OPTIMISATION OF WINTER MAINTENANCE ON PEDESTRIAN AND CYCLING PATHS - CASE STUDY RR 110

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Nordic Road Safety Forum 13-14.10.2022, Copenhagen

Jaakko Klang

His main mission is to design the transport system so that nobody should die or be seriously injured on the roads.

Jaakko Klang is a road safety engineer at the Center for Economic Development, Transport, and the Environment. The Centre acts as a regional road manager on state roads, promotes the economy, and is responsible for environmental protection in the region. The centers are state authorities and operate at the provincial level.

He is a road technical investigator on the road accident investigation board and has investigated over 250 fatal road traffic accidents.

He has worked as a member of the Road Safety committees of the Nordic Road Association (NVF) since 2012 and of the World Road Association (PIARC) since 2008.

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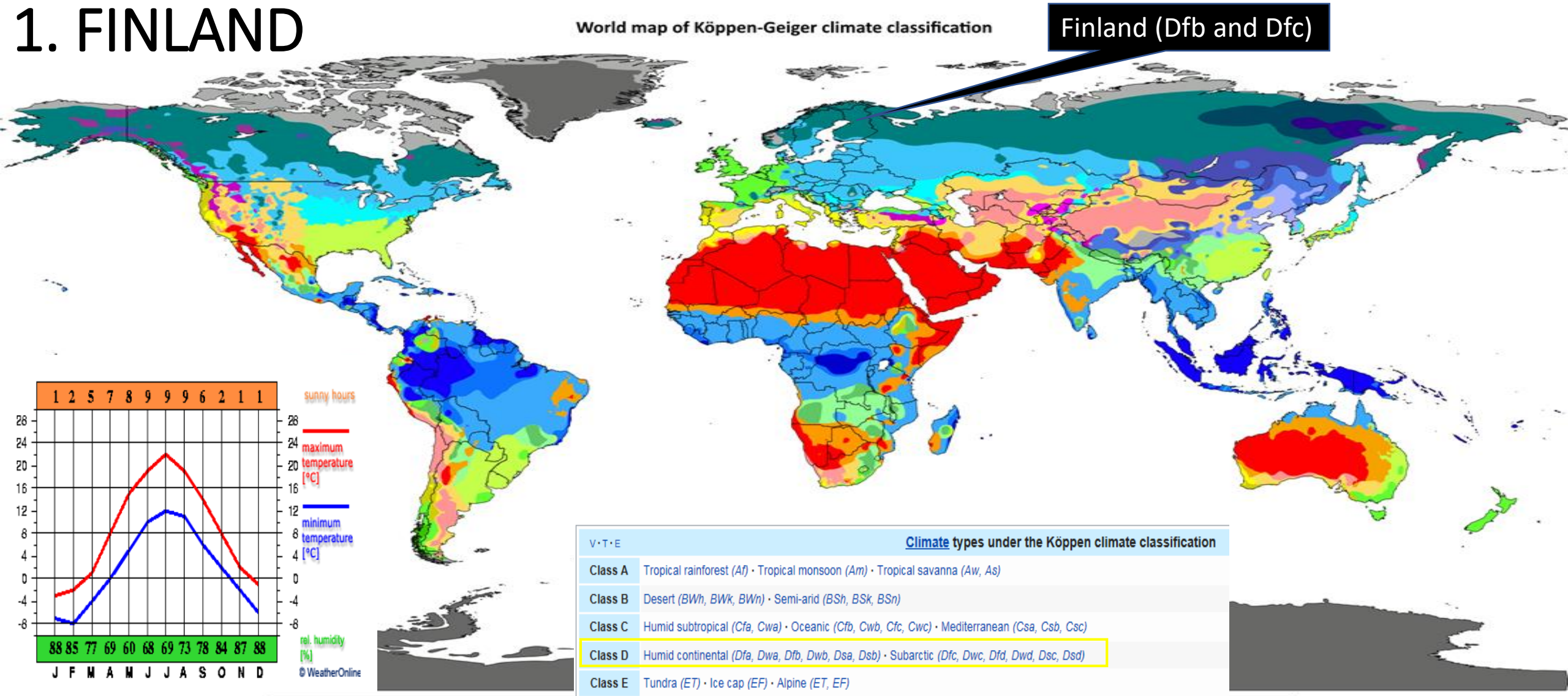
1. FINLAND



