Costa Rica experience in the application of the IRI parameter as criteria for the acceptance of road maintenance and rehabilitation projects

By

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RPUG Road Profile Users' Group

About LanammeUCR

UNIVERSIDAD DE COSTA RICA

LanammeUCR
LABORATORIO NACIONAL DE MATERIALES Y MODELOS ESTRUCTURALES

National Laboratory of Materials and Structural Models

Law number 8814

Evaluation of the entire paved national network.

Research programs on the problems of paved road infrastructure in the country.

Training and accreditation programs for laboratory technicians and field inspectors.

Technical audits of projects in execution.

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National Paved Road Network in CRC

Allows to connect the farthest regions of the country with the main cities**, the Costa Rican road network is one of the densest in America (0.7 km / km2).**

Having a dense Road Network implies a challenge for decision makers in the transport sector in Costa Rica.

More kilometers to attend

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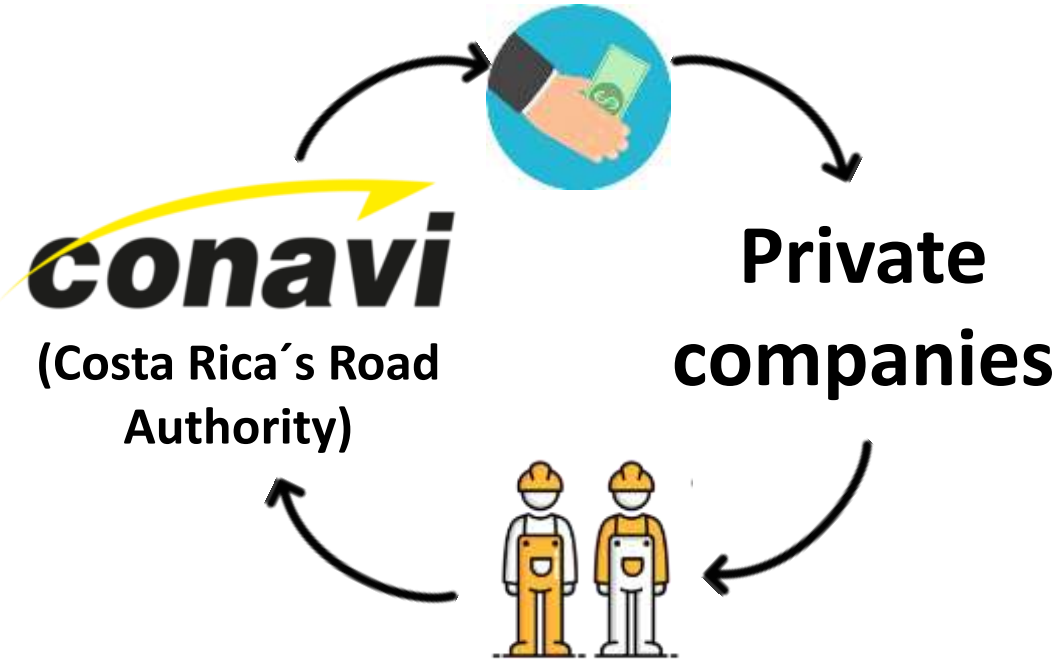
Manteinance scheme in Costa Rica

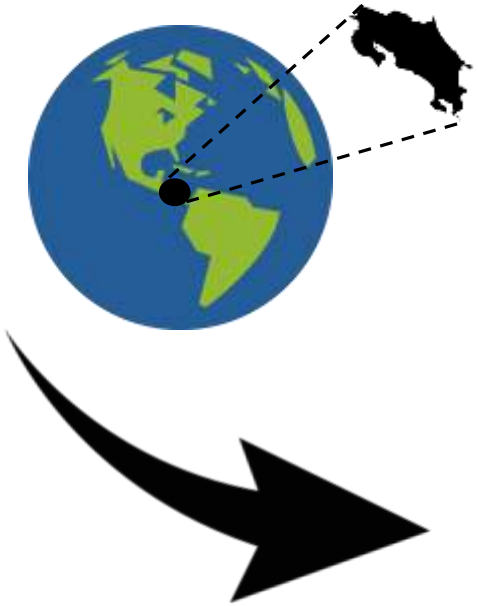
It is based on the payment for activities through unit prices. Where private companies compete to opt for the maintenance of one of the 22 conservation areas that divide the country.



