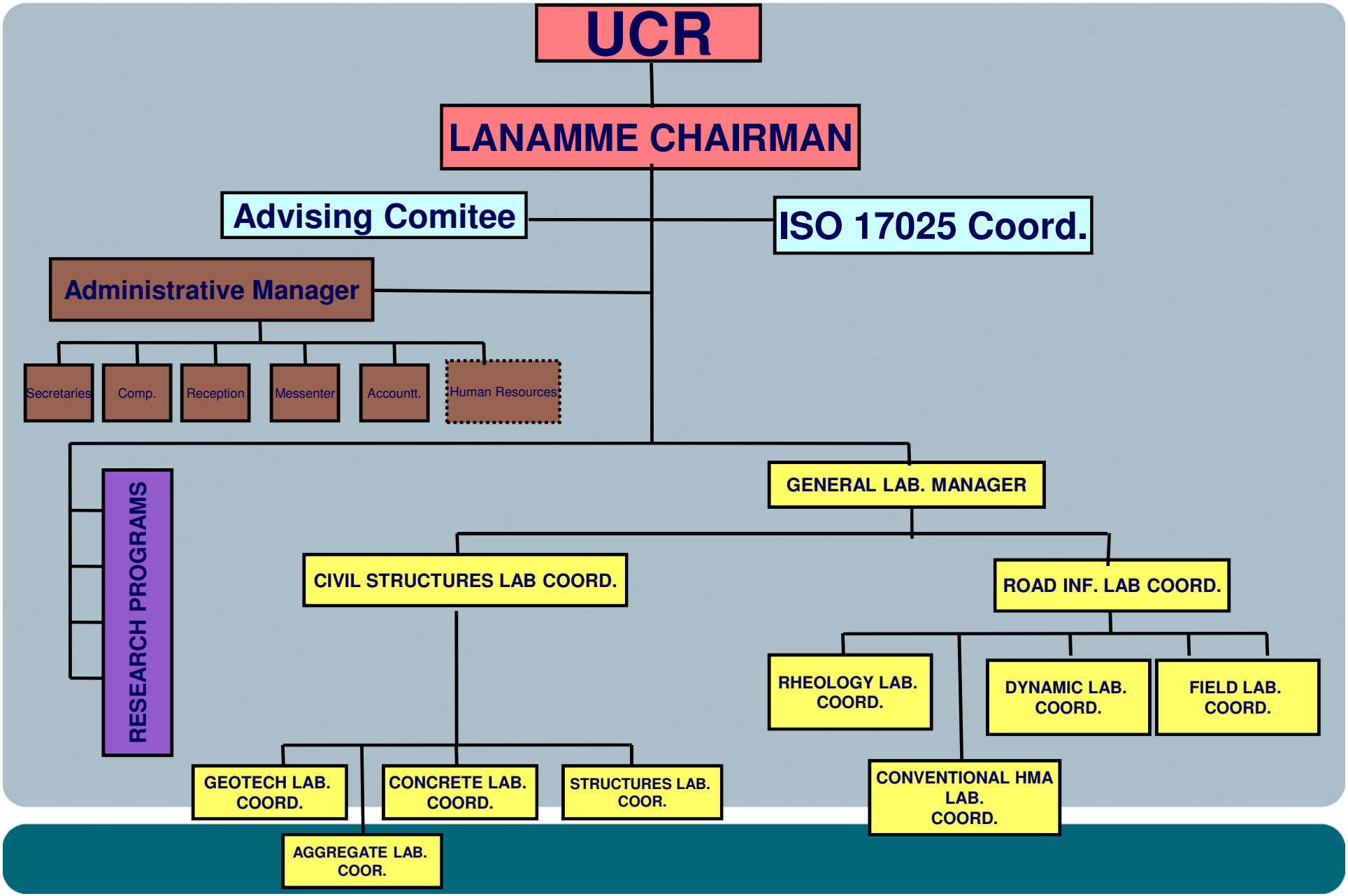
- **Auditing** the rehabilitation projects constructed with the DOT funding.
- **Applied research** of the problems of the national road network.
- **Technology transfer** and **accreditation** of engineers and technicians.

Law 8114

Objectives:

- Advising the **municipalities and local governments** in QA/QC, pavement design, material design and analysis, PMS,etc.
- **Advising** specific needs of the **Minister of Transportation** of the Republic.
- **Evaluation** of the national **bridges system.**
- **Developing of the Standard Specs. Manual.**
- **Evaluation of the national road system** every **two years** with high-tech equipments: FWD, RSP and Griptester.

Organization Chart after Law 8114



LANAMME nowadays

- 60 technicians.
- 40 engineers.
- 15 administrative personnel.
- 2 lawyers.
- 2 chemists.
- 20 students/assistants.

