

NADIM 2018  
Oslo



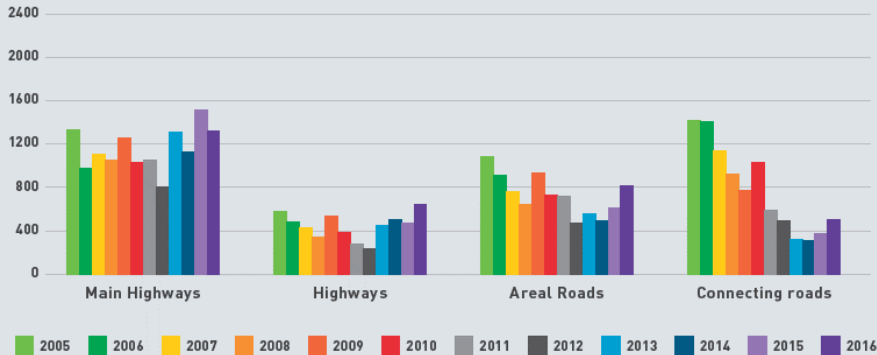
# PEHKO 2015–2025 Project – from Reactive to Proactive Road Maintenance

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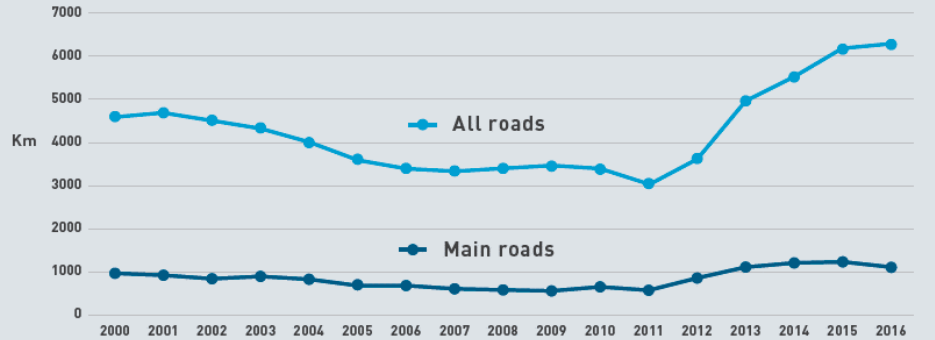
BEYOND  
THE  
SURFACE

# Challenges with Public Paved Road Network Asset Management in Finland

Public Road Paving Programme in Finland 2005–2016 (km)



Total Length of Poor Quality Paved Roads in Finland 2000–2016 (km)



## ANNUAL FUNDING FOR PAVEMENTS

Finland has ~60.000 km of public paved roads (calculated as 2-lanes)  
 Annual funding has been around 130–140 mill. €/year → Annual funding: 2.25 €/m/year

PEHKO pilot areas  
2015-2025



- Karstula
- Kemi-Tornio
- Rovaniemi (main roads)
- Hyvinkää (2018-2028)



# Intelligent Asset Management: FTA PEHKO Pilot for Paved Roads 2015-2025 in Kemi-Tornio and Karstula Area and 2018-2028 in Hyvinkää Area

**Final goal in 2025:  
Paved road network will be in better  
shape and annual paving costs 50%  
lower than current levels.**



**ROADDEX**  
Network  
For better rural roads

Calculations were based on ROADDEX recommendations  
[www.roadex.org](http://www.roadex.org)

# PEHKO PILOT 2015 - 2025: HOW WE PLANNED TO DO IT?



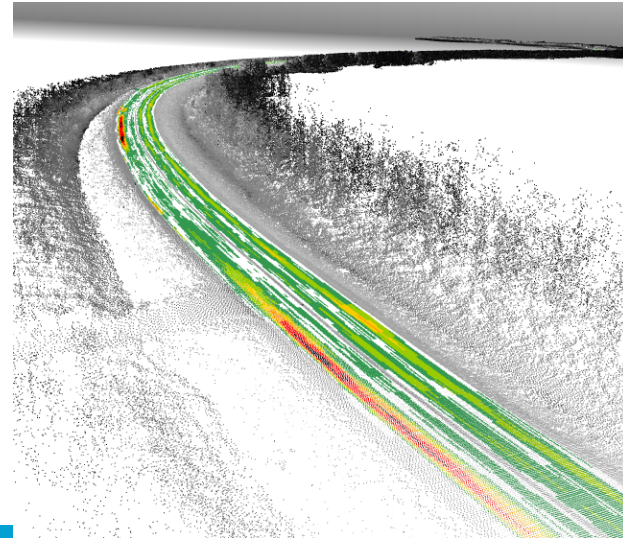
- 1) **The road maintenance standards to be improved, especially drainage maintenance. This increases pavement life time and cuts down annual paving costs. Savings 10-30%.**
- 2) **New technology to be implemented in pavement management allowing focus on the weakest sections - paved road lifetime will be increased and annual paving costs decreased. Savings 10-40%.**
- 3) **Proactive maintenance policy to be used and maintenance crews to react to arising problems before they cause damages in the pavement. Savings 20-60%.**