Since this contracting system is based on unit prices, it became necessary to implement quality control systems such as IRI.

Background

Since 2016



Started the implementation of the International Roughness Index (IRI) parameter as a criterion for the acceptance of road maintenance and rehabilitation projects, such as asphalts overlays and rehabilitations with cement treated bases.

IRI specification: Two cases

Rehabilitation

Overlay

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Contents of the investigation

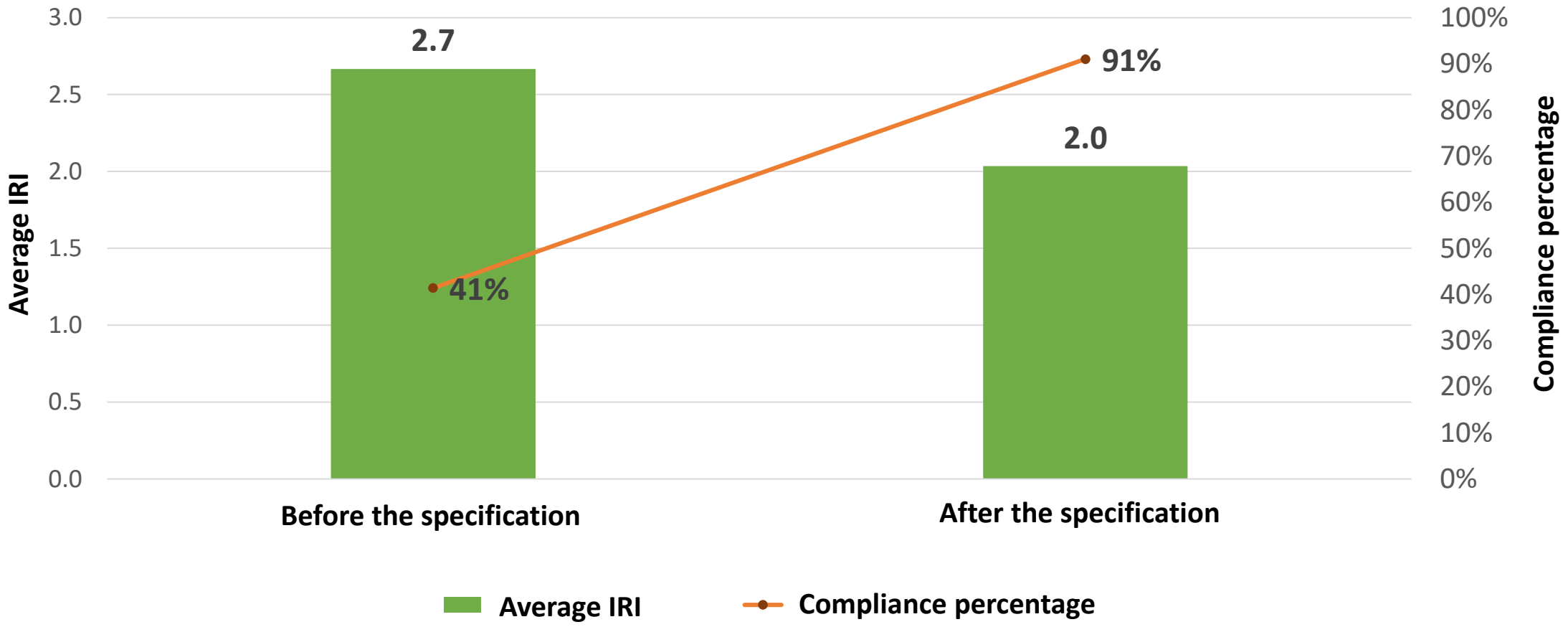
This research collects and analyzes information about the roughness of all the asphalt overlays and cement treated bases that were developed from 2016 to 2018.