LANAMME nowadays

- 2 new full-equipped laboratory buildings for a total investment of **$3,225.000**.
- An auditorium was built in 2007:
  - Capacity for 150 people.
  - 3 state-of-the-art classrooms.
  - Video conference.

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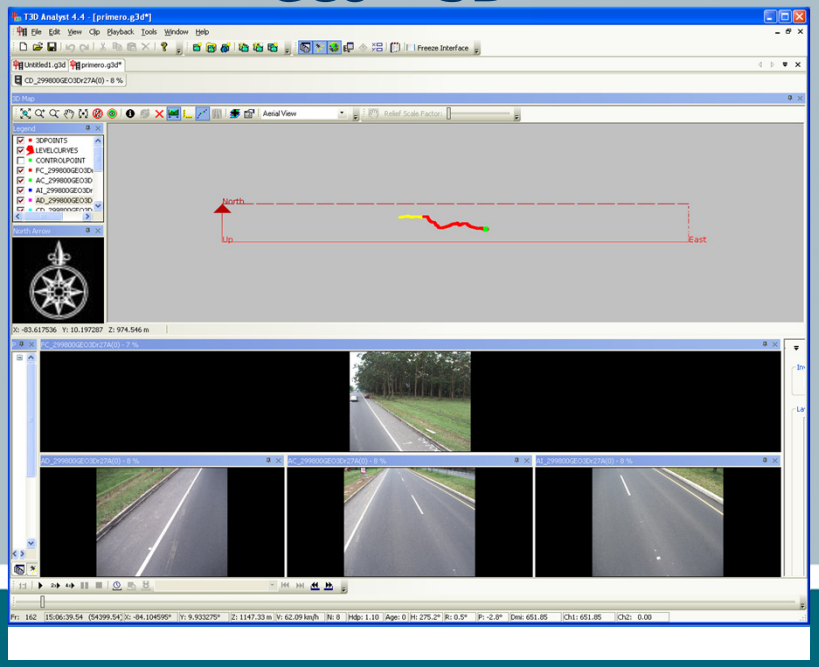
2 FWD