# WHAT IS PROACTIVE (INTELLIGENT) ASSET MANAGEMENT

1. **Reactive:** measures are taken based mainly on the surface condition monitoring results (=symptoms)



2. **Proactive:** monitoring is carried out to detect root causes of the surface condition problems (diagnostics) and measures taken before damages appear



# WHAT IS PROACTIVE (INTELLIGENT) ASSET MANAGEMENT?

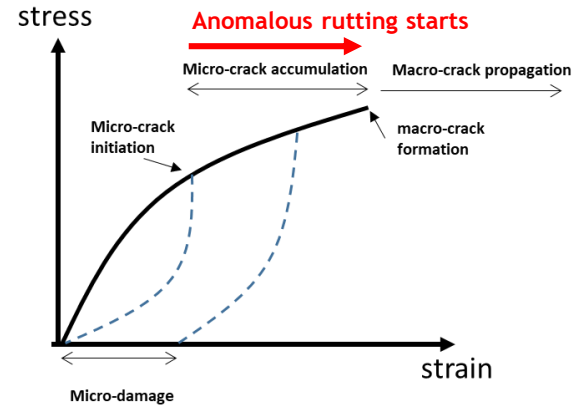
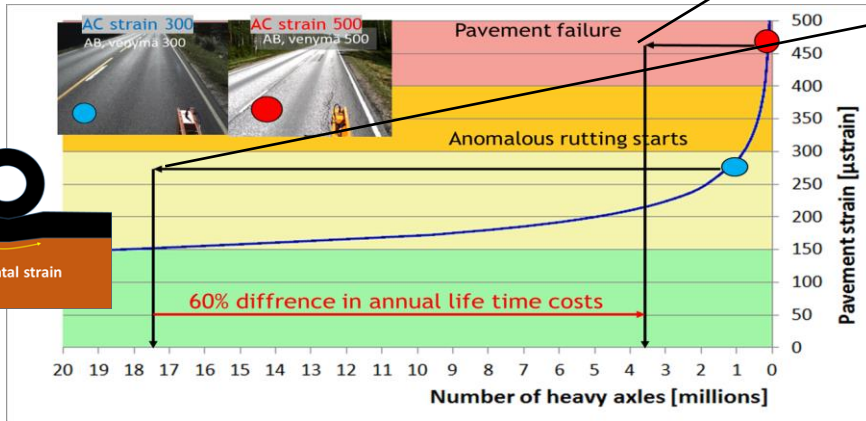
Should we pave before crack appears?



Or should we pave after cracking?