Comparison between the roughness in projects executed before and after the specification (rehabilitations and overlays). **Effect of the specification**	Specification compliance percentages. **To determine if the specification is achievable**	Comparison between the surface roughness calculations made by LanammeUCR against a sample of roughness calculations made by every quality control laboratory hired by the Administration. **To determine if they are not benefiting the contractor**	Analysis of the influence of the slope and curves in the IRI values. **Its more difficult to build and overlay in a mountain route.**

Comparison between the roughness in projects executed before and after the specification (rehabilitations and overlays). **Effect of the specification**

IRI Before and After the specification

Case 1: Rehabilitation



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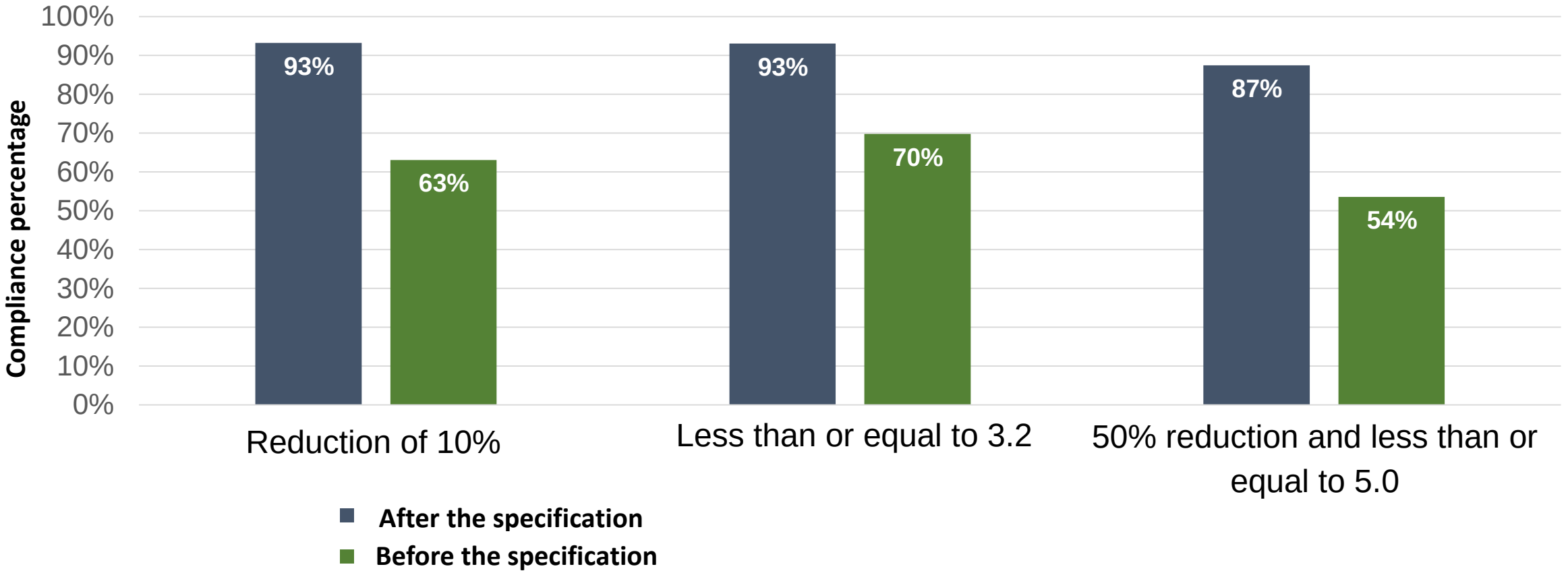
IRI Before and After the specification

