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ROADEX Drainage Demonstration Projects: N56 and N59, Ireland

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Roadscanners, Finland

ROADSCANNERS

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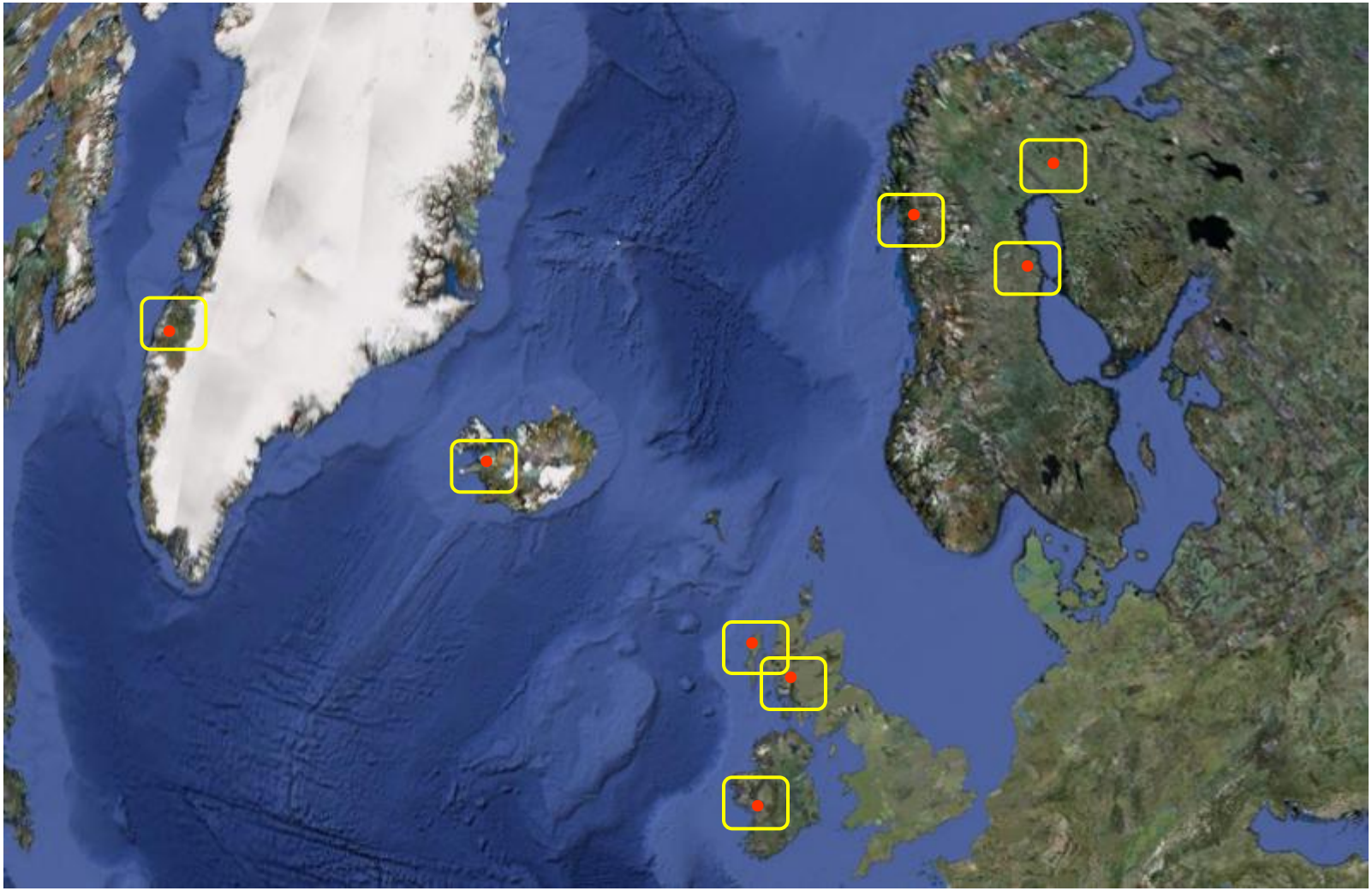
ROADEX Demonstration Projects:

The ROADEX demonstration projects - Drainage



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Drainage Demonstration in Ireland

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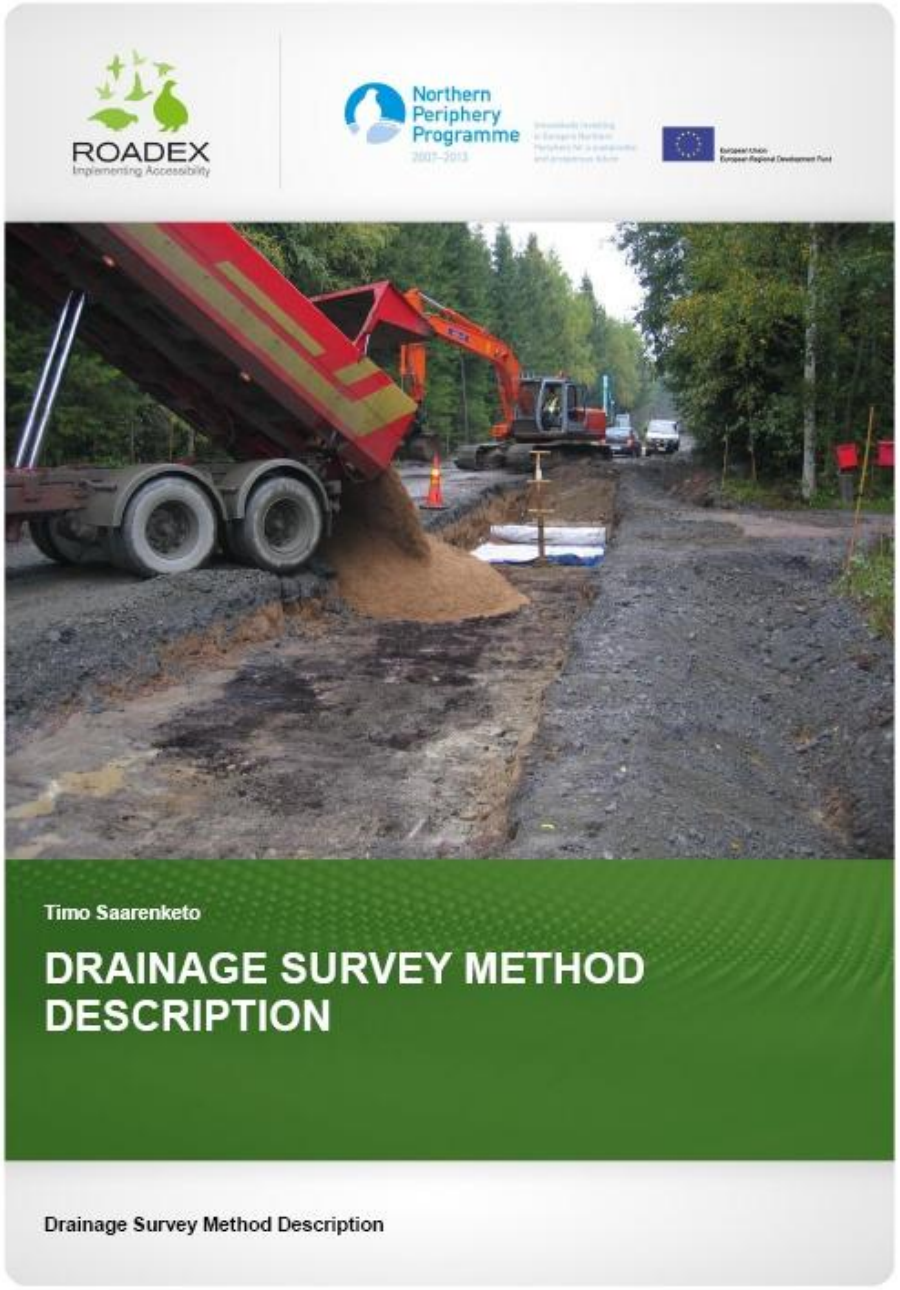
Temporary method description made in 2009 – 2011 drainage pilot projects.



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Survey Vehicle and Driver from PMS

Road Condition & Drainage Problems

Typical drainage deficiencies in Ireland

- The majority of the severe drainage problems in Ireland appear to occur in the same kind of circumstances as in Nordic countries.
- A good example of this are the road sections located on side sloping ground
  - If the ditch is not in good condition in the upper side of the road problems will most likely occur

Problems in the upper side of the side slope

”Local” drainage problems

- Verges are very common on the N56 and N59,
- Verges prevent the water flowing away from the roadway, forcing any surface water to drain through the pavement structure instead of flowing away from the road

Example of extremely high verge

”Local” drainage problems

- Another typical feature on the Irish roads surveyed was the presence of rock walls.
- Where road improvements had been carried out these walls appear to have been removed.
- Usually the walls are very old and in many cases not visible due to vegetation growth.
- Typically these walls blocked the flow of surface water away from the road unless water outlets had been provided

Rock wall blocking the water

”Local” drainage problems

- A very special feature on the roads surveyed was the narrow road cutting
- In many cases there is a complete absence of ditches or any other drainage structure within these types of road cuts.
- This means that water generally flows along the road as there is no possibility for it to get off the road, and this causes erosion and deformation problems to the road

Problems in a road cutting

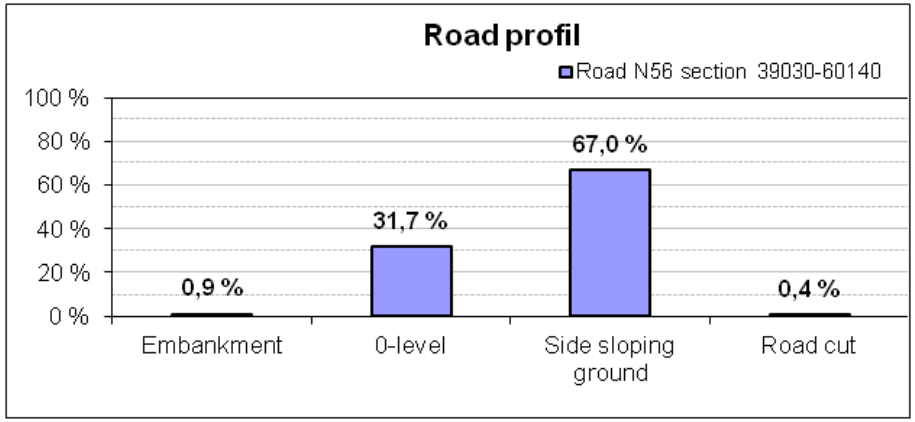
Example:

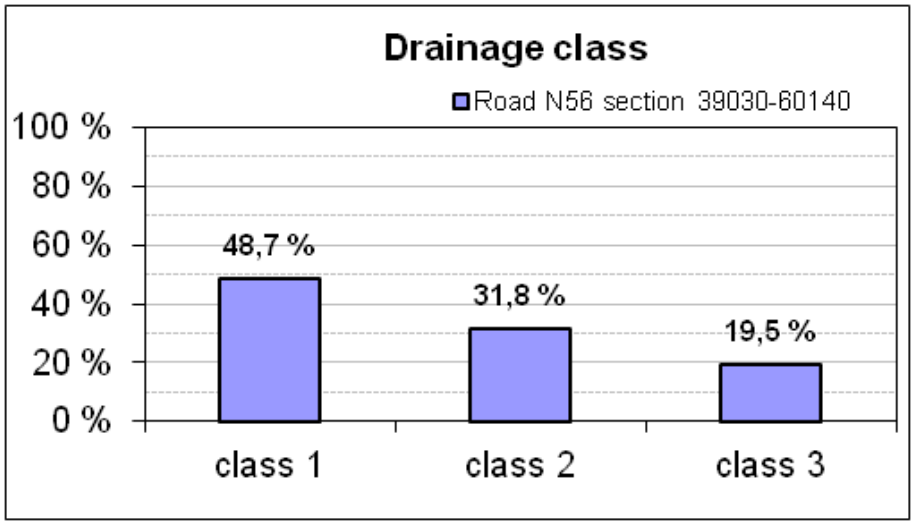
N56 Section 39030 - 60140

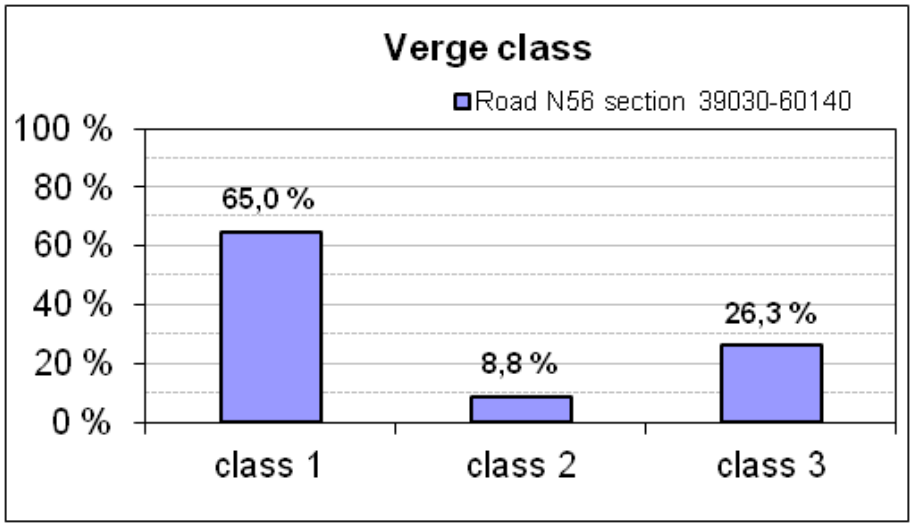
- The section starts at Ardara and ends to the Qweebarra Bridge
- The surveyed section varies a lot but most of the section is in side sloping profile (67%). Also there are newer and older road structures which both include several subsections where drainage maintenance work is needed


Gweebarra River
N56
Glenties
Ardara
GWEEBARRA BAY
Béal an Bheara
LOUGHROS MORE BAY
Gaoth Luacharois Mór
Trawenagh Bay