Performance when we pave before cracking appears

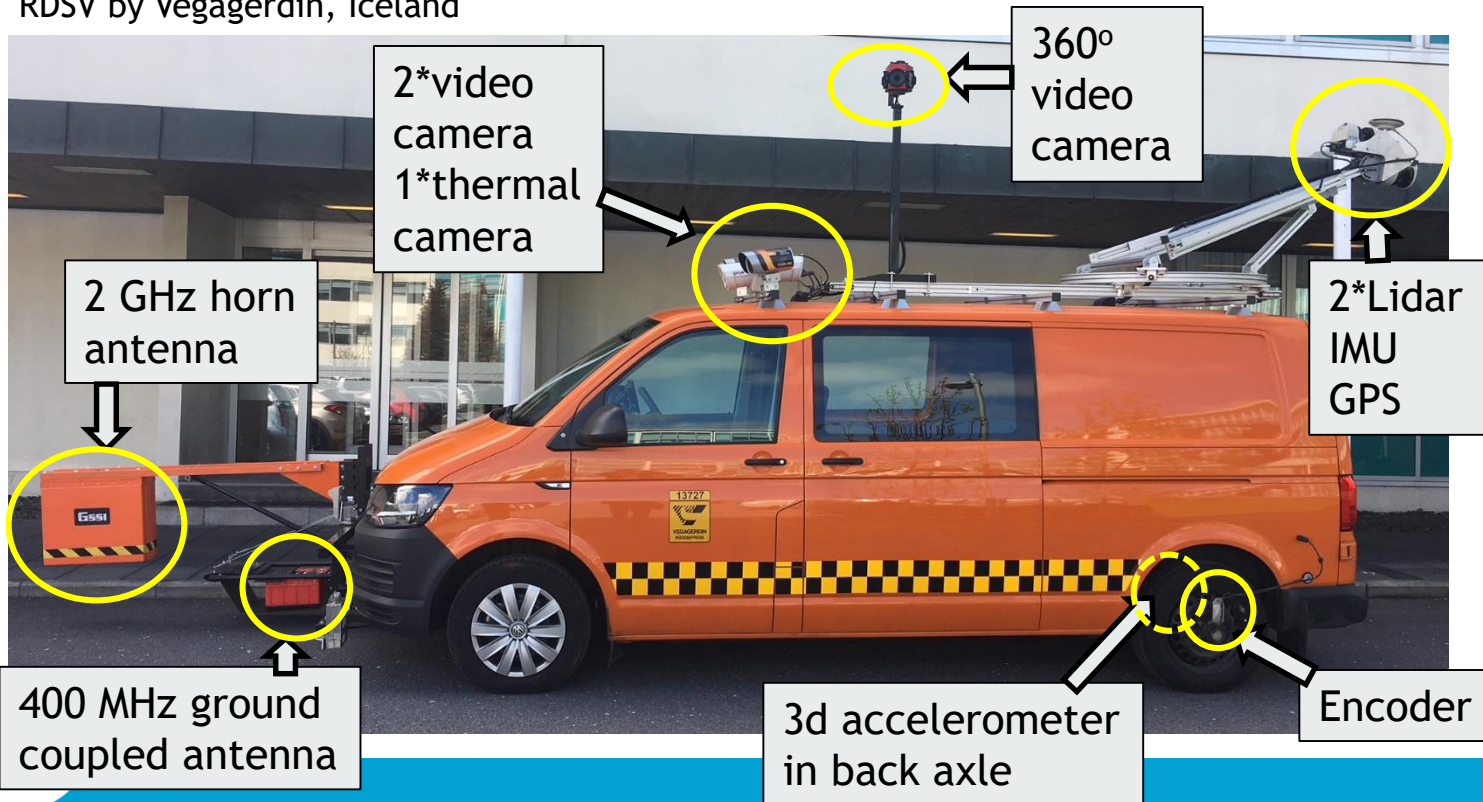


Modified from Birgisson 2018

# Modern Road Survey Technologies

## Road Doctor Survey Van, RDSV

RDSV by Vegagerdin, Iceland

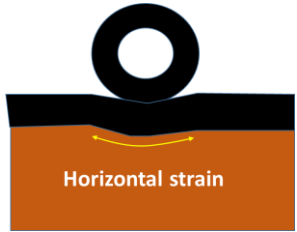


# SURVEY METHODS AND PARAMETERS/VARIABLES THAT ARE USED/TESTED FOR ROAD CONDITION DIAGNOSTICS

Road Doctor Survey Van