Case 2: Overlays



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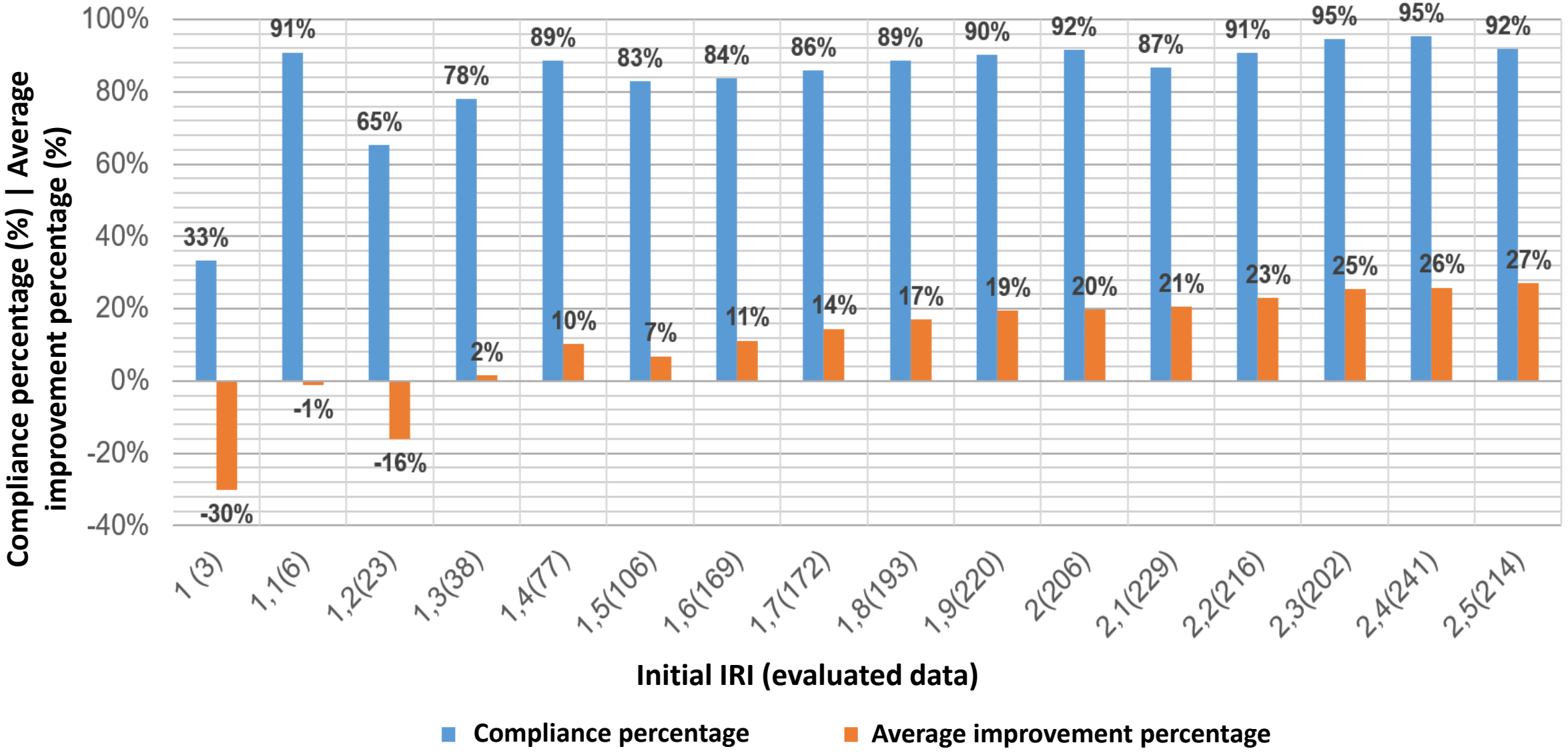
Specification compliance percentages. **To determine if the specification is achievable**

We found that the compliance percentages were fine, up to 90 %, except in one case.