RSP

Geo – 3D



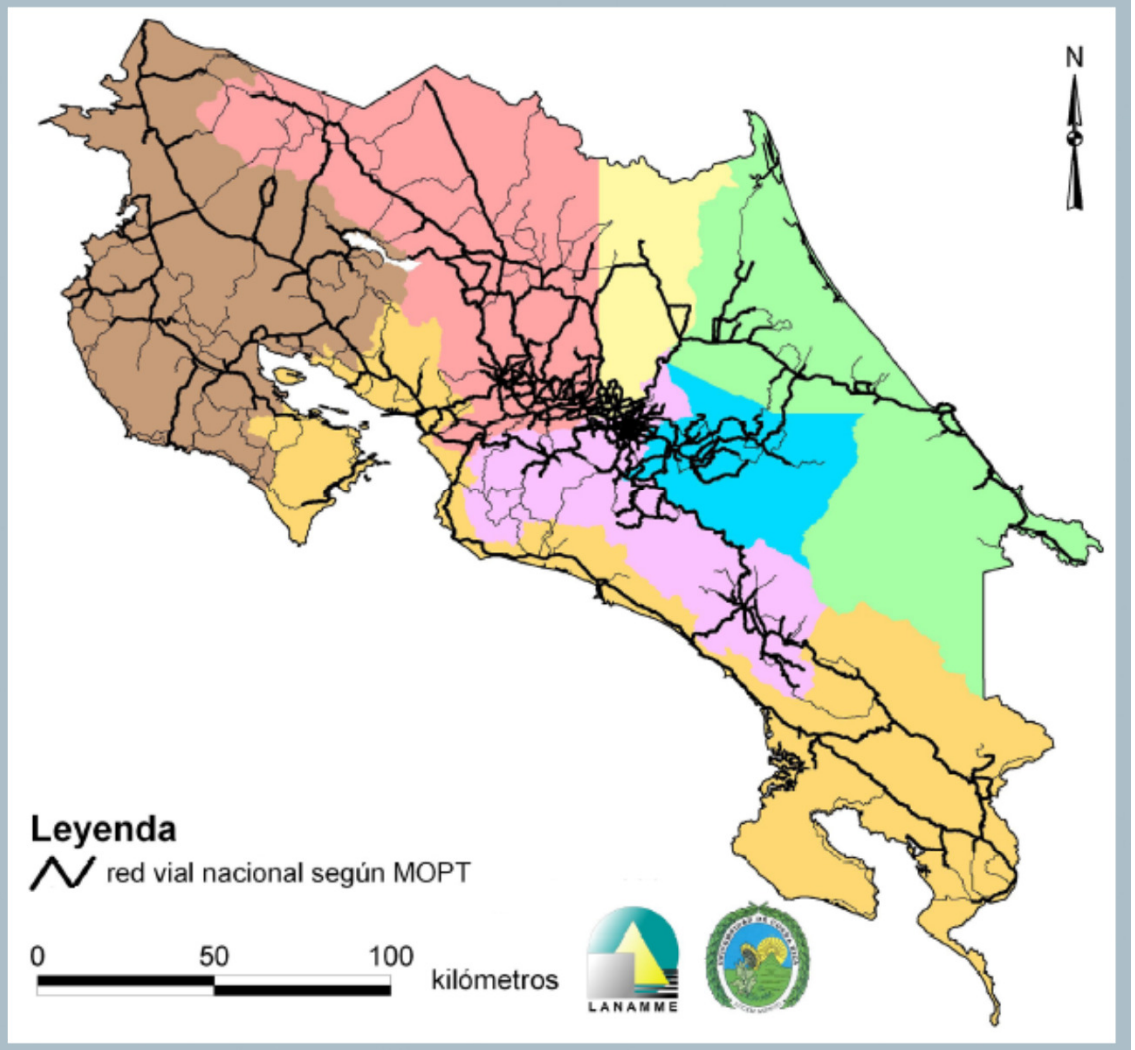
Griptester

The Evaluation

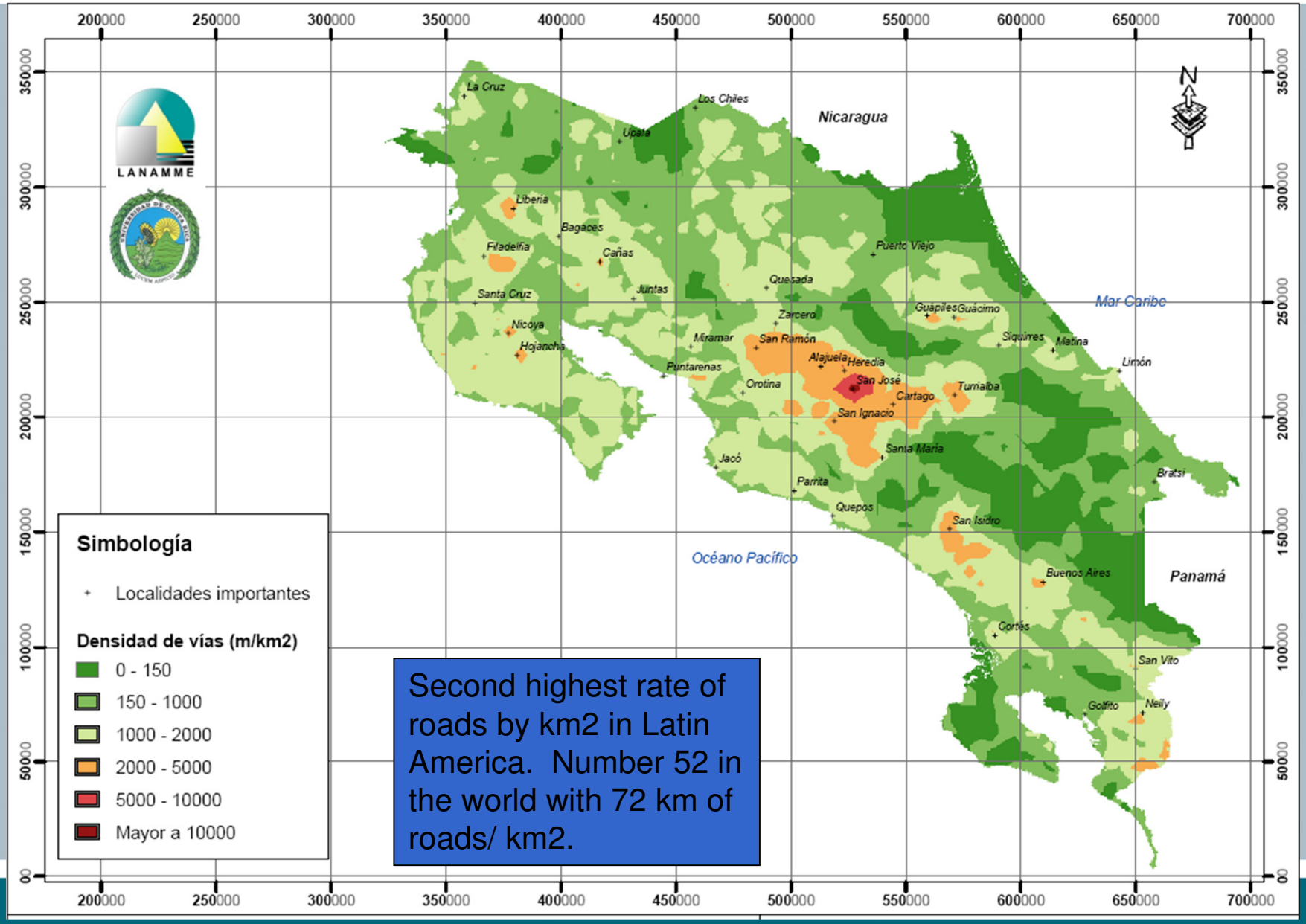
Composition of the National Road Network