Traffic Speed Deflectometer

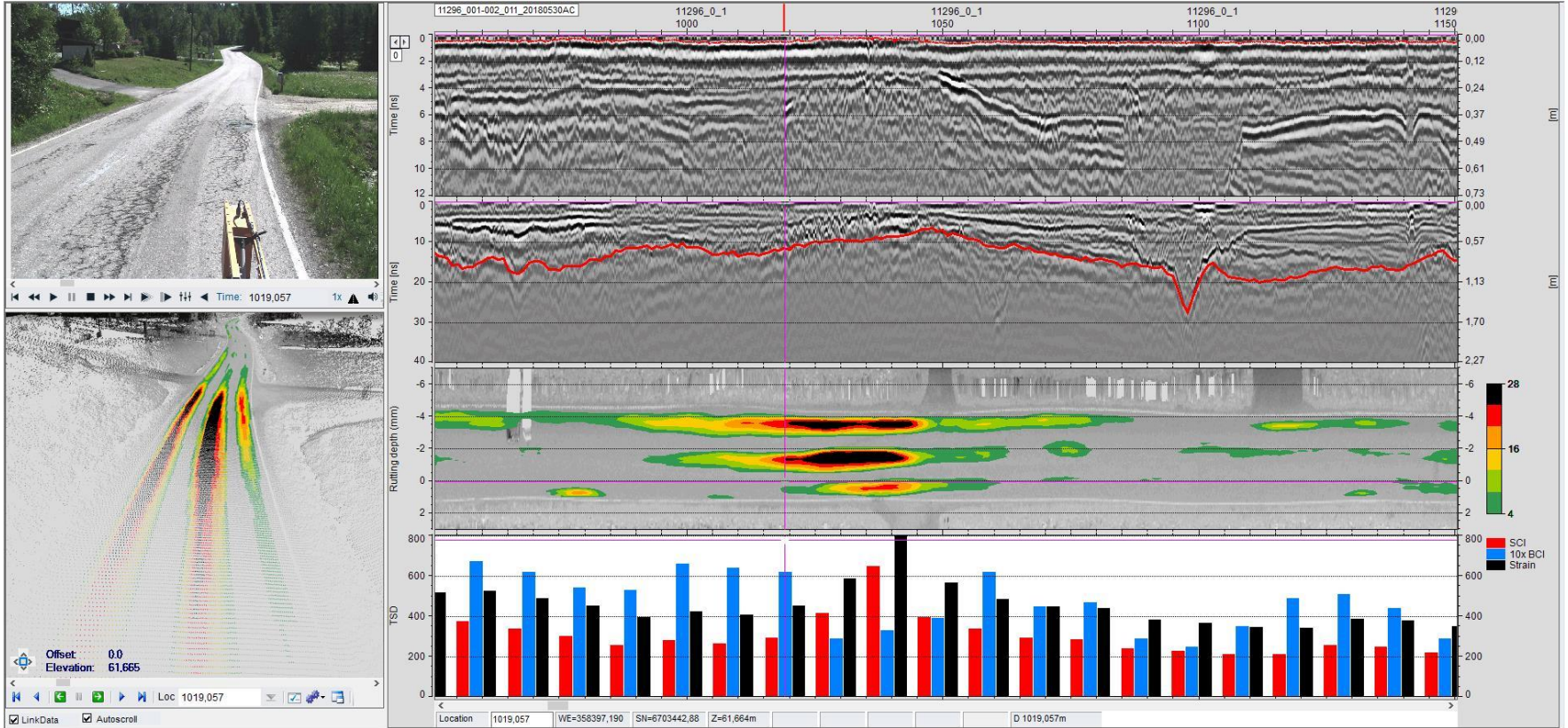


First measures were focused on road section with:

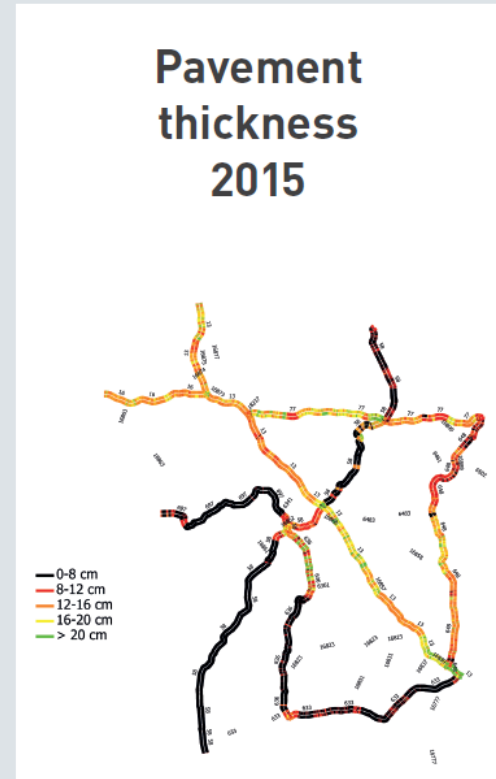
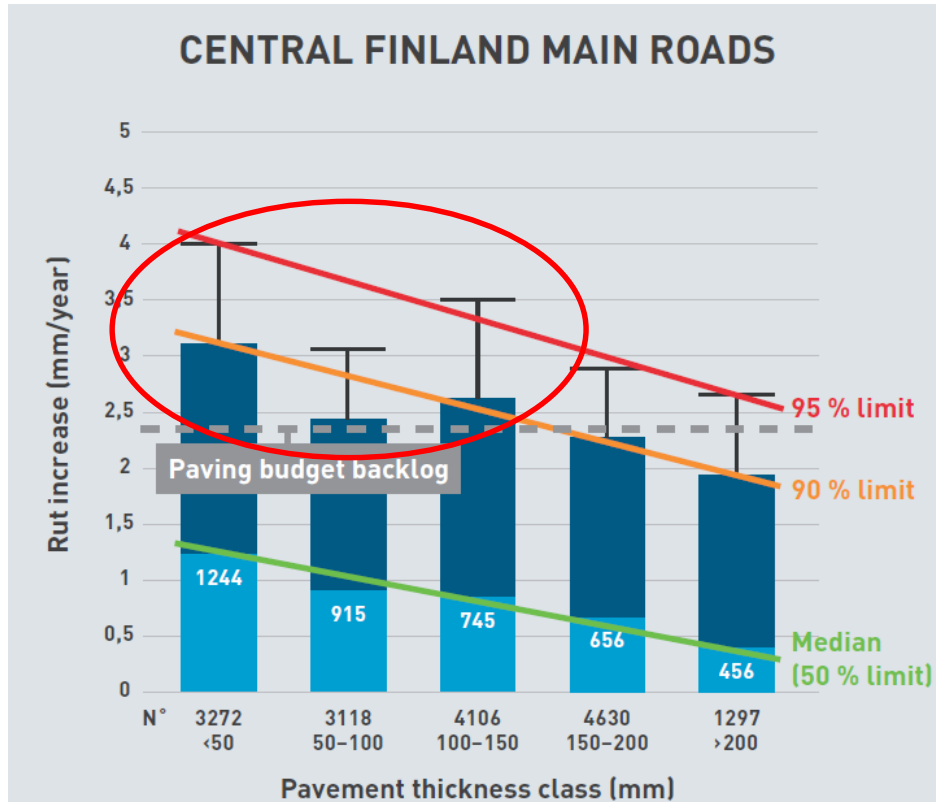
- High asphalt strain (TSD/GPR)
- High annual rut increase (lidar)
- Potential microcracking (GPR)