Statistics of the Section Ardara-Gweebarra







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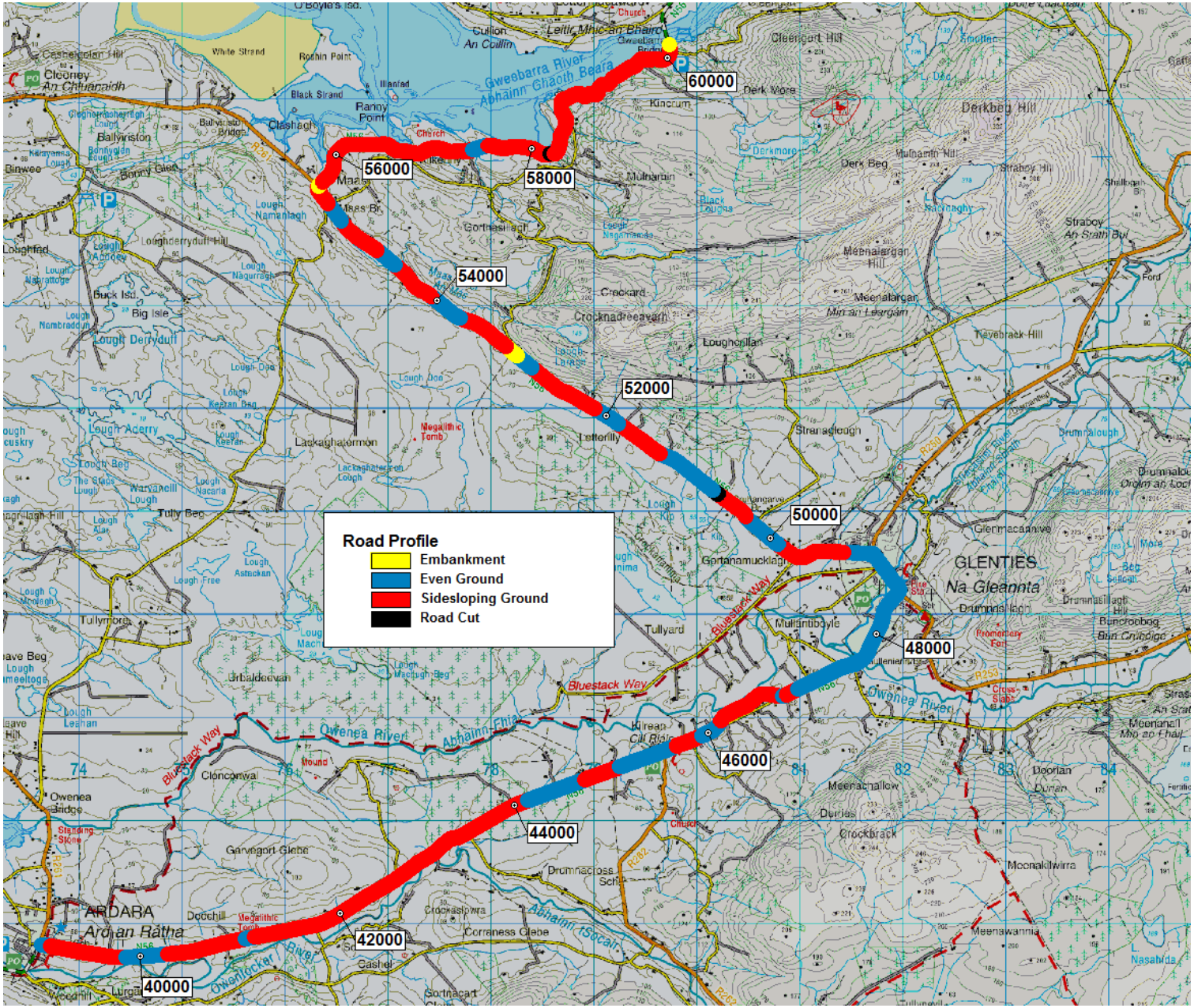

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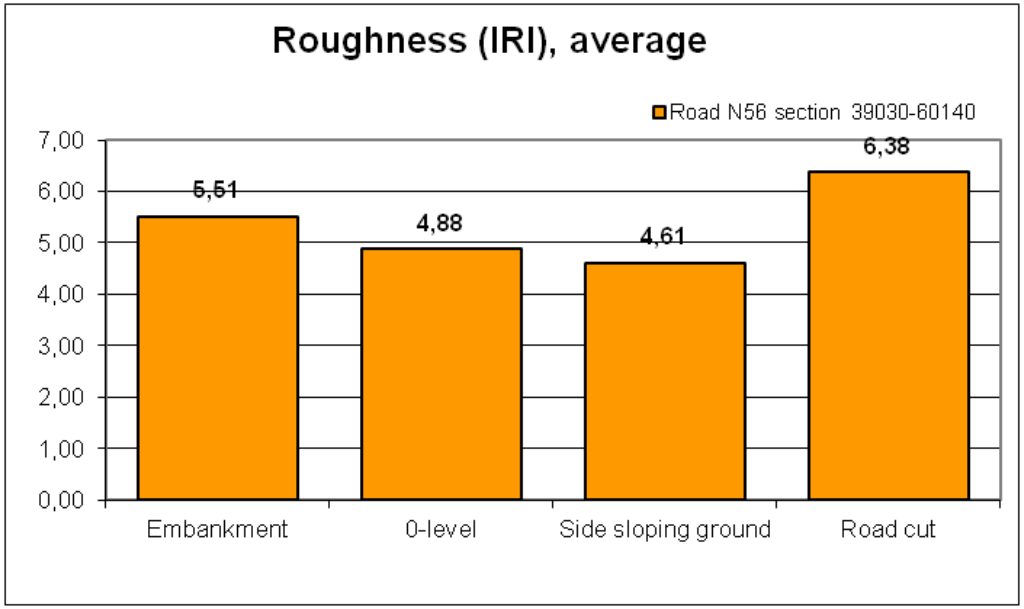
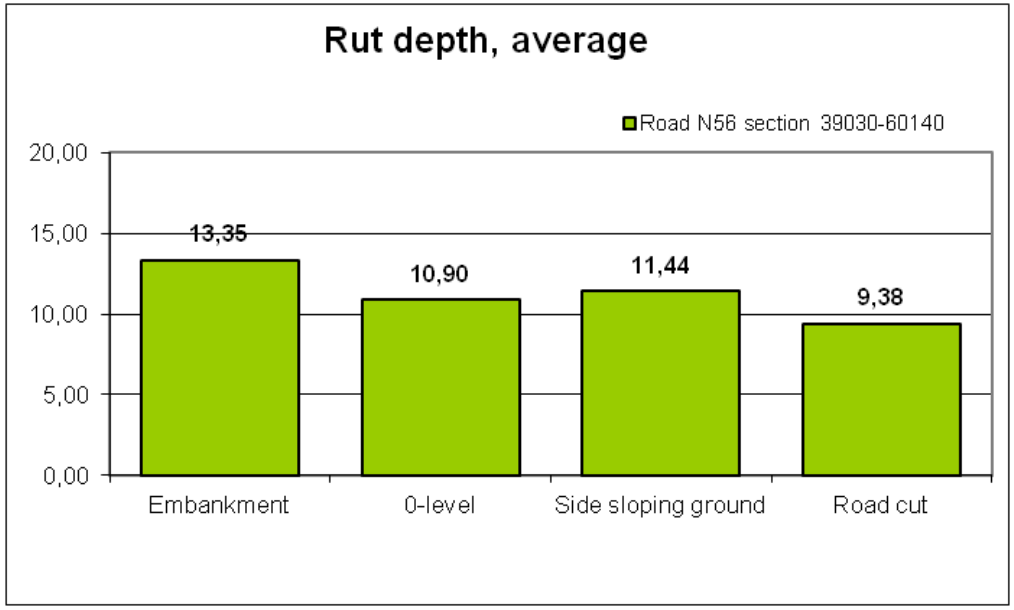
IRI and Rutting Values in Different Road Profiles in Section Ardara-Gweebarra





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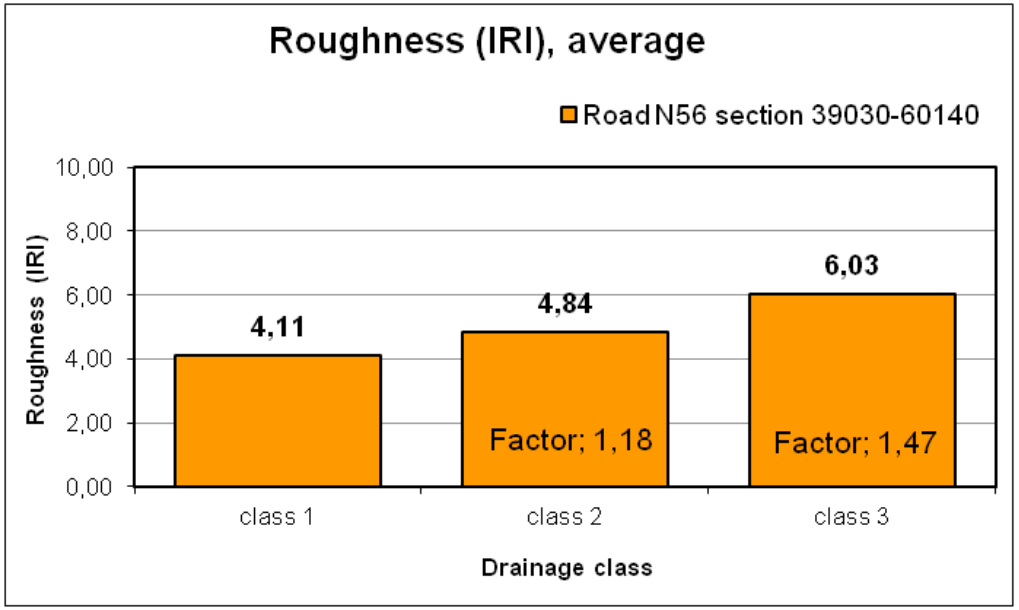
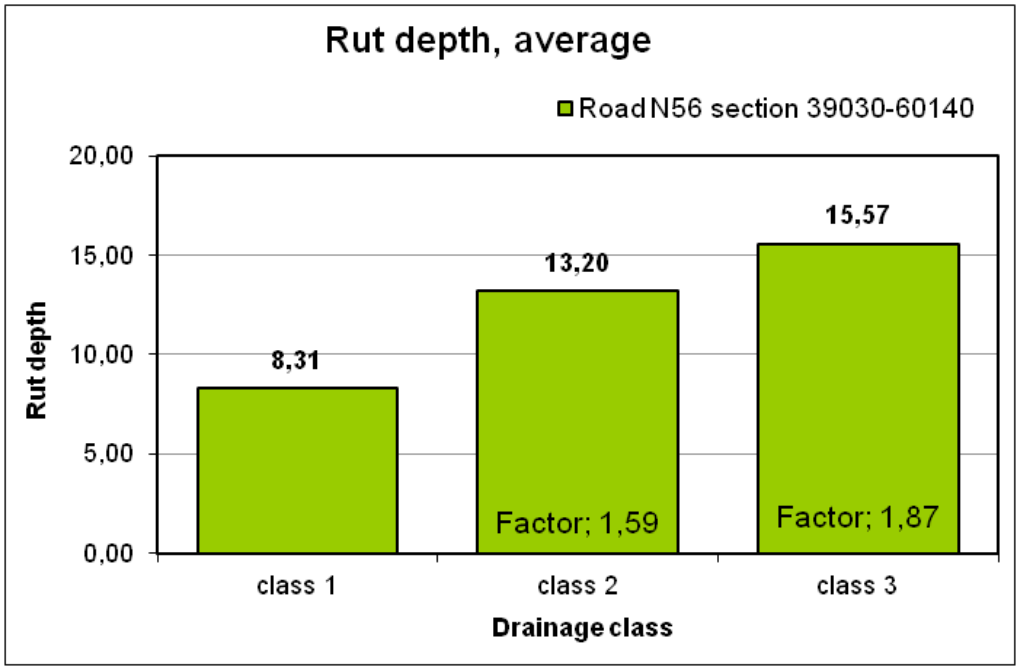
IRI and Rutting Values in Different Drainage Classes in Section Ardara-Gweebarra





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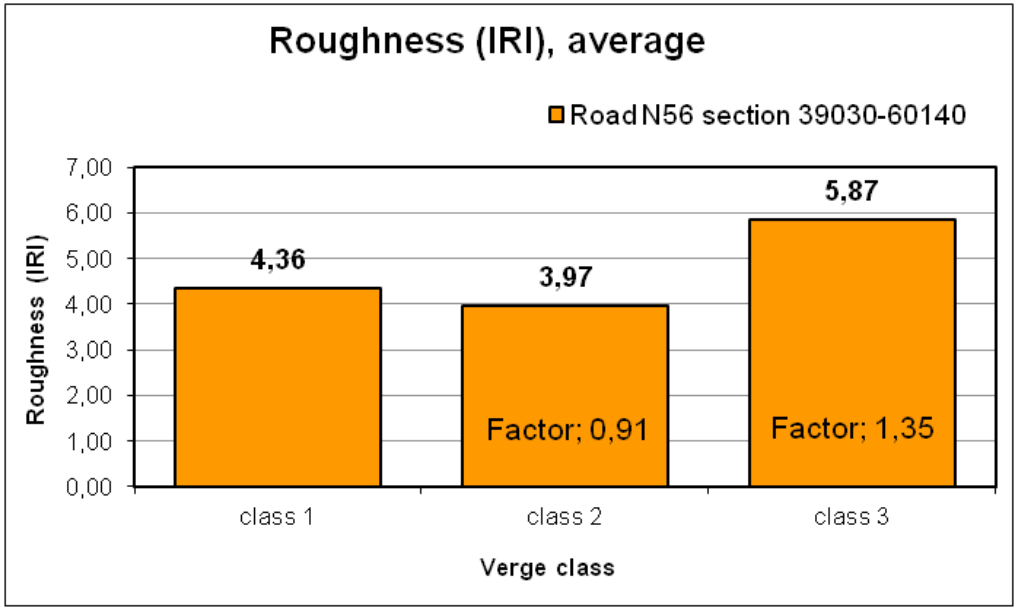
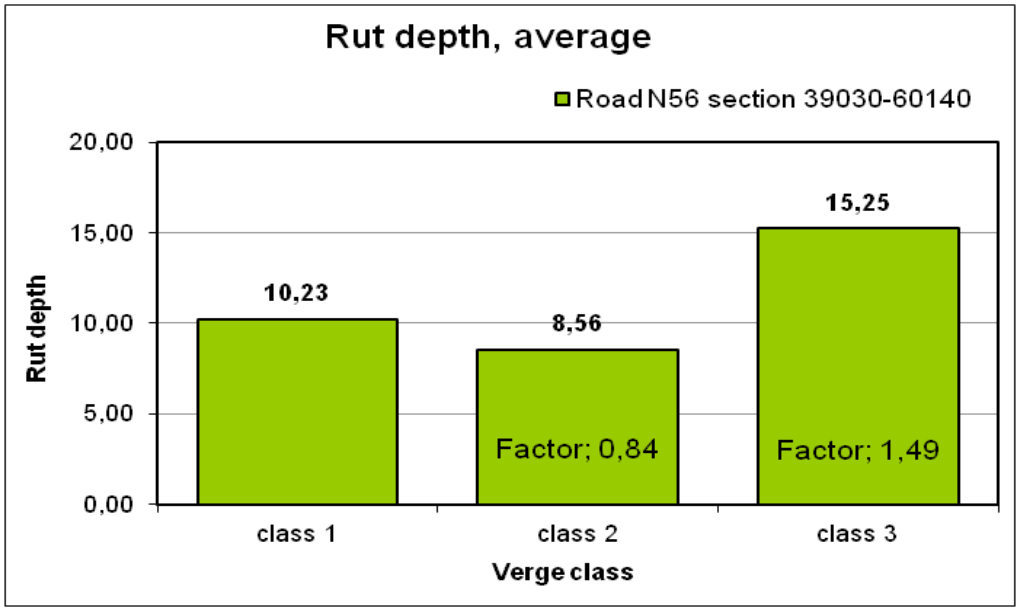
IRI and Rutting Values in Different Verge Classes in Section Ardara-Gweebarra