Total road network is about: 35,000 km

- Municipal Road Network: 28,000 km
- National Road Network: 7,479 km
  - Flexible pavements: 60%
    - 98% of resources are invested in this part of the network
  - Other: 40%



Road Density



Second highest rate of roads by km2 in Latin America. Number 52 in the world with 72 km of roads/ km2.

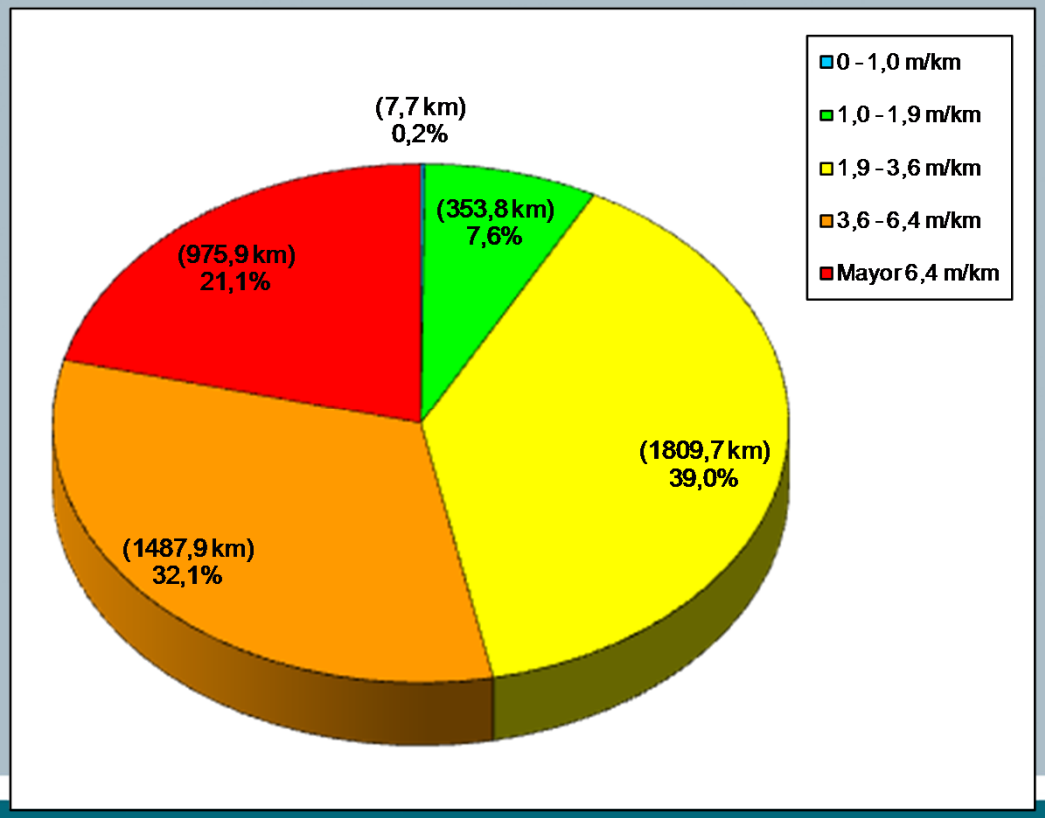
Evaluation

- Functional Evaluation: IRI
- Structural Evaluation: FWD
- Skid resistance evaluation: Grip Tester
- Superficial deterioration: Vizir and PCI

Functional Evaluation
IRI

IRI – 2004	IRI – 2006	IRI – 2008	IRI - 2010
Evaluated : 4081 Km	Evaluated : 4395,1 Km	Evaluated : 4564,7 Km	Evaluated : 4855,6 Km