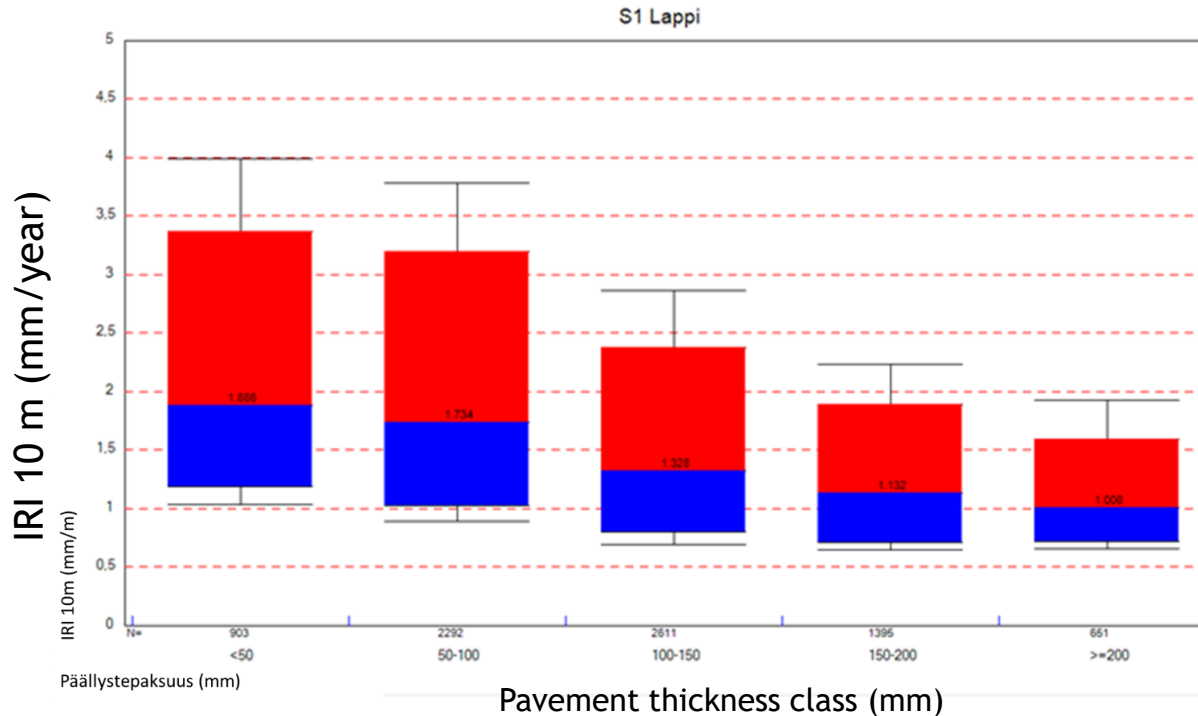
# PEHKO Problem Diagnostics



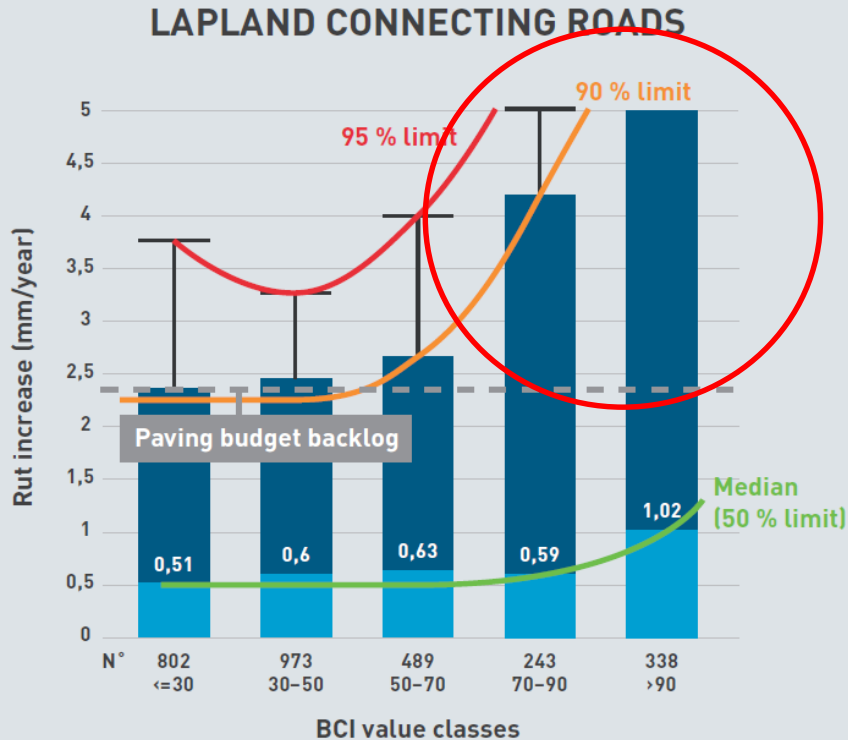
# PEHKO Diagnostics - Pavement Thickness and Annual Rut Increase