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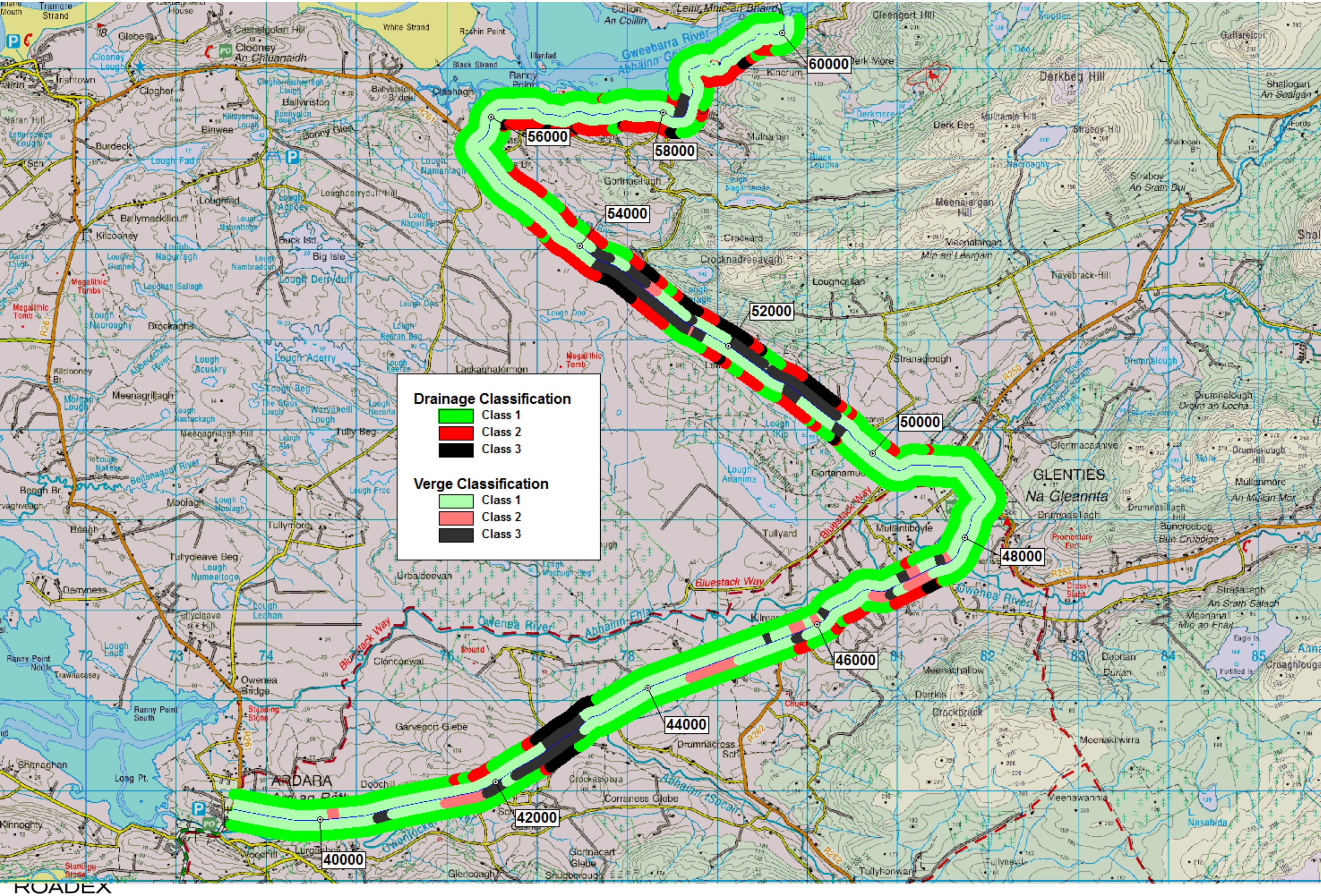
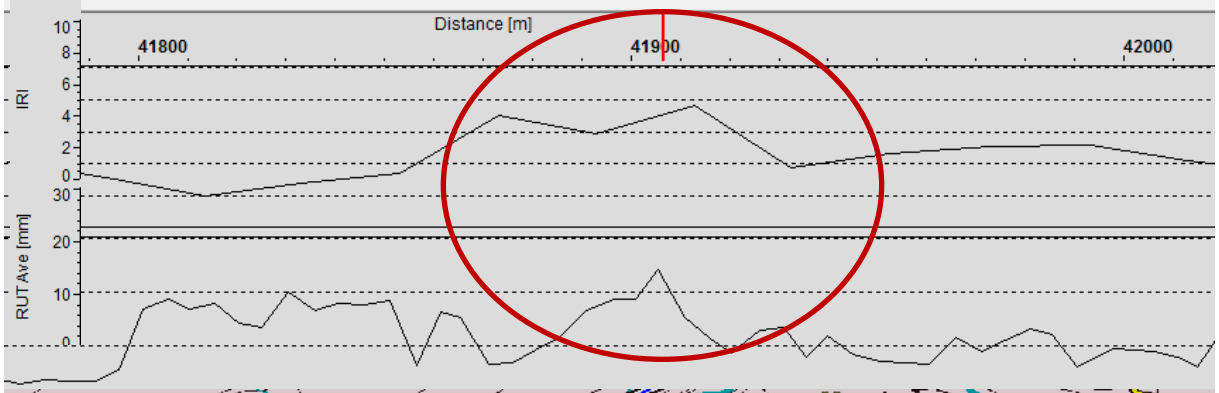


Drainage Classification
Class 1
Class 2
Class 3
Verge Classification
Class 1
Class 2
Class 3
40000
42000
44000
46000
48000
50000
52000
54000
56000
58000
60000
GLENTIES
Na Gleannta
ARDARA
Gweebarra River
Owenea River
Bluestack Way

41900m the road profile is side sloping from left to right. Possibly there is a french drain but it's not working well enough. Higher IRI and Rutting values!



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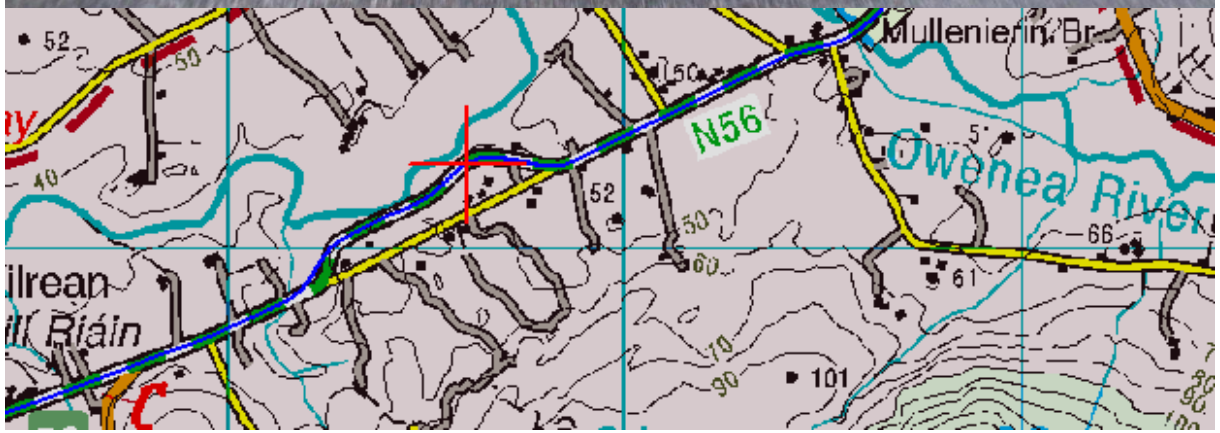
46600m there is a tight bend to the left in side sloping road profile. There is no room for a ditch in the upper side of the slope. Severe damages on the road!



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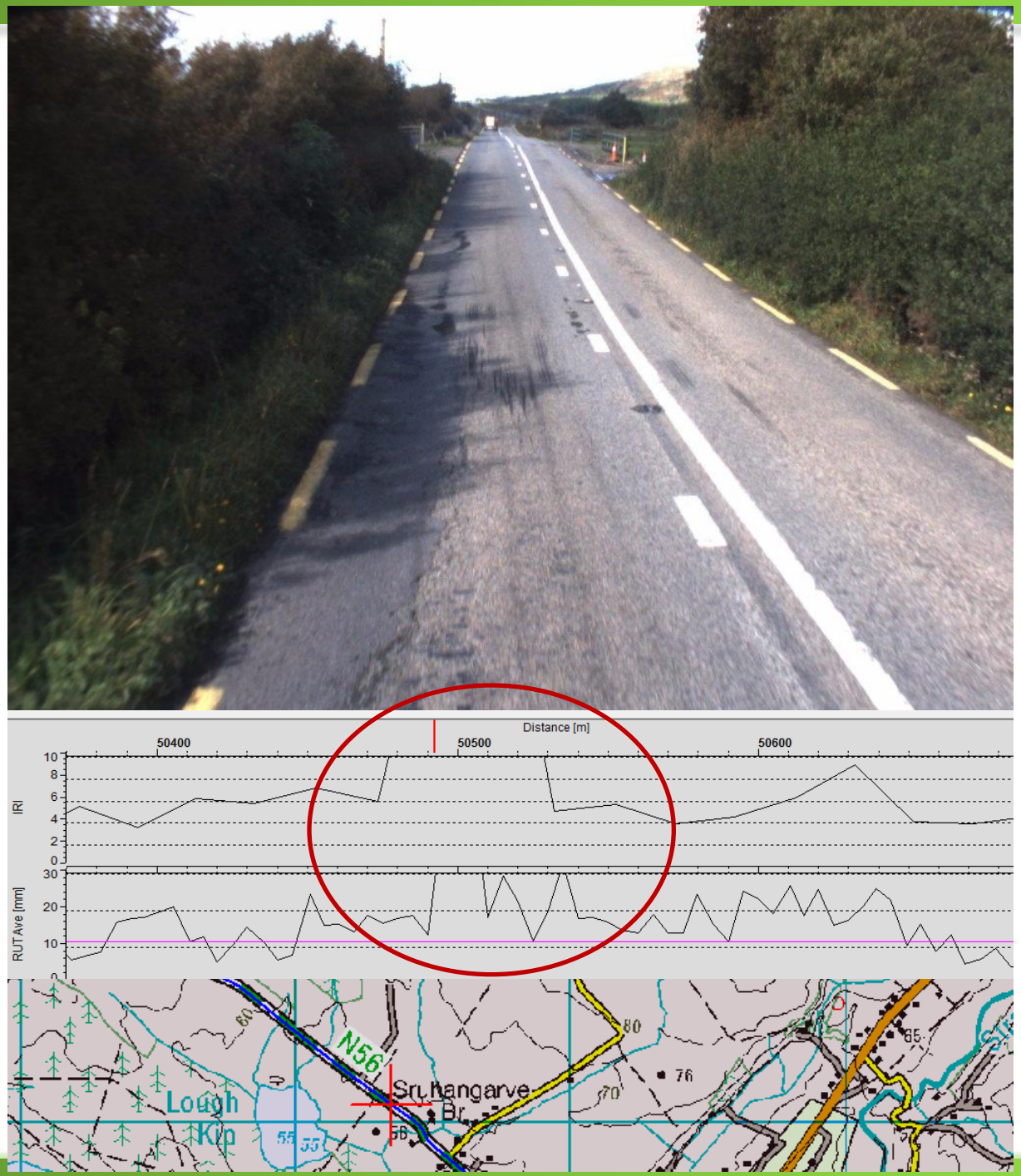
50500m the road profile is side sloping from right to left. On the left (lower) side there is a problematic verge stopping the water. High IRI and Rutting values!



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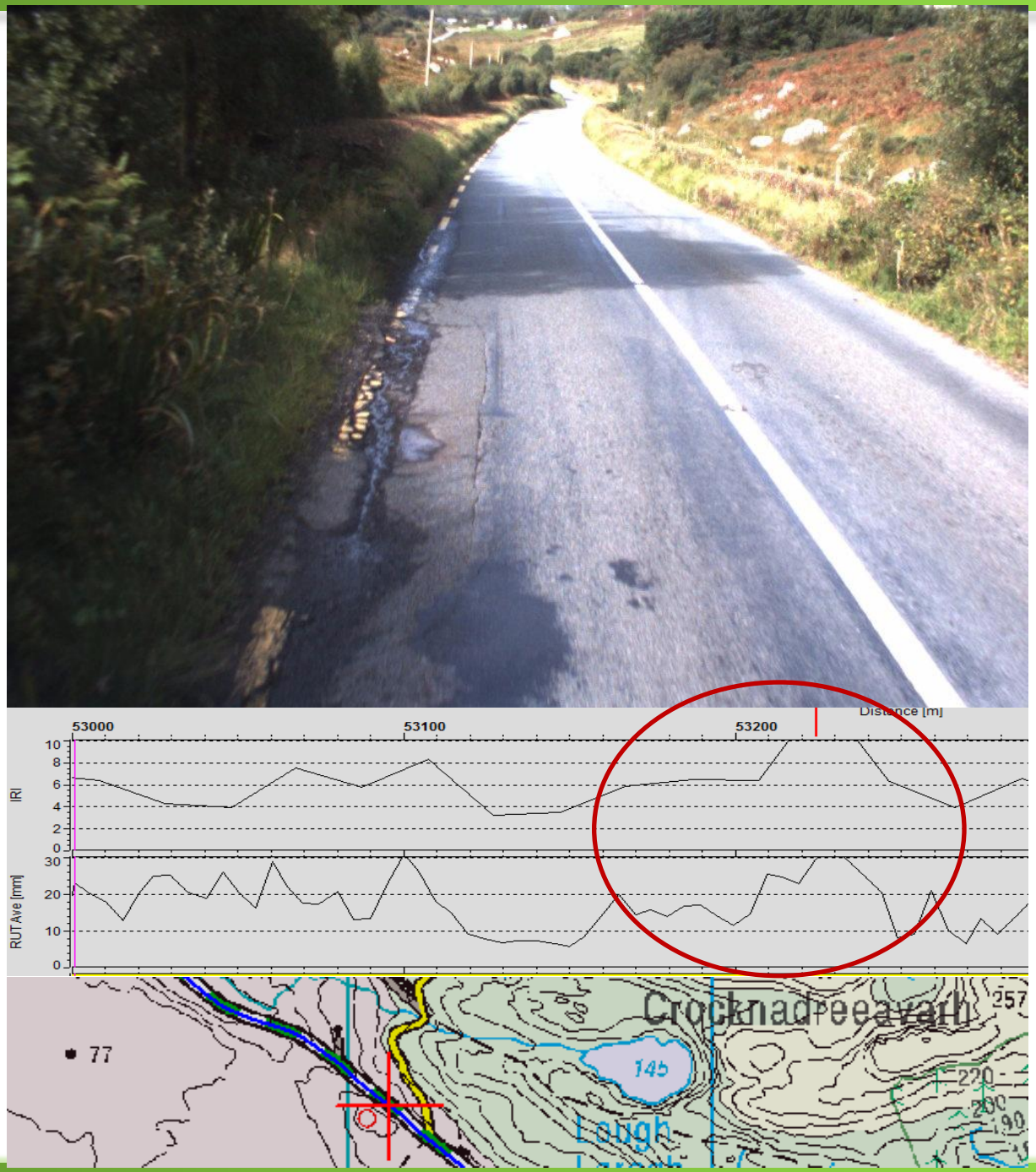
50600-52900 open ditch full of vegetation on the right which needs cleaning to improve the drainage

53200 steep downhill and on the left the ditch is missing. Clearly a peak in the IRI and Rutting values and damages on the road!