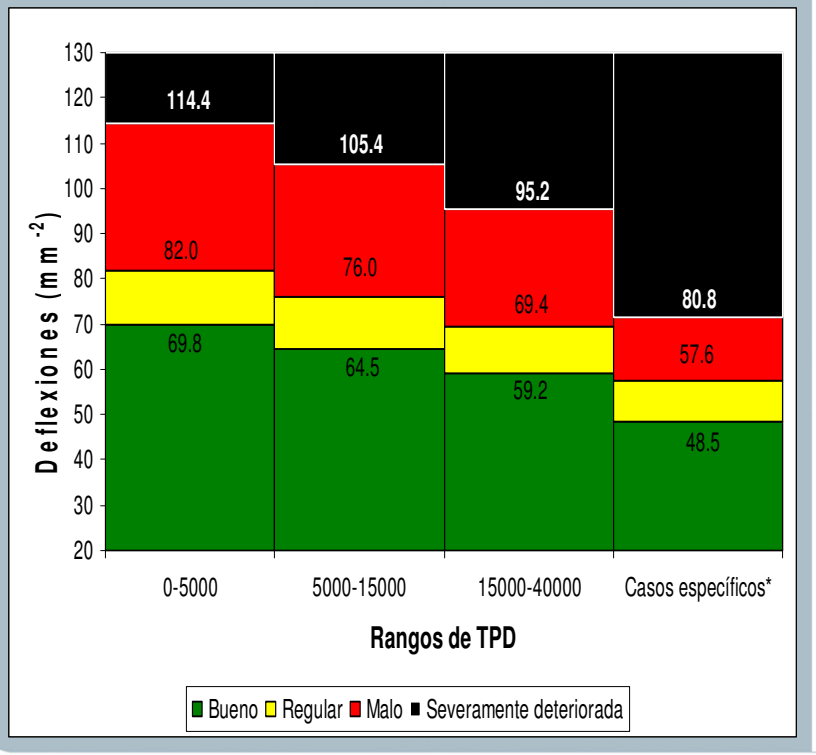
2008

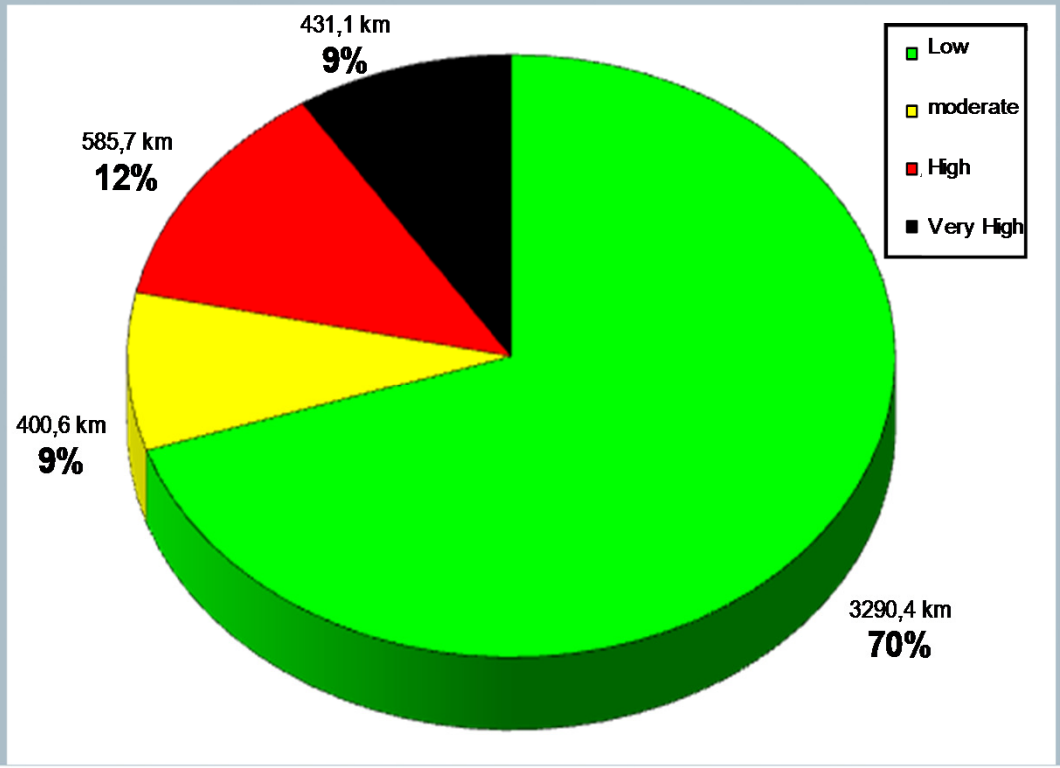


Structural Evaluation
FWD

FWD – 2004	FWD – 2006	FWD – 2008[1]	FWD - 2010
Evaluated : 3676,8 Km	Evaluated : 4395,1 Km	Evaluated : 4707,2 km	Evaluated : In process 40%