# PEHKO Diagnostics - Pavement Thickness and IRI



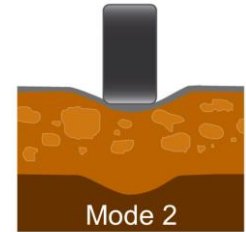
# PEHKO Diagnostics - BCI Value and Annual Rut Increase



BCI > 80,  
Hyvinkää  
Test Area

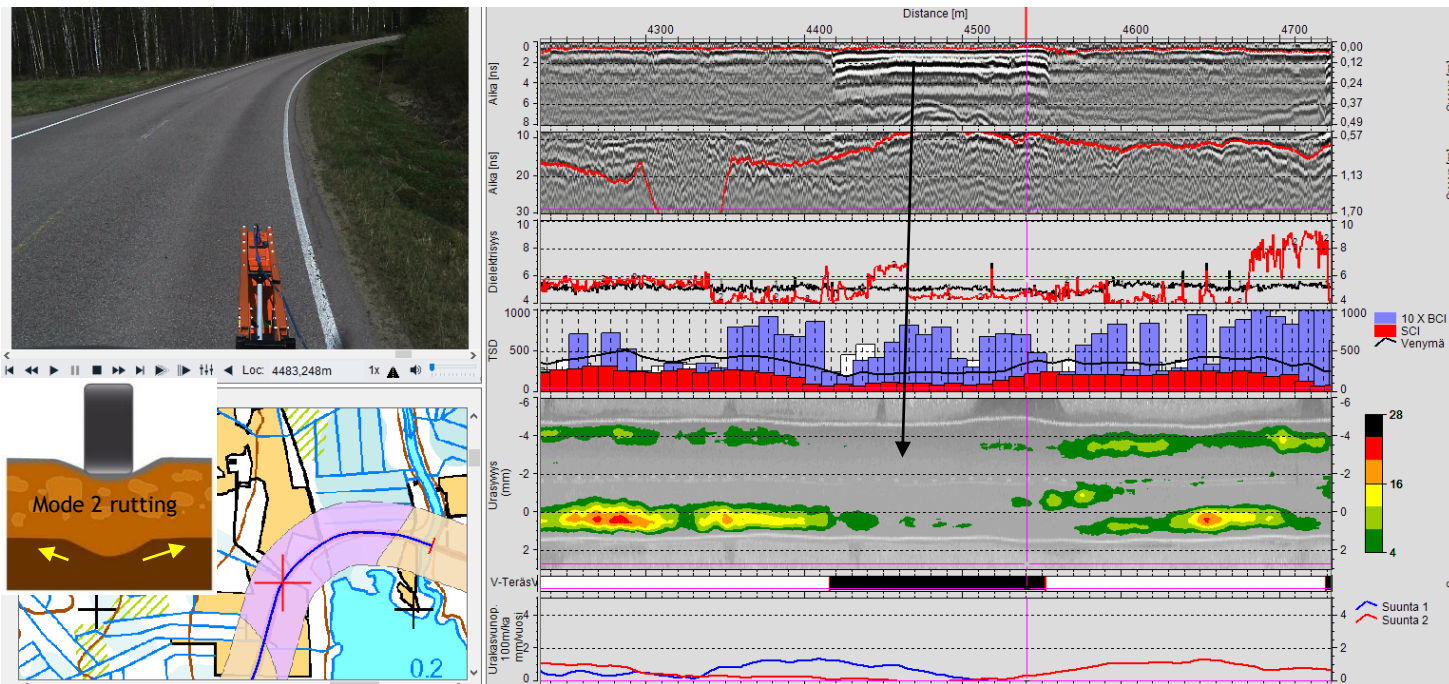


Problem:  
deformation and  
pumping due to soft  
subgrade



# EXAMPLE OF PEHKO FINDINGS:

1. MODE 2 RUTTING ON WEAK SUBGRADES IS A MUCH BIGGER PROBLEM THAN EXPECTED (REASON: NEW HEAVY TRUCKS)
2. STEEL GRIDS IN BASE COURSE PERFORM VERY WELL AGAINST MODE 2 RUTTING



# PEHKO Findings: 7 Key Reasons Behind the Paving Backlog in Finland



Pavement structure

Daily maintenance

Both

## 1. Heavy trucks and weak subgrade

- Big problem. Sections mainly where subgrade is peat.