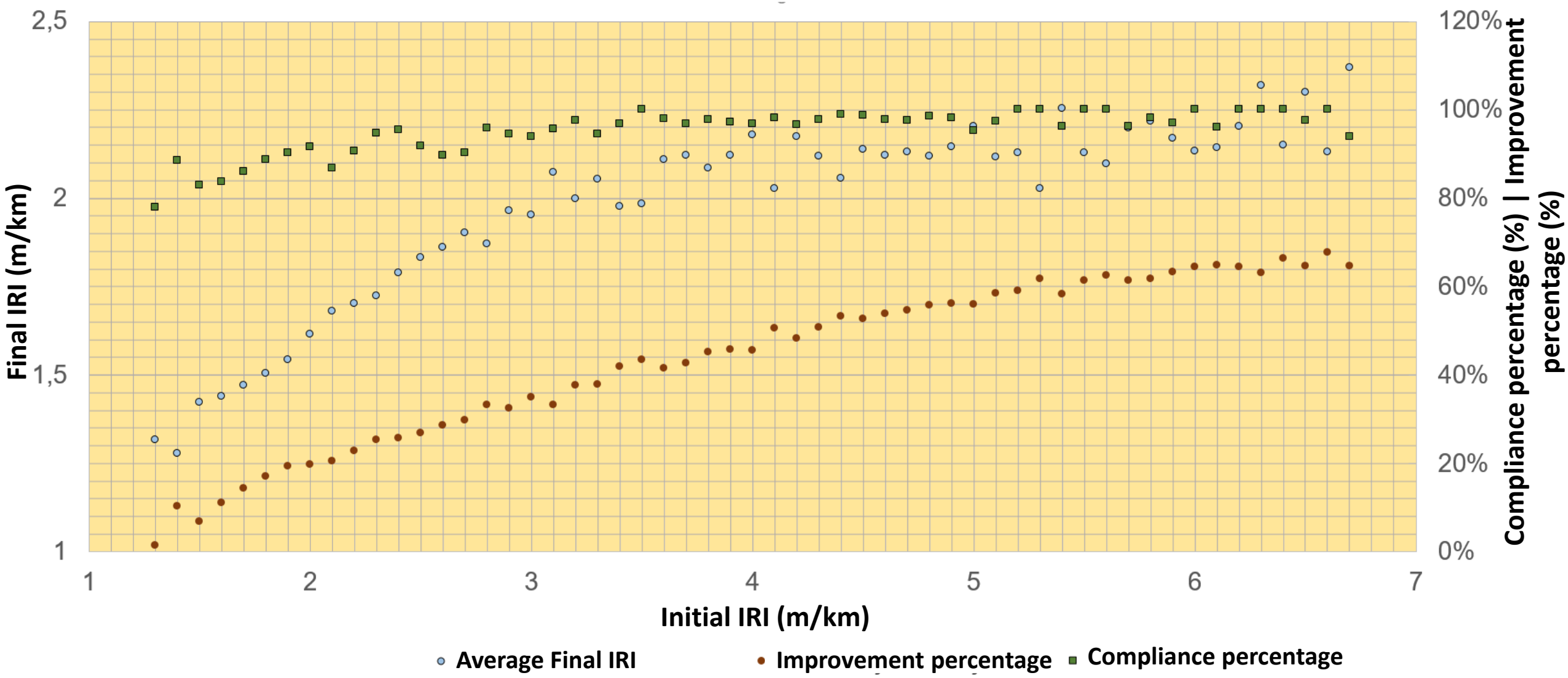
In overlays, when we had sections of the road with good initial IRI values, less tan 2,5 m/km.

Why? Because after placing the overlay, they need to accomplish an IRI value equal or better than the initial IRI.