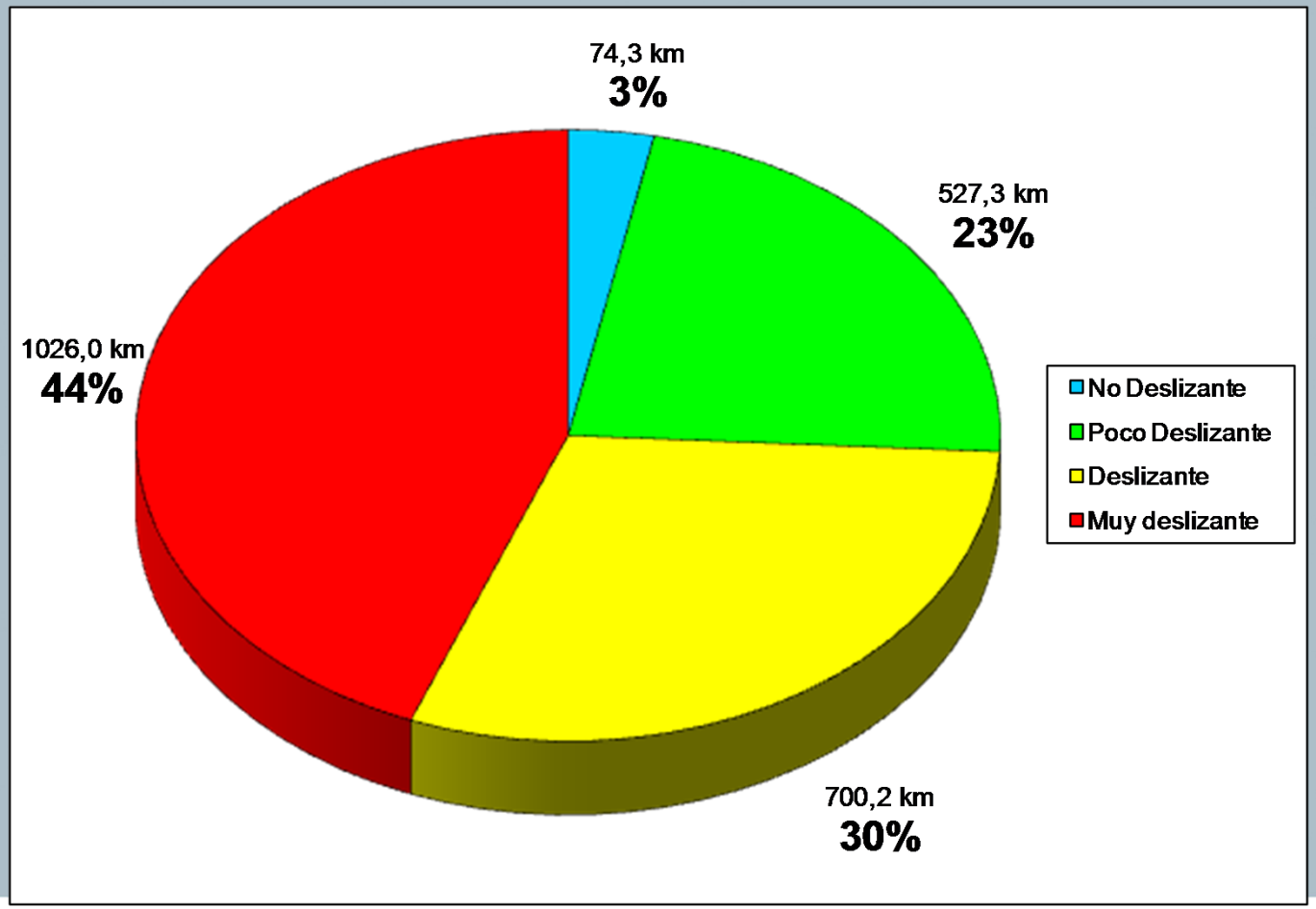
2008





Friction

Total evaluated in 2008: 2.327,81 km



Intervention strategies

ADT 0 - 5000					
PCI	Deflection 10^{-2} mm / Superficial deterioration Is	76.5	88.5	115.7	
		Class 1	Class 2	Class 3	Class 4
70 - 100	1 - 2 No cracking or rutting	Q1	Q3	Q6	QF-1
40 - 70	3 - 4 Cracking or rutting medium severity.	Q2	Q5	Q8	QF-2
0 - 40	5 - 6 - 7 Cracking and rutting high severity	Q4	Q7	Q9	QF-3