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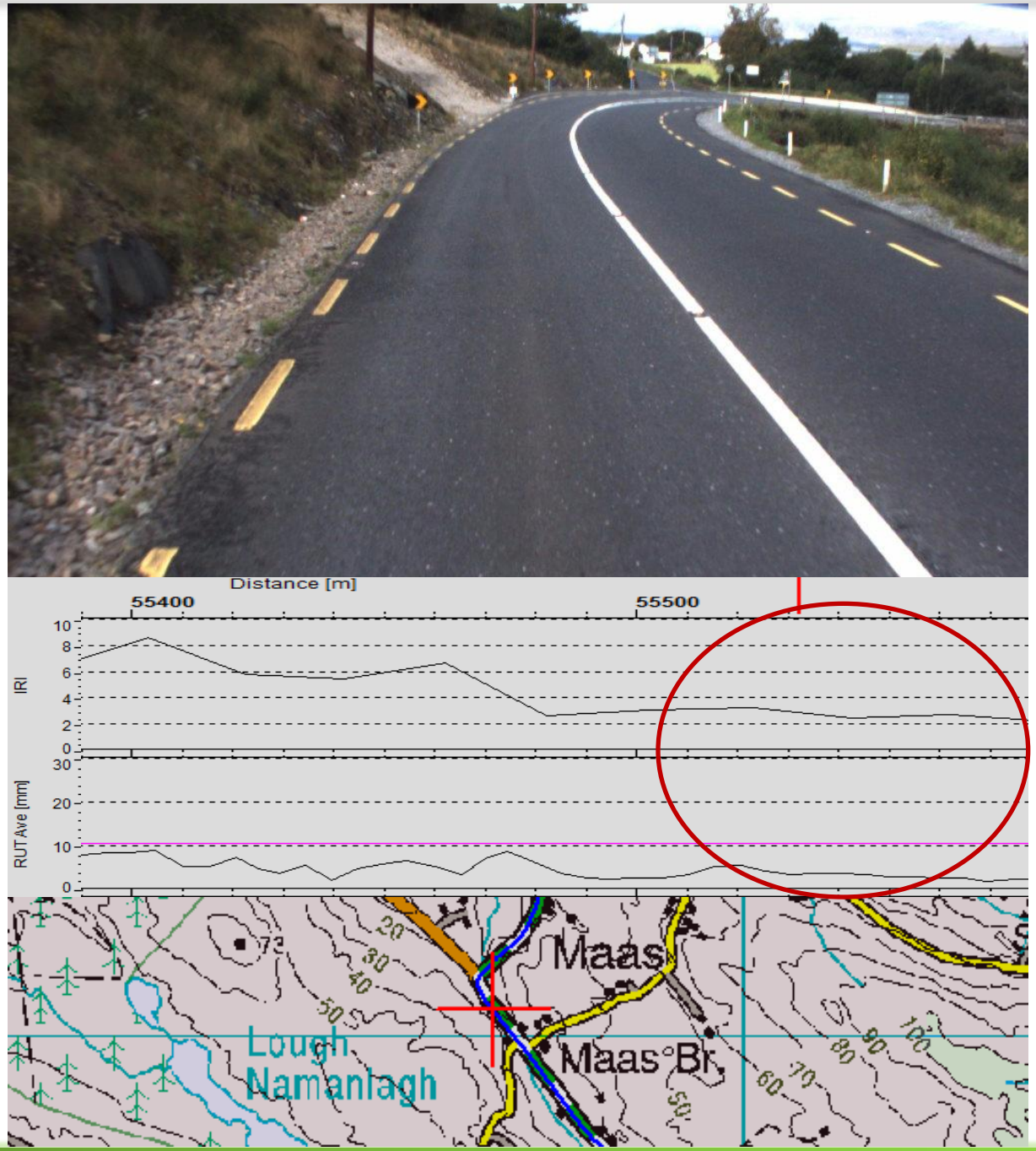
55200 new structure and there is a french drain on the left which seem to be working well. Low IRI and Rutting values on this part.






From 56000 to the end of the section the road is in quite steep side sloping ground. On the upper side there are drainage deficiencies in times. There is little room for a ditch which makes it hard to improve drainage.

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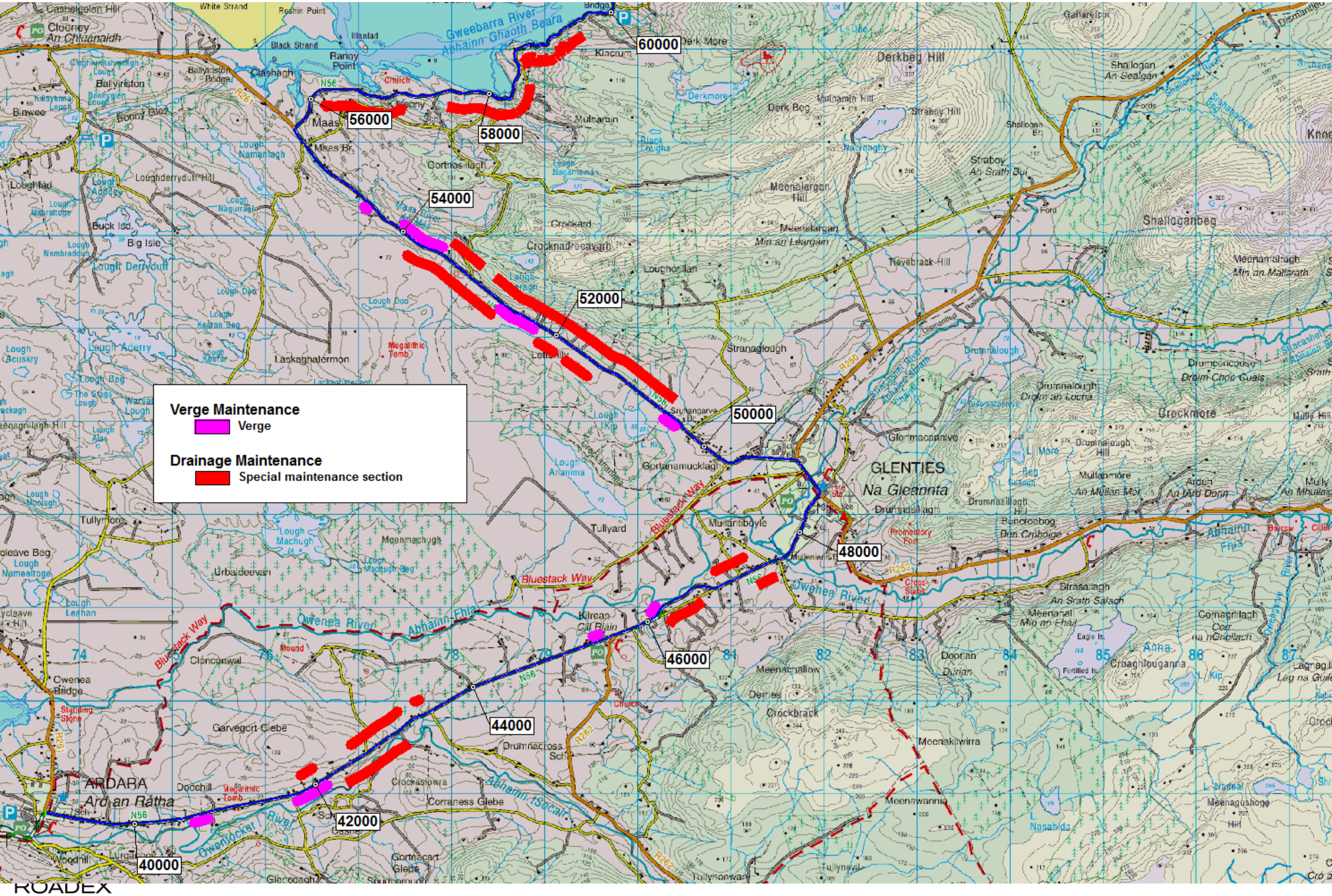
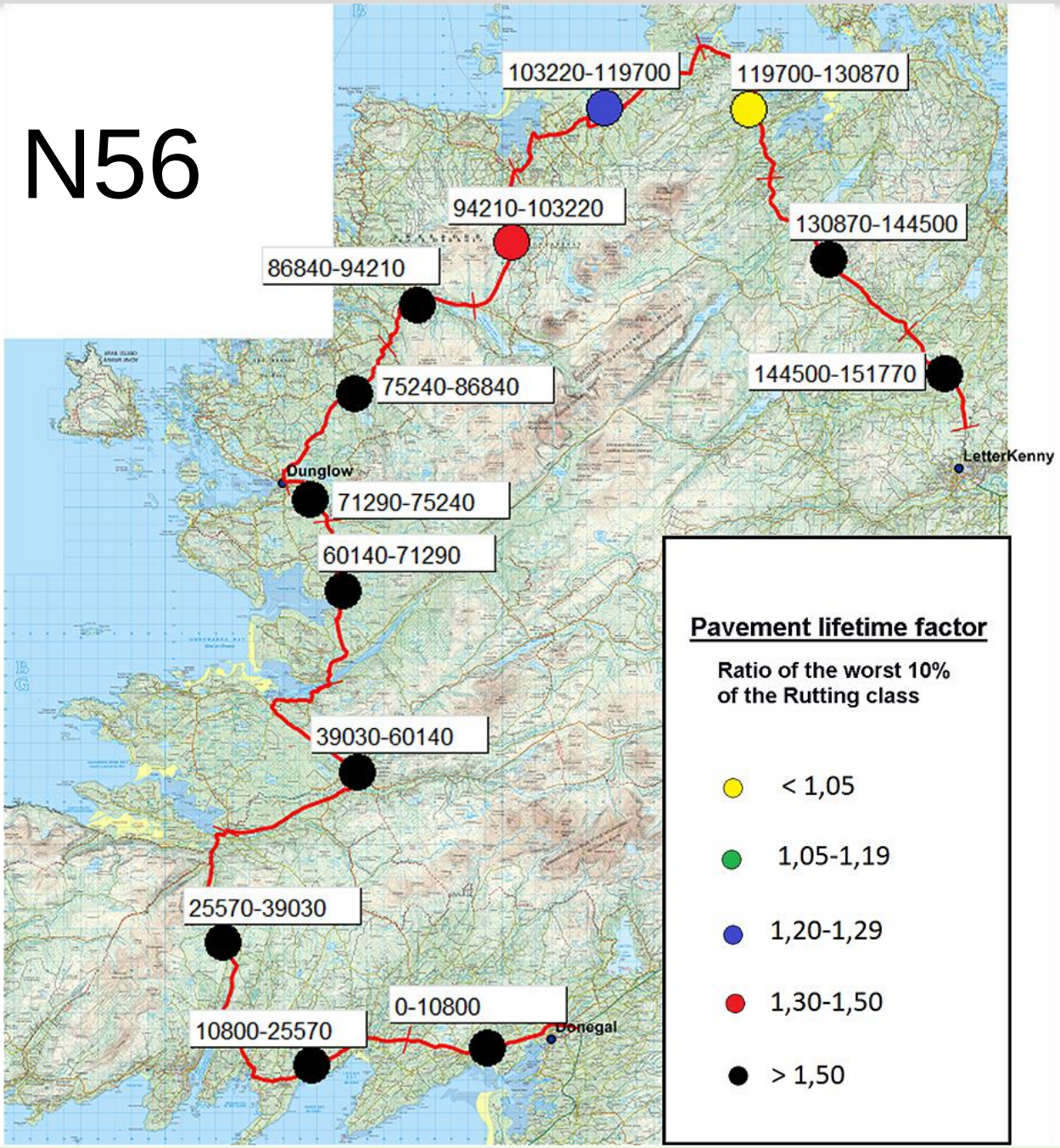
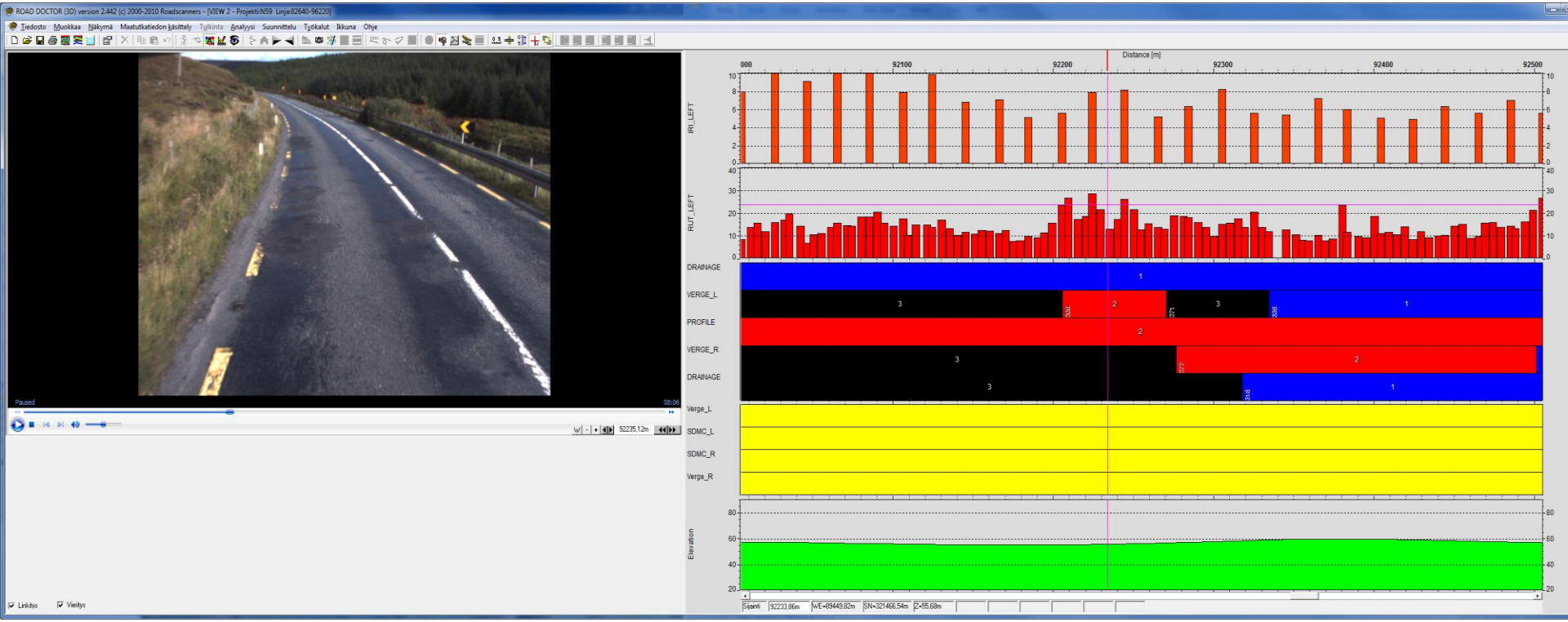