Specification compliance percentages in overlays: Case 1 At least keep initial IRI



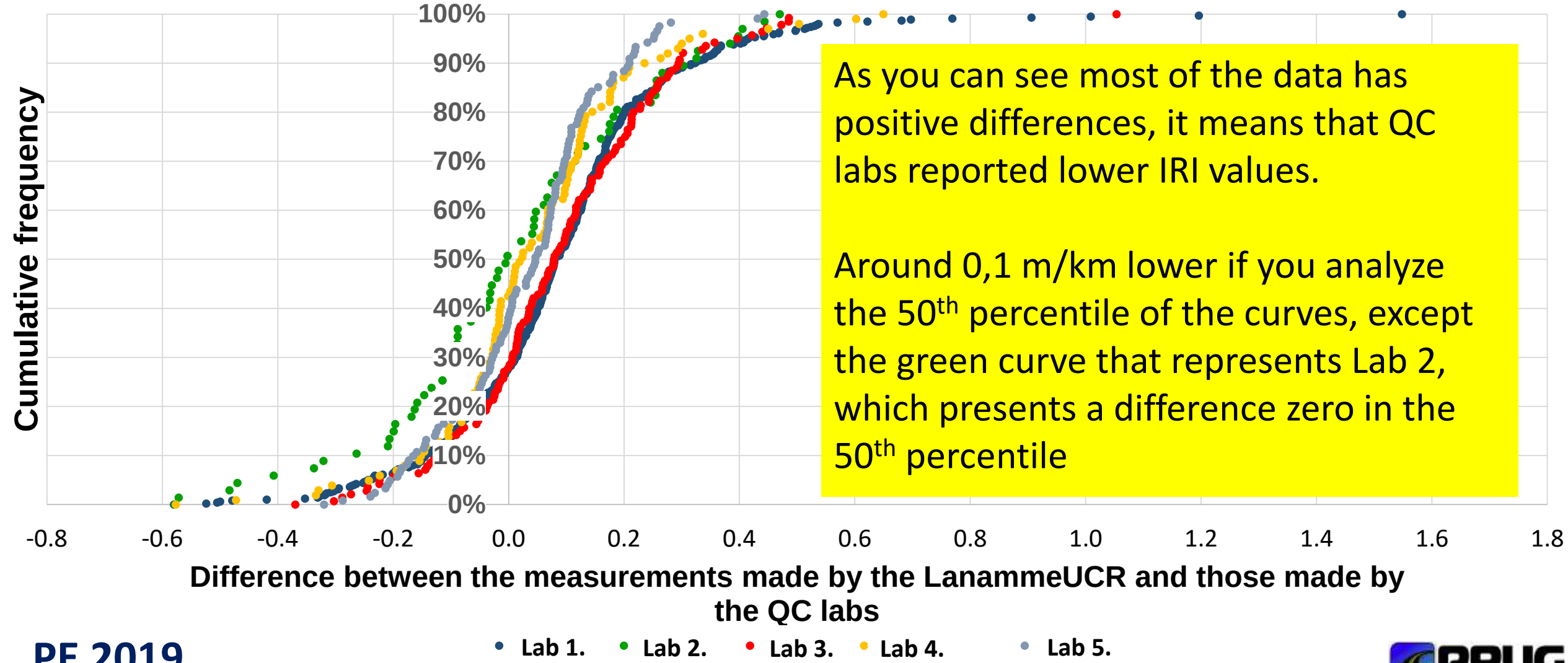
Overview of IRI in overlay projects



Comparison between the surface roughness calculations made by LanammeUCR against a sample of roughness calculations made by every quality control laboratory hired by the Administration.