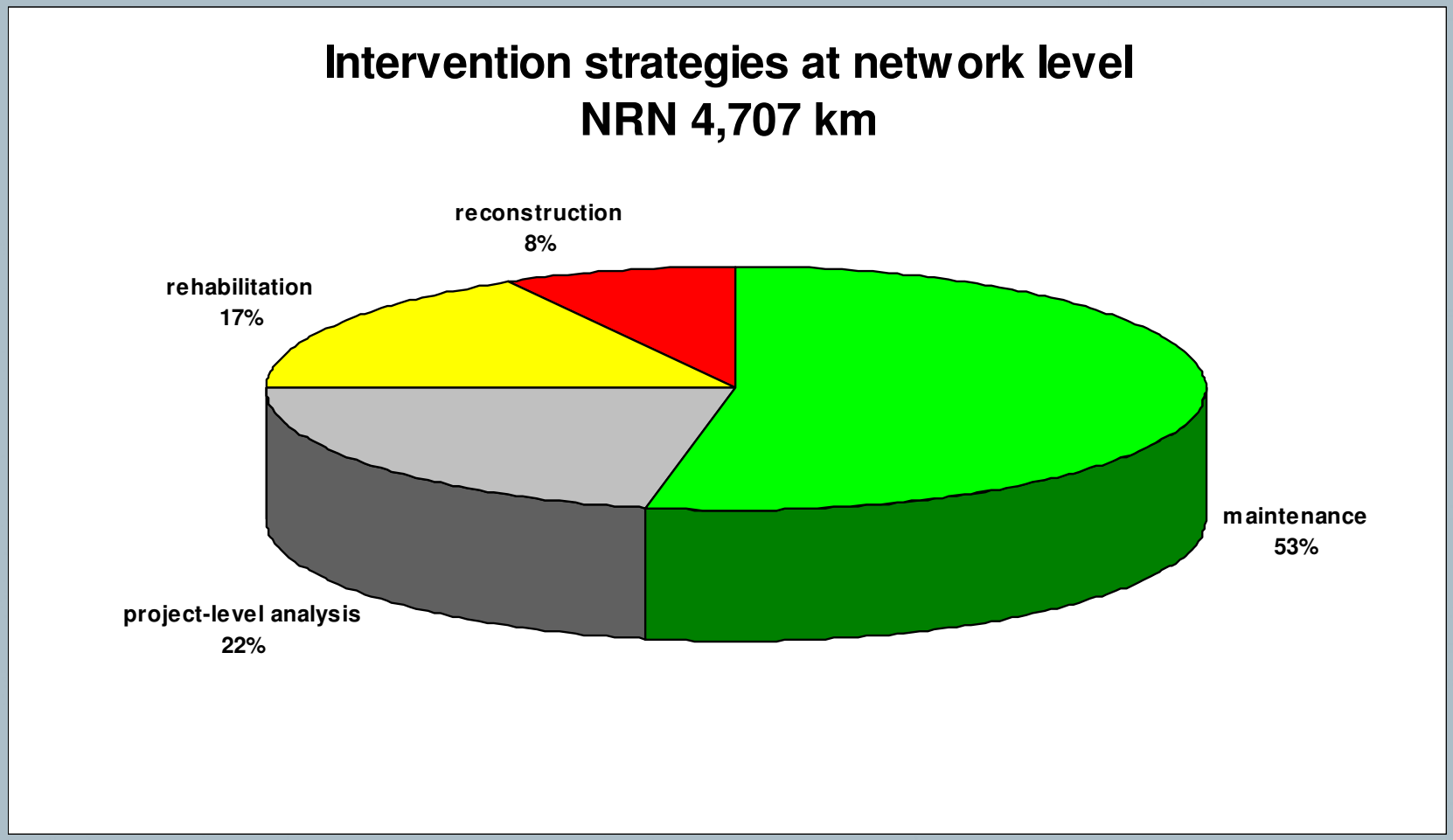
maintenance

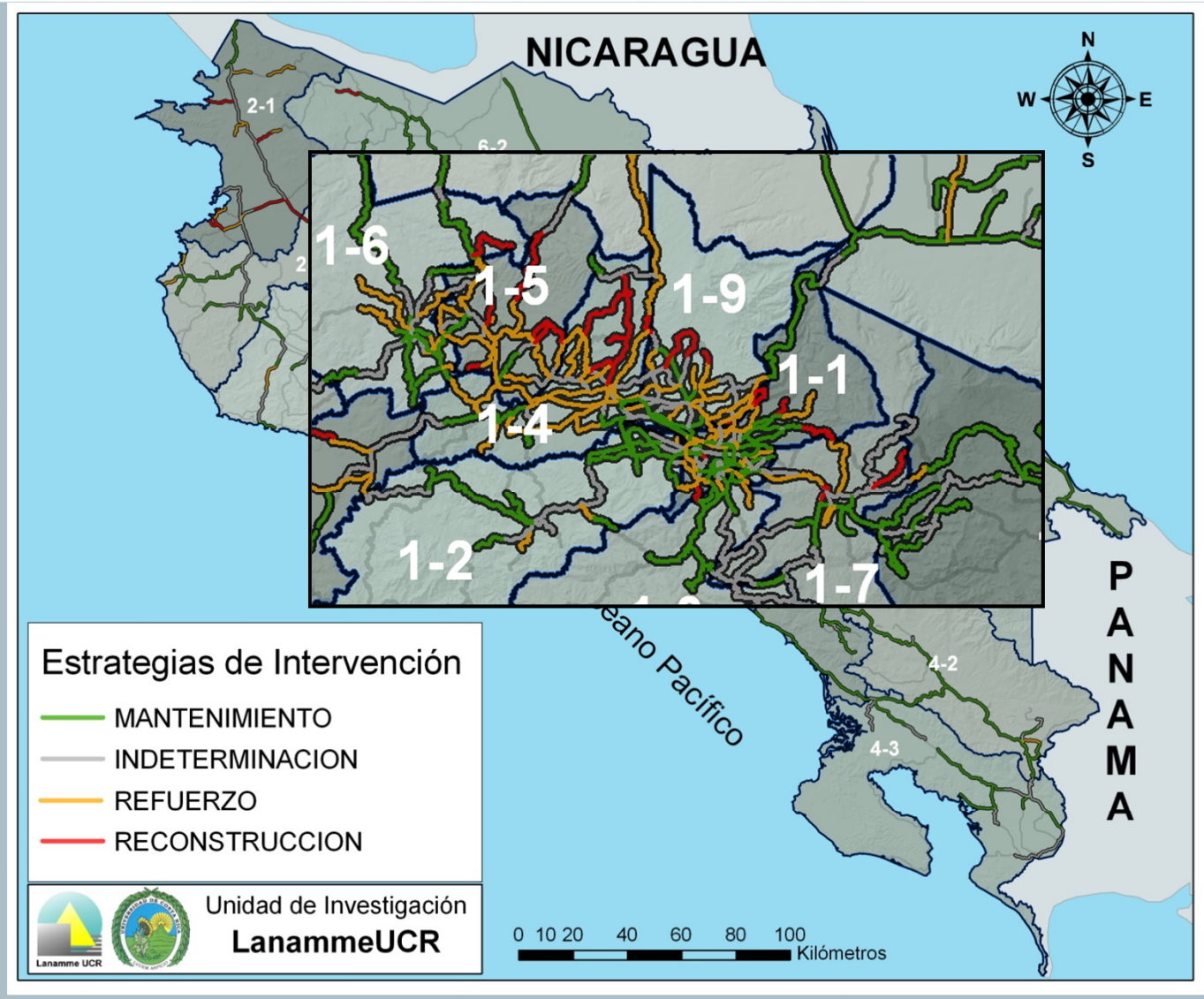
project-level analysis

rehabilitation

RECONSTRUCTION

Intervention strategies

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4-2
4-3
PANAMA
Estrategias de Intervención
MANTENIMIENTO
INDETERMINACION