Verge Maintenance
Verge
Drainage Maintenance
Special maintenance section
60000
58000
56000
54000
52000
50000
48000
46000
44000
42000
40000
GLENTIES
Na Gleannta
ARDARA
Ard an Rátha
N56
Owenea River
Bluestack Way

N56


103220-119700
119700-130870
94210-103220
130870-144500
86840-94210
144500-151770
75240-86840
Dunglow
LetterKenny
71290-75240
60140-71290
39030-60140
25570-39030
0-10800
10800-25570
Donegal
Pavement lifetime factor
Ratio of the worst 10% of the Rutting class
< 1,05
1,05-1,19
1,20-1,29
1,30-1,50
> 1,50

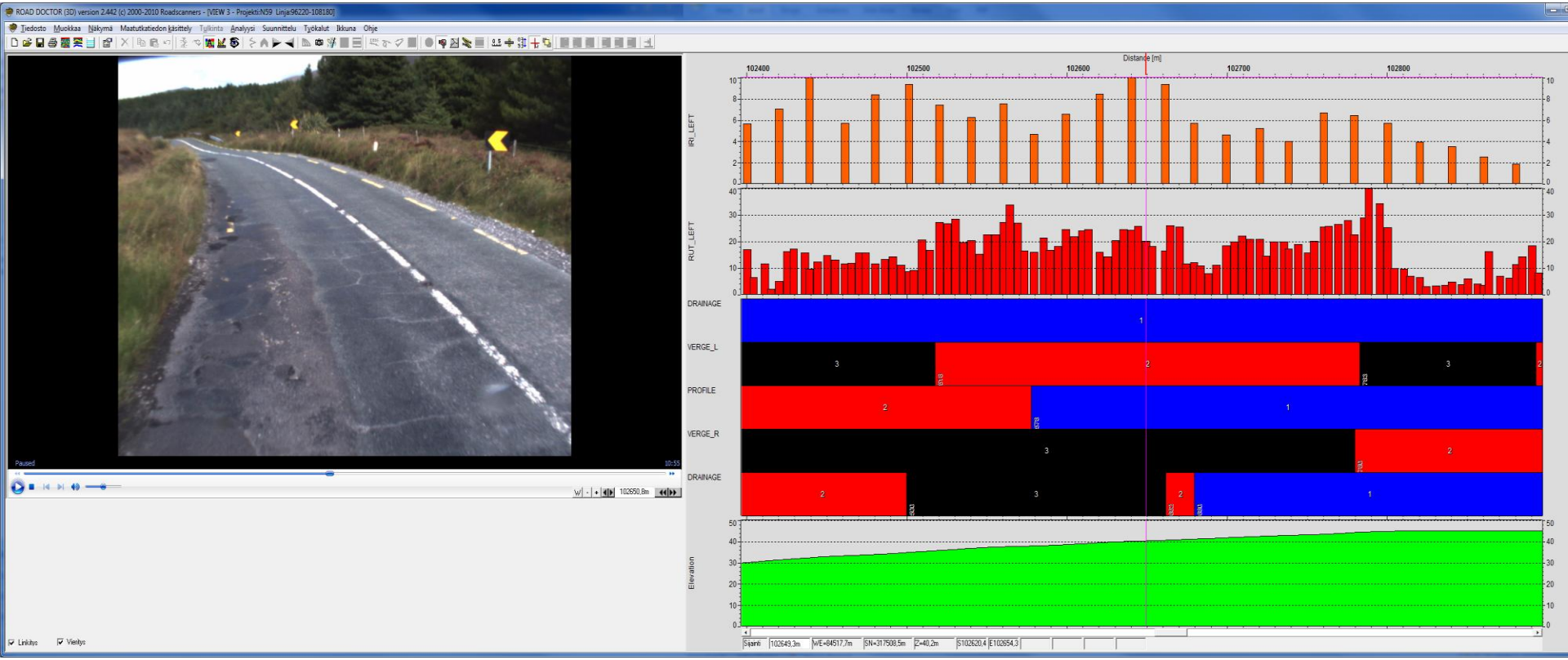
N59 Mayo County

92 230, Steep side sloping with no drainage



N59 Mayo County

102 620, High grass verge in inner curve blocks water flow away from pavement, severe damages



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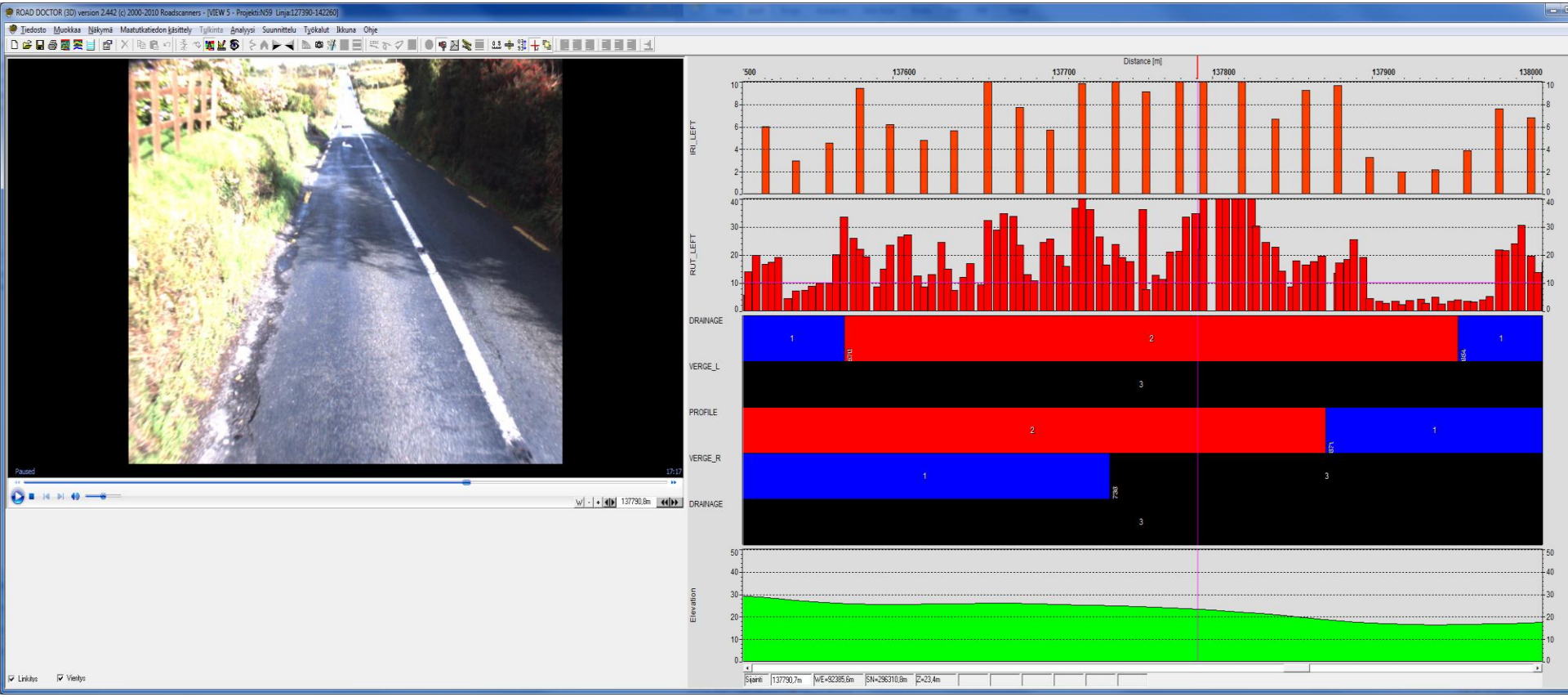
N59 Mayo County

137 800, Steep hill cut with no ditches, severa damages



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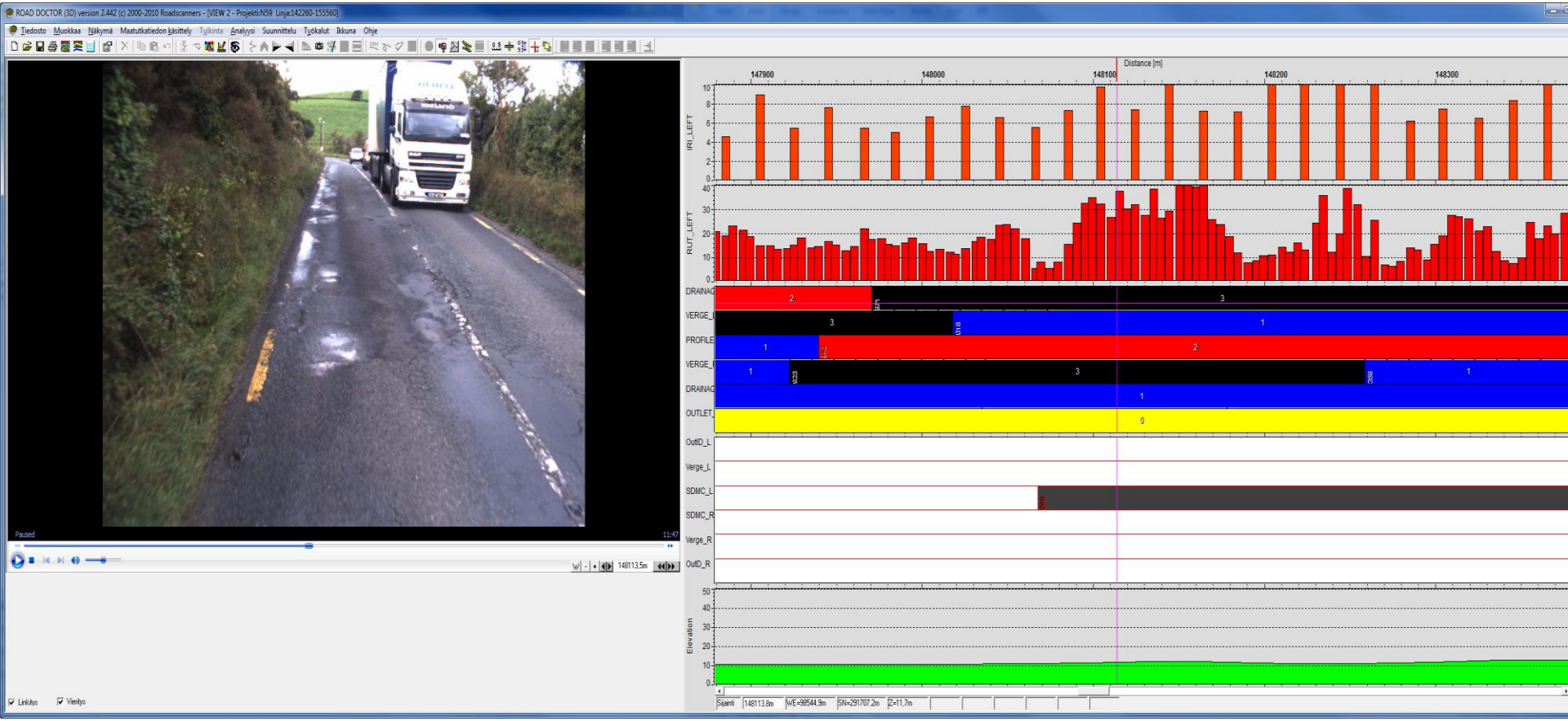
N59 Mayo County

148 120, Side sloping ground with no drainage. Space for ditch or ”french drain”?