To determine if they are not benefiting the contractor

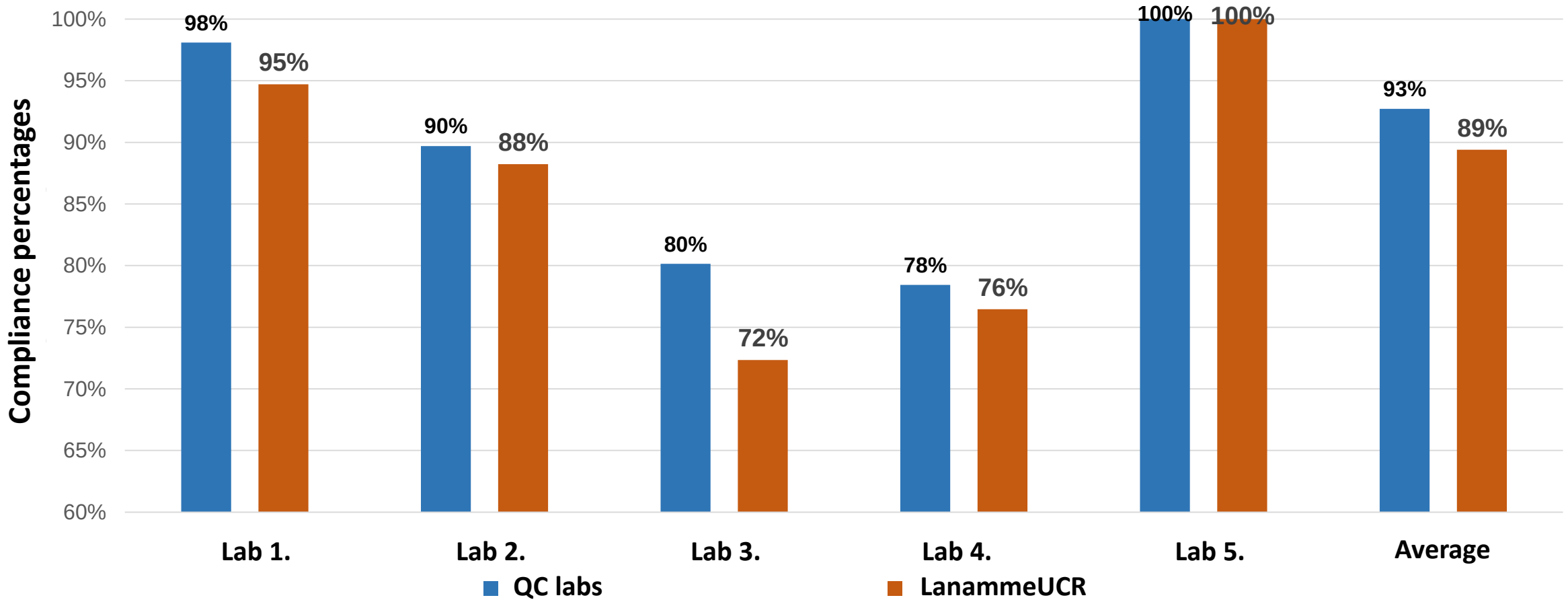
Comparison: LanammeUCR / QC labs



As you can see most of the data has positive differences, it means that QC labs reported lower IRI values.

Around 0,1 m/km lower if you analyze the 50th percentile of the curves, except the green curve that represents Lab 2, which presents a difference zero in the 50th percentile

Comparison: LanammeUCR / QC labs



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Analysis of the influence of the slope and curves in the IRI values. **Its more difficult to build and overlay in a mountain route.**

Influence of the slope and curves in the IRI values

Average IRI values:

Categories	No curves	Smooth curves	Sharp curves	Very sharp curves
Flat	2,06 (0,97)	2,74 (1,12)	3,10 (1,09)	3,04 (1,12)
Wavy	2,20 (1,00)	2,86 (1,16)	2,93 (1,09)	2,80 (0,96)
Mountainous	2,74 (1,19)	2,92 (1,05)	2,64 (0,91)	2,71 (0,96)
Steep	2,46 (1,11)	2,79 (1,27)	2,83 (0,94)	3,41 (1,44)

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(Jiménez, 2019)

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Conclusions

- After the IRI specification it was observed and improvement in the surface roughness of maintenance projects. **50 % in rehabilitations** and **29 % in overlays.**

- A difference between 0 and 0.1 was observed between the IRI measurements made between LanammeUCR and the rest of the laboratories

(Jiménez, 2019)

Conclusions

- There is a relation between the road geometry and the roughness, slope and curves could affect the constructive process and consequently affect the IRI of the road.

- The roughness affectation during construction is bigger when there is a combination of slopes and curves.

(Jiménez, 2019)

Thank you!

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