REFUERZO
RECONSTRUCCION
Unidad de Investigación
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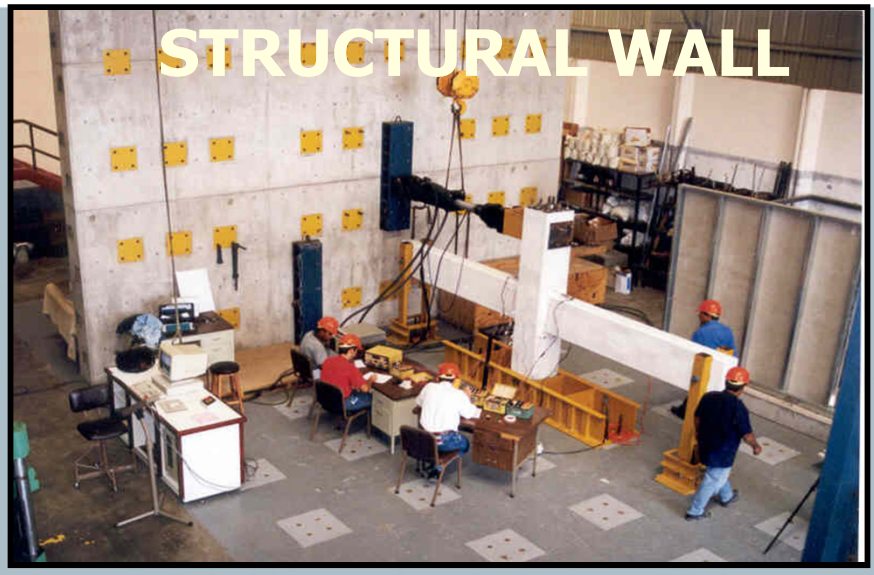
Kilómetros

Laboratory Facilities



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Questions?

THANKS

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