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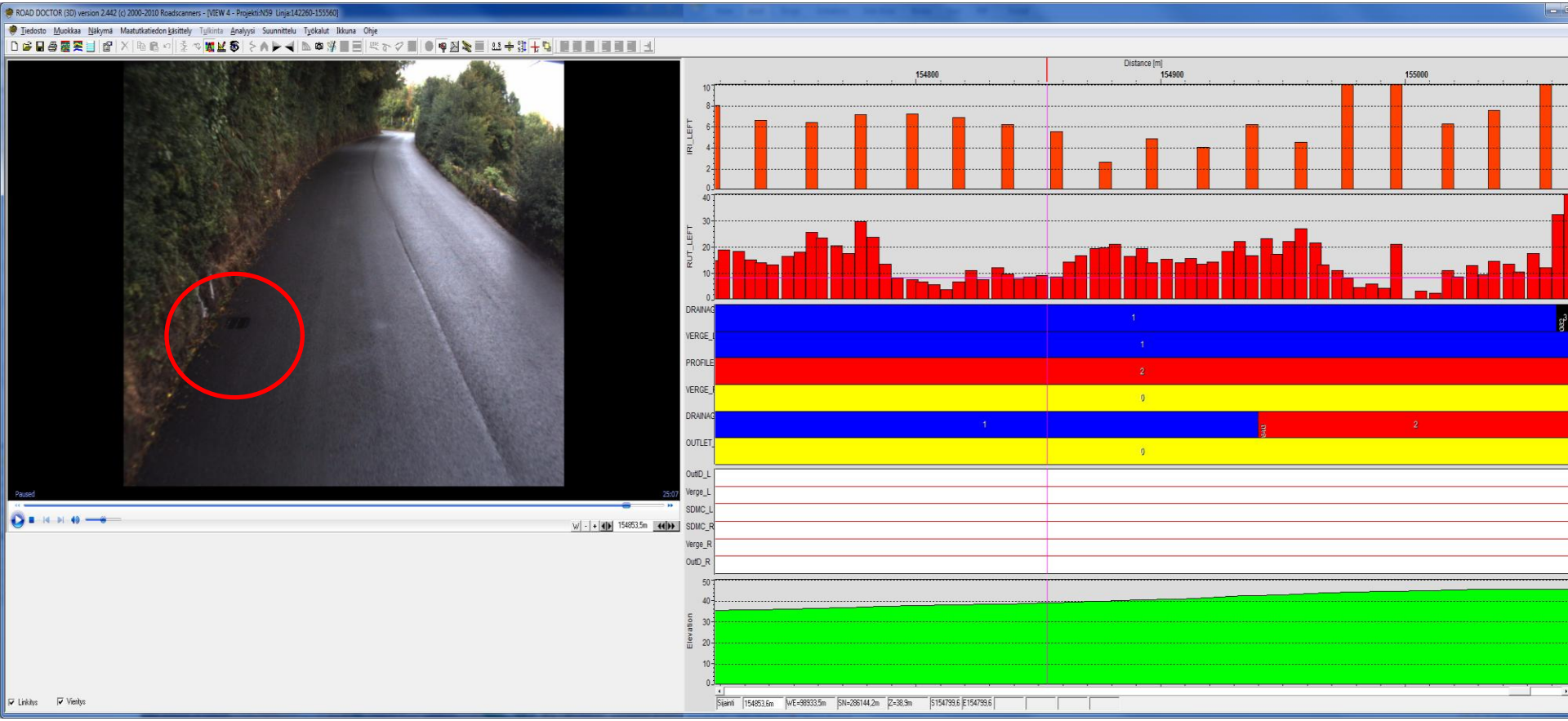
N59 Mayo County

154 850, Steep hill where a built drainage system keeps the rut depth growth in low level, also pavement is new



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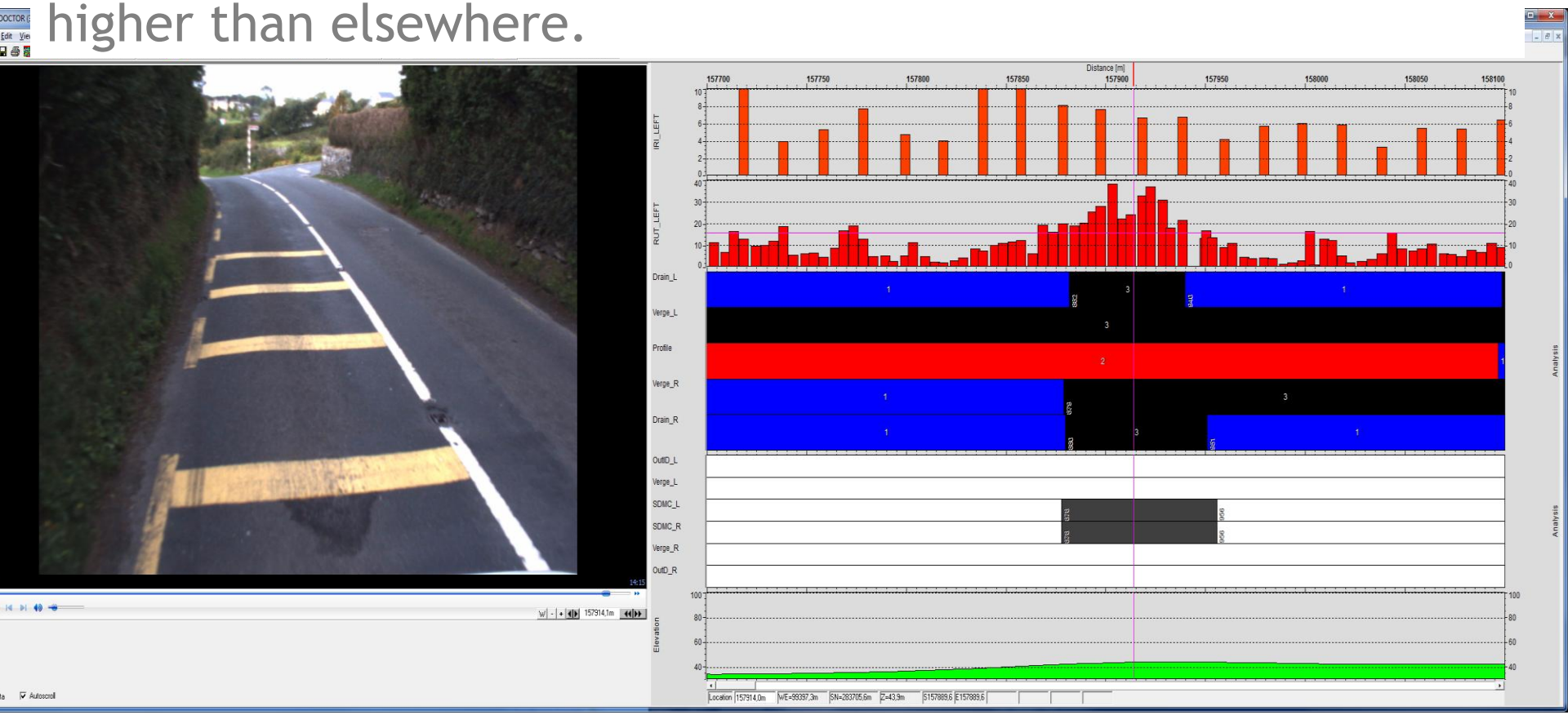
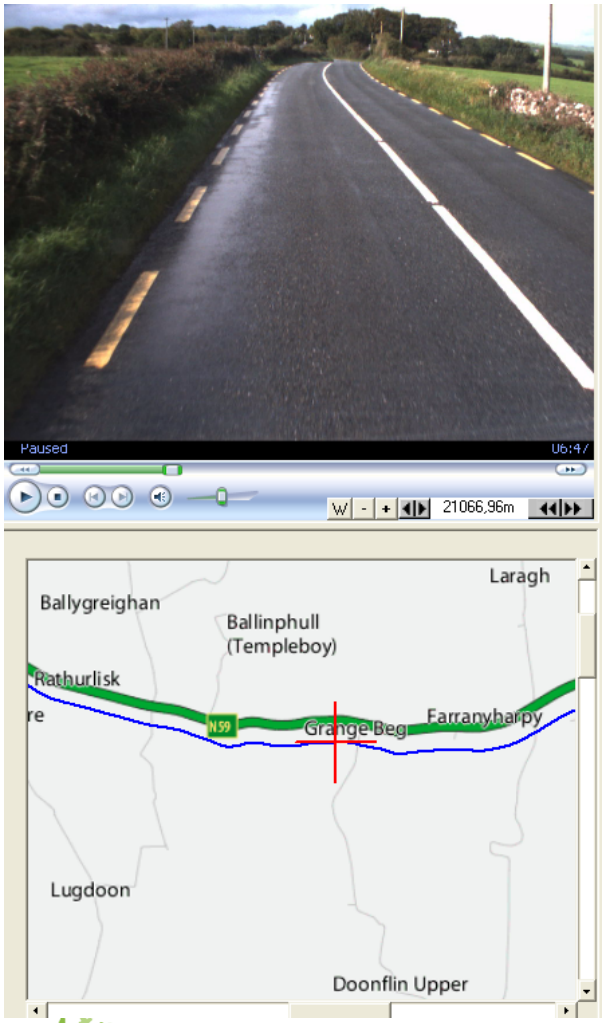
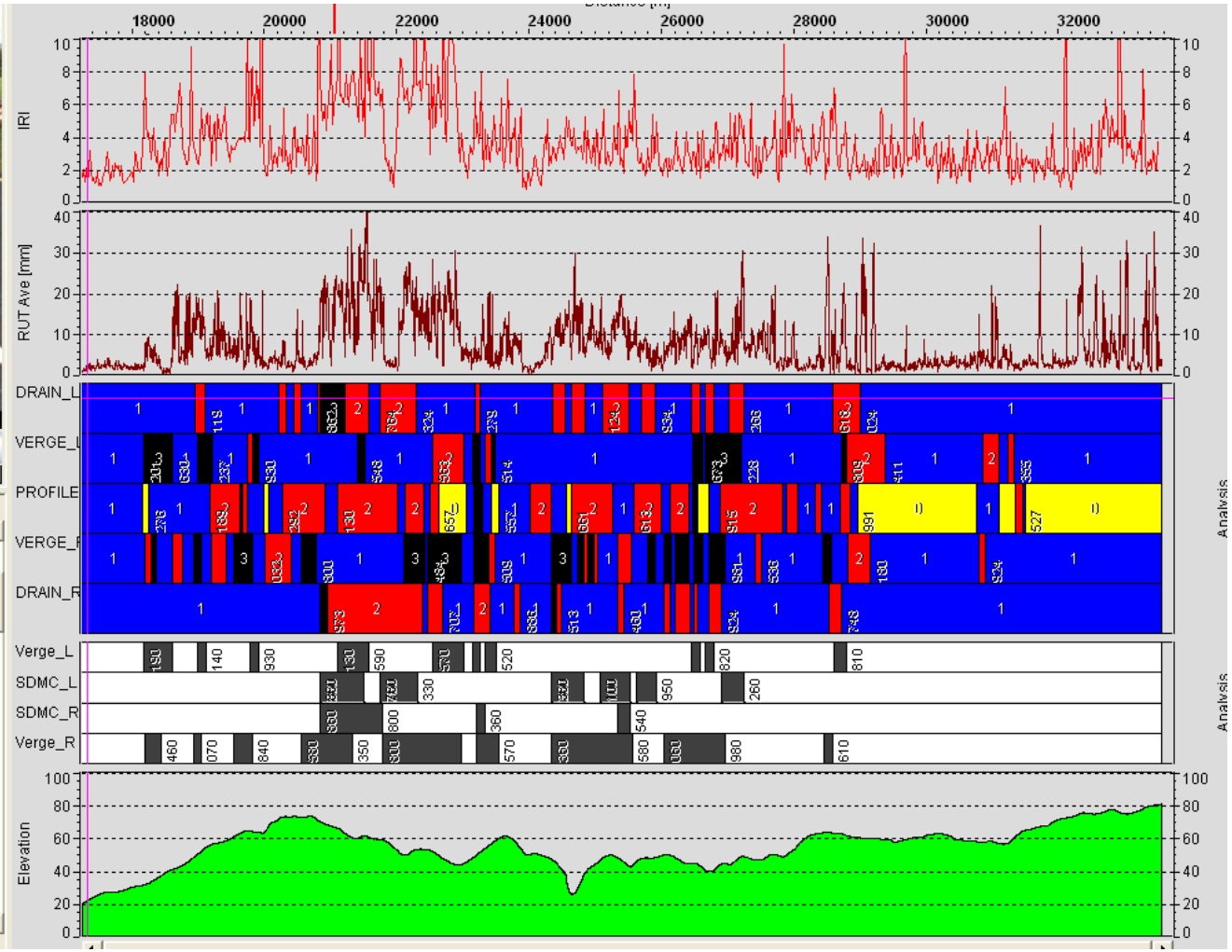
N59 Mayo County

157 900, Rock wall both side of the road. Typical example of problems on top hill sections in test roads . Rutting 3-4 time higher than elsewhere.