## 2. Heavy trucks and thin pavements (<150 mm)

- Fast increasing problem with heavier trucks and new tyre types

## 3. Pavement quality in some areas

- Also with thicker pavement, reason: aggregate quality, creep, paving type, patching, etc.

## 4. Drainage problems: private access road junctions

- Really big problem but cheap to fix. Rut increase can be > 7 mm/v.

## 5. Drainage problems: side ditches

- Clogged and shallow ditches - impact 4-5%

## 6. Winter drainage problems - delayed removal of snow walls

- Great impact on shoulder deformation and roughness

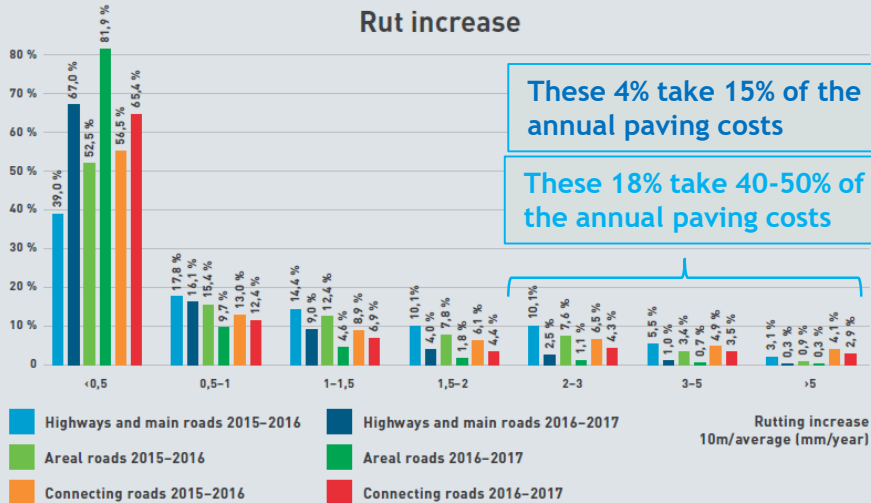
## 7. Extensive use of deicing salt and thin pavements

- New and very interesting finding

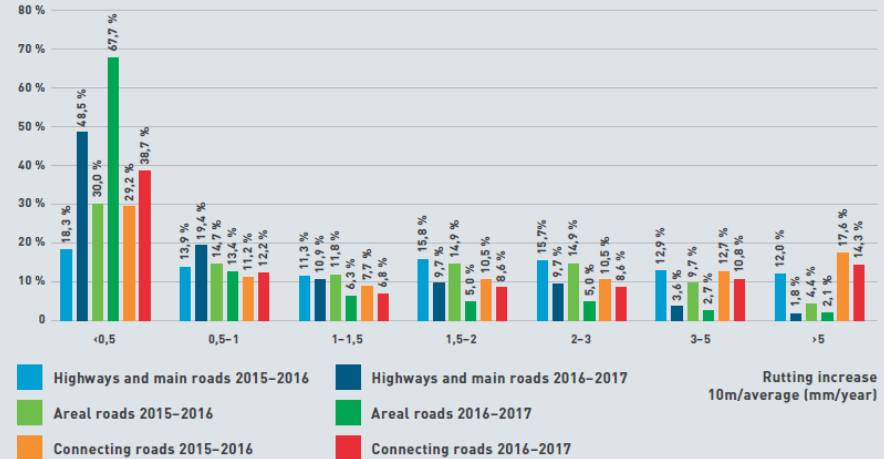
# Economical Benefits of the PEHKO Techniques and Policies - Karstula Central Finland

Distributions in Central Finland pilot area in 2015–2016 and 2016–2017 in different road classes