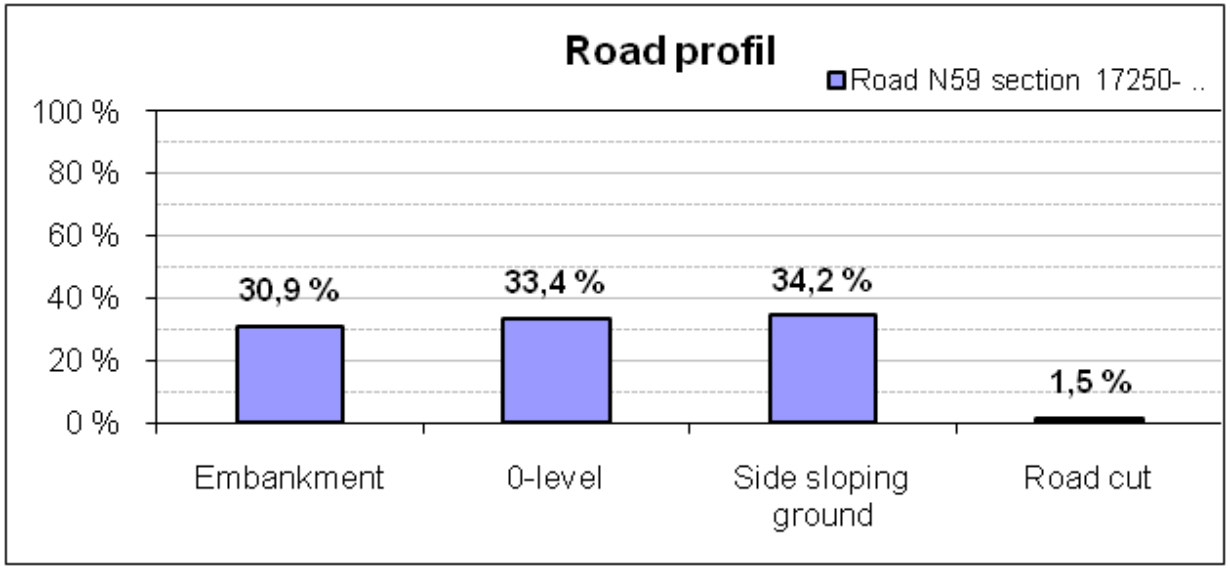


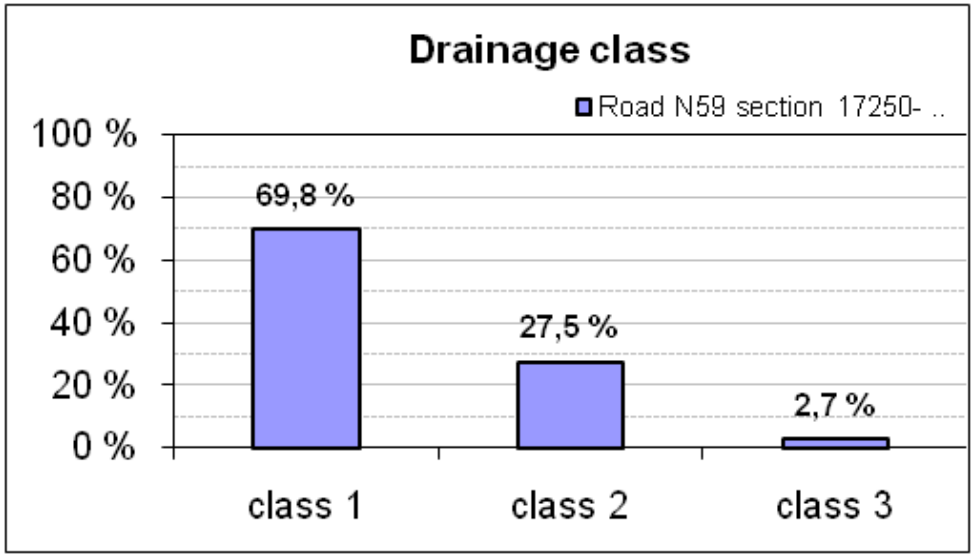
Statistical Analys Exapmple: N59





Statistical Analys Exapmple: N59





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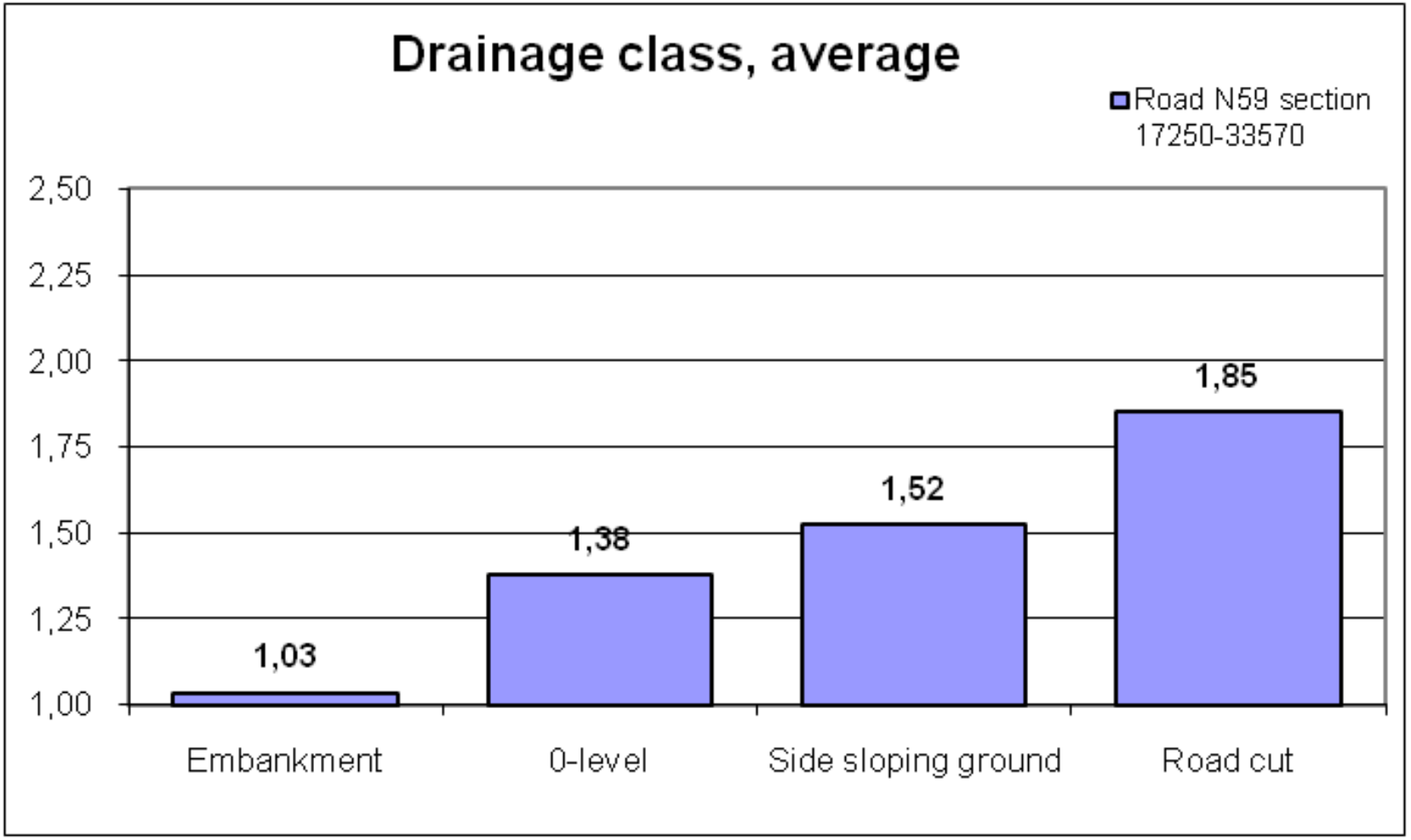
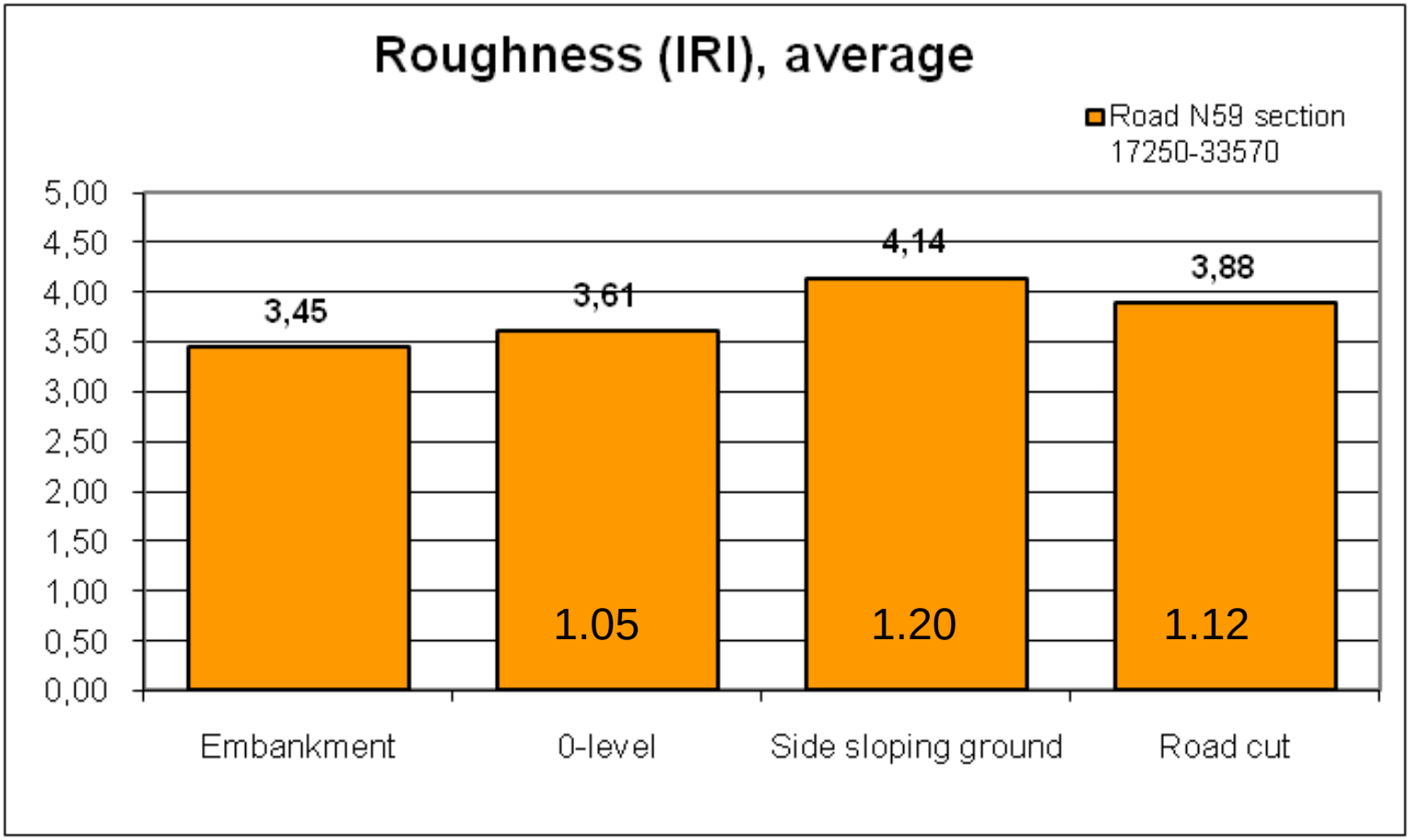
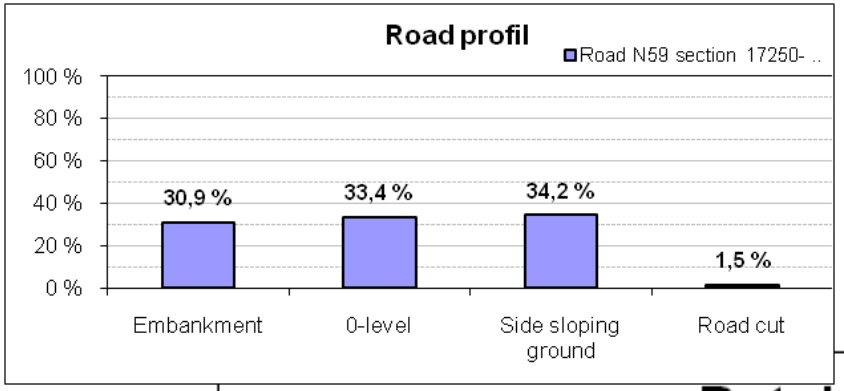
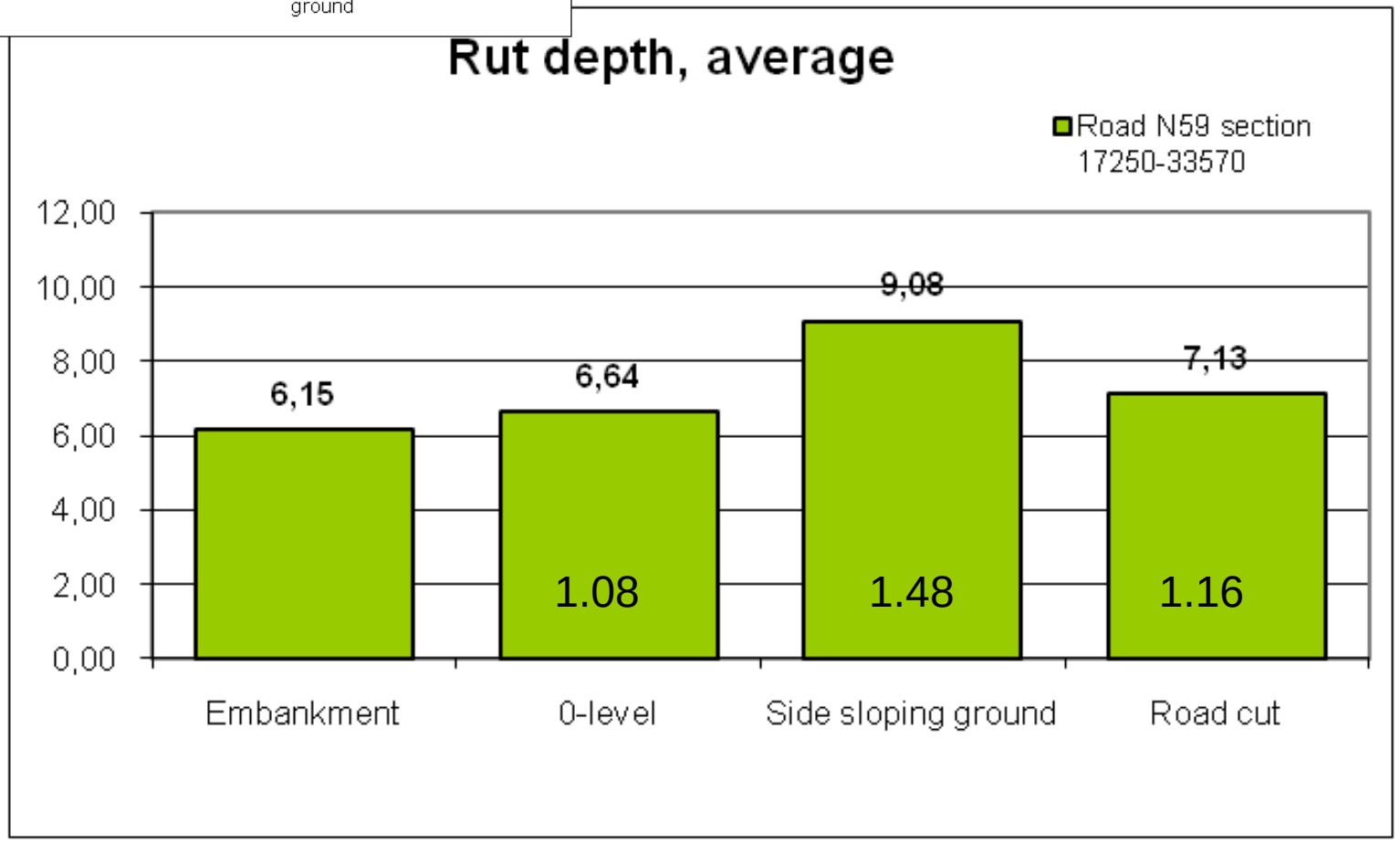

Drainage class, average
Road N59 section 17250-33570
2,50
2,25
2,00
1,75
1,50
1,25
1,00
1,03
1,38
1,52
1,85
Embankment
0-level
Side sloping ground
Road cut


Roughness (IRI), average
Road N59 section 17250-33570
5,00
4,50
4,00
3,50
3,00
2,50
2,00
1,50
1,00
0,50
0,00
3,45
3,61
4,14
3,88
1.05
1.20
1.12
Embankment
0-level
Side sloping ground
Road cut





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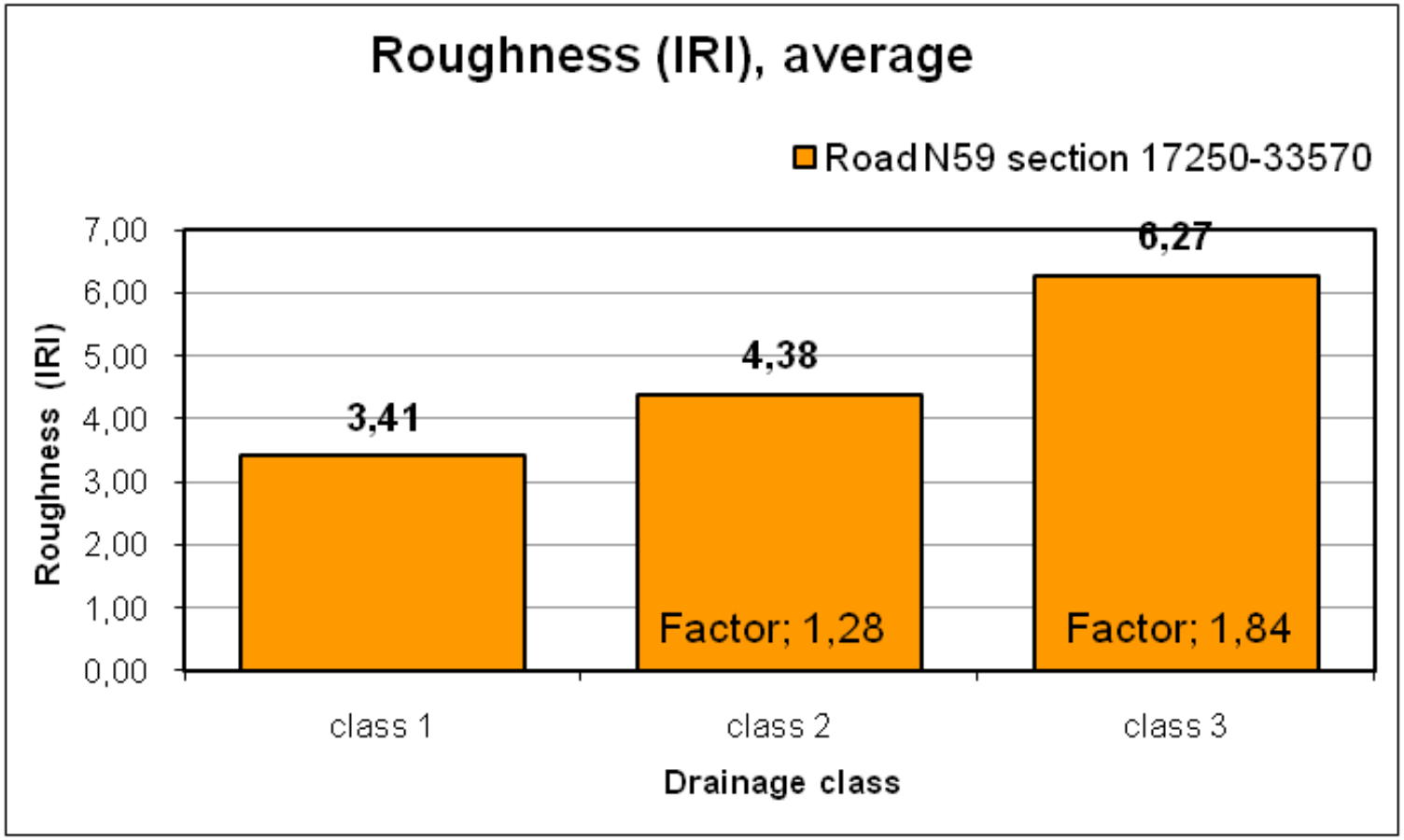
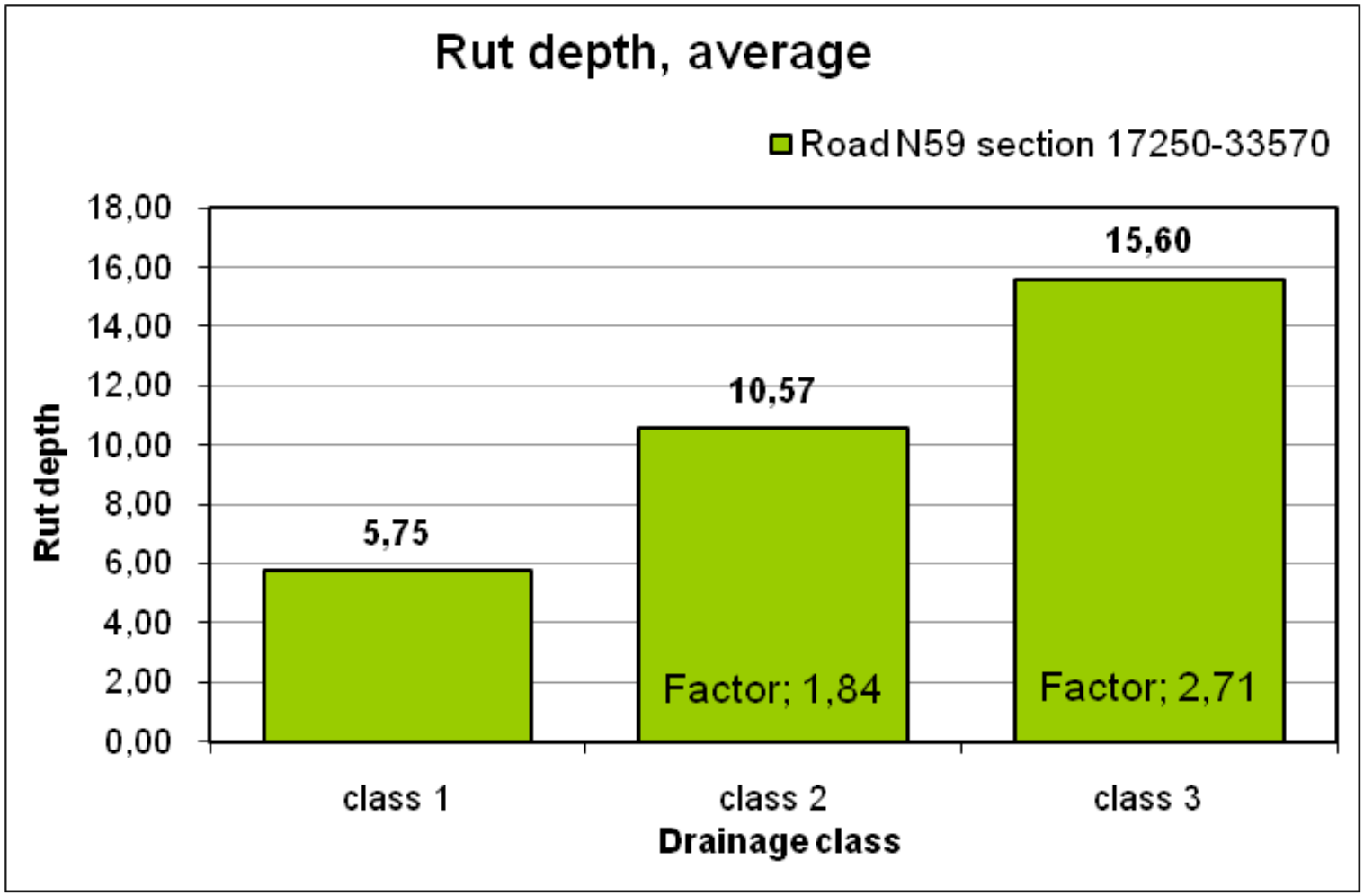
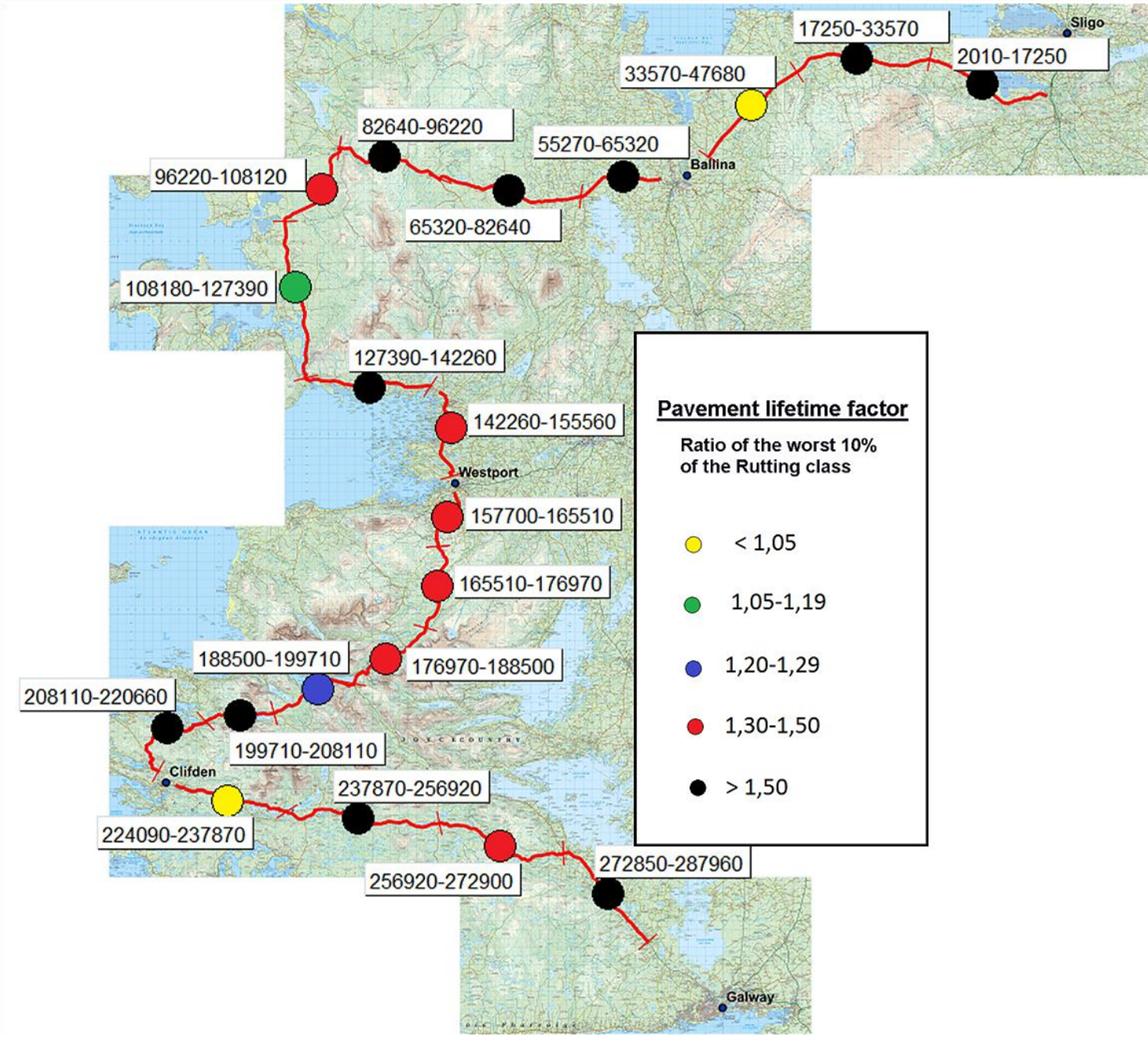

Roughness (IRI), average
Road N59 section 17250-33570
Roughness (IRI)
7,00
6,00
5,00
4,00
3,00
2,00
1,00
0,00
3,41
4,38
6,27
Factor; 1,28
Factor; 1,84
class 1
class 2
class 3
Drainage class


Rut depth, average
Road N59 section 17250-33570
Rut depth
18,00
16,00
14,00
12,00
10,00
8,00
6,00
4,00
2,00
0,00
5,75
10,57
15,60
Factor; 1,84
Factor; 2,71
class 1
class 2
class 3
Drainage class

N59



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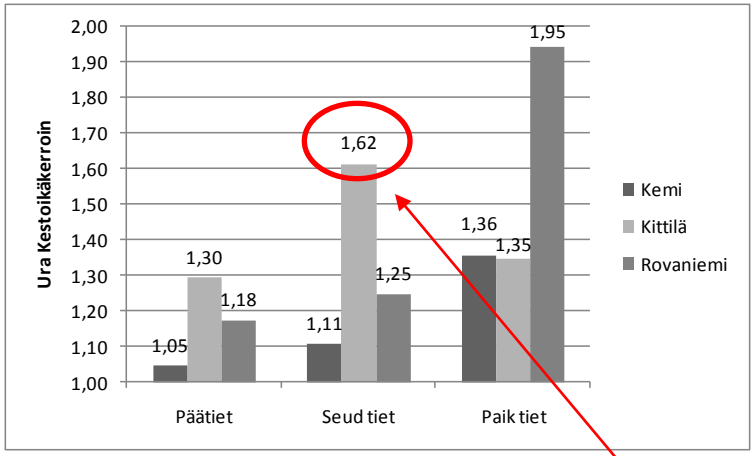
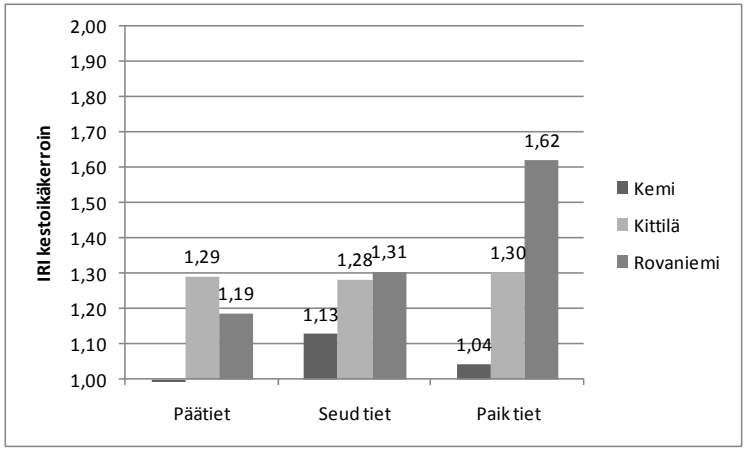
Potential Savings in 3 Maintenance Areas in Finland





Kemi

	Main roads	Regional roads	Local roads	All roads
Annual paving costs (€)	2044000	1106000	915000	**4065000**
Annual paving cost if drainage improved (€)	1956000	1013000	710000	**3679000**
Savings (€)	88000	93000	205000	**386000**
Savings (%)	4,3	8,4	22,4	**9,5**

Kittilä

	Main roads	Regional roads	Local roads	All roads
Annual paving costs (€)	2022000	527000	512000	**3061000**
Annual paving cost if drainage improved (€)	1663000	381000	400000	**2444000**
Savings (€)	359000	146000	112000	**617000**
Savings (%)	17,8	27,7	21,9	**20,2**

Rovaniemi

	Main roads	Regional roads	Local roads	All roads
Annual paving costs (€)	1695000	530000	370000	**2595000**
Annual paving cost if drainage improved (€)	1505000	464000	314000	**2283000**
Savings (€)	190000	66000	56000	**312000**
Savings (%)	11,2	12,5	15,1	**12,0**

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Preliminary Conclusions from Irish Drainage Pilot:

- poor drainage has a major effect on pavement condition and pavement life time on test roads
- biggest problems on side sloping ground
- if drainage improved, potential savings up to 30-40 % in annual paving costs.
- drainage solutions can be challenging and expensive but pay-back time will be short

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