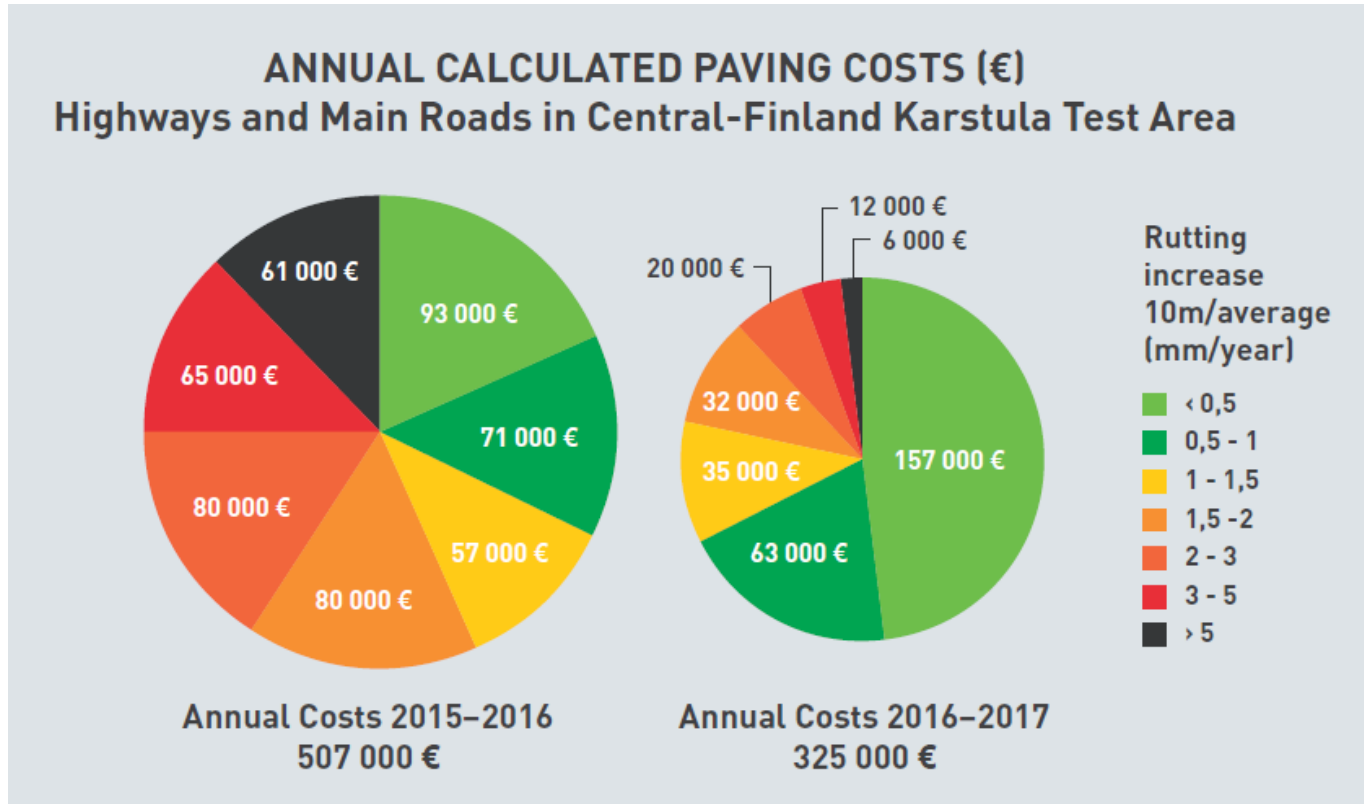
Rut increase



Annual paving costs



# BENEFITS OF THE PEHKO TECHNIQUES AND POLICIES





## CRITICAL PEHKO FINDING: WINTER MAINTENANCE PROBLEMS LEADING TO INCREASED ANNUAL PAVING COSTS



Frozen or clogged private access road culverts leading to deformations.

Annual cost effect: ~10%



Delayed snow removal from road shoulders leading to water infiltration under the pavement and permanent deformations.

Annual cost effect: 13 - 17 %

With better winter maintenance it is possible to cut about the 50% of the annual paving backlog in Finland (50-60 million €)

# How We Will Do the 50% Cut:

- Detailed surveys and analytical diagnostics based design
- LCA based solutions
- Thicker pavements
- Focused problem section repair
- Steel grids
- Drainage improvement
  - Side ditches
  - Private access road culvert
- Better winter maintenance
- Reacting before cracks appear to the pavement
- Surface dressing against early phase fatigue

# BENEFITS OF THE INTELLIGENT ASSET MANAGEMENT TECHNOLOGIES

- Better understanding of root causes of road damages
- Better road drainage maintenance management (new techniques)
- Better pavement design practises:
  - Heavier measures focused on exact problem locations
  - Optimised pavement thickness
  - New structural solution for road over weak subgrades
  - Enabling monitoring performance of new structures (learning process)
- Enabling proactive pavement maintenance policies
  - Repaving before pavement loses its strength
- Longer pavement life times => **Better roads and major savings with asset management costs**

# The New PEHKO Maintenance Practices have also Improved Traffic Safety



March 31st, 2018. Road outside PEHKO areas



March 31st, 2018. PEHKO Road



# Thank You