V·T·E	Climate types under the Köppen climate classification
Class A	Tropical rainforest *(Af)* · Tropical monsoon *(Am)* · Tropical savanna *(Aw, As)*
Class B	Desert *(BWh, BWk, BWn)* · Semi-arid *(BSh, BSk, BSn)*
Class C	Humid subtropical *(Cfa, Cwa)* · Oceanic *(Cfb, Cwb, Cfc, Cwc)* · Mediterranean *(Csa, Csb, Csc)*
Class D	Humid continental *(Dfa, Dwa, Dfb, Dwb, Dsa, Dsb)* · Subarctic *(Dfc, Dwc, Dfd, Dwd, Dsc, Dsd)*
Class E	Tundra *(ET)* · Ice cap *(EF)* · Alpine *(ET, EF)*

Peel, M. C. and Finlayson, B. L. and McMahon, T. A. (2007) (University of Melbourne)

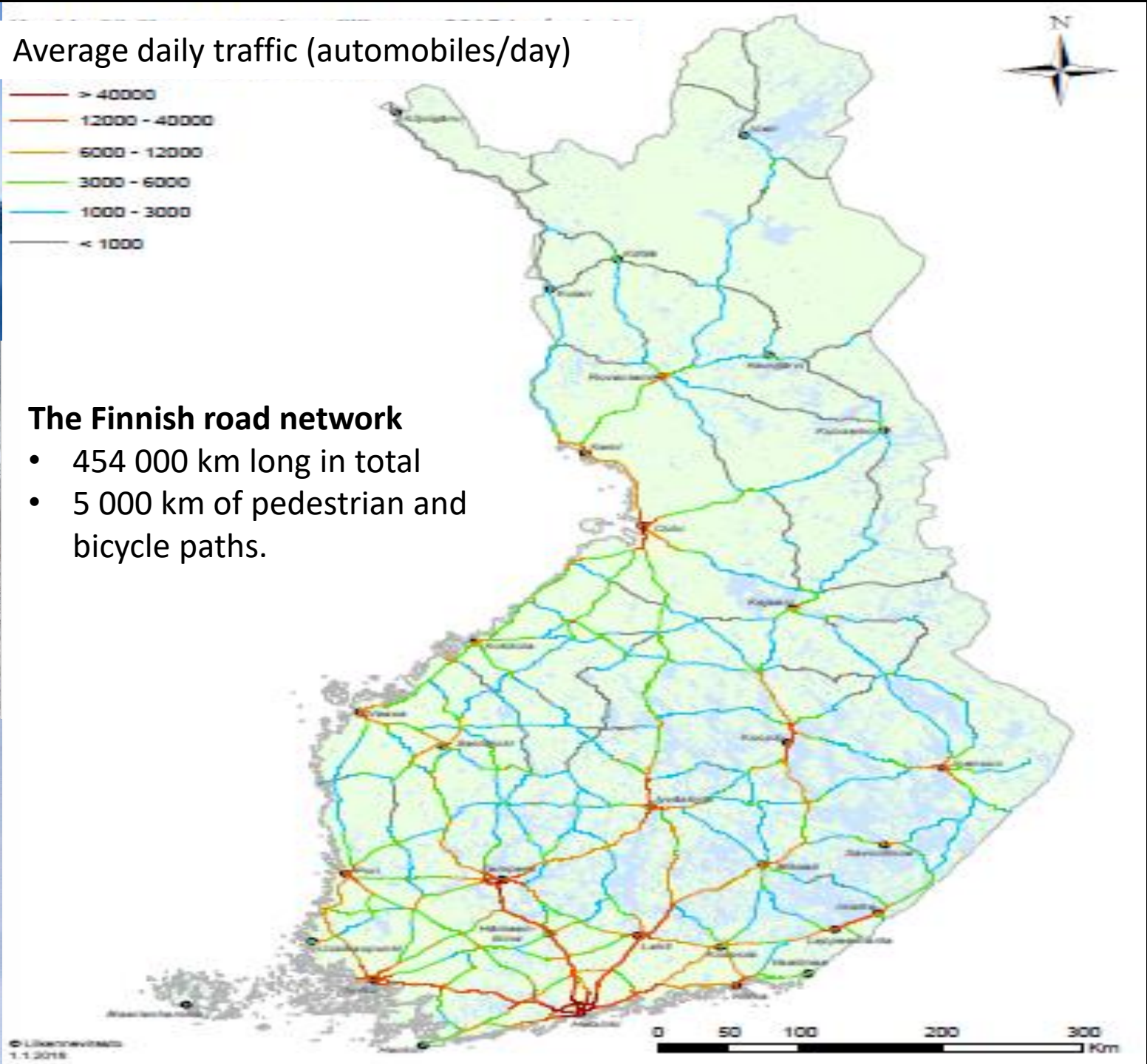
Vectorization by : Ali Zifan

Private and forest roads 350 000 km

Highways 78 000 km (motorways 900 km)

Municipal streets 26 000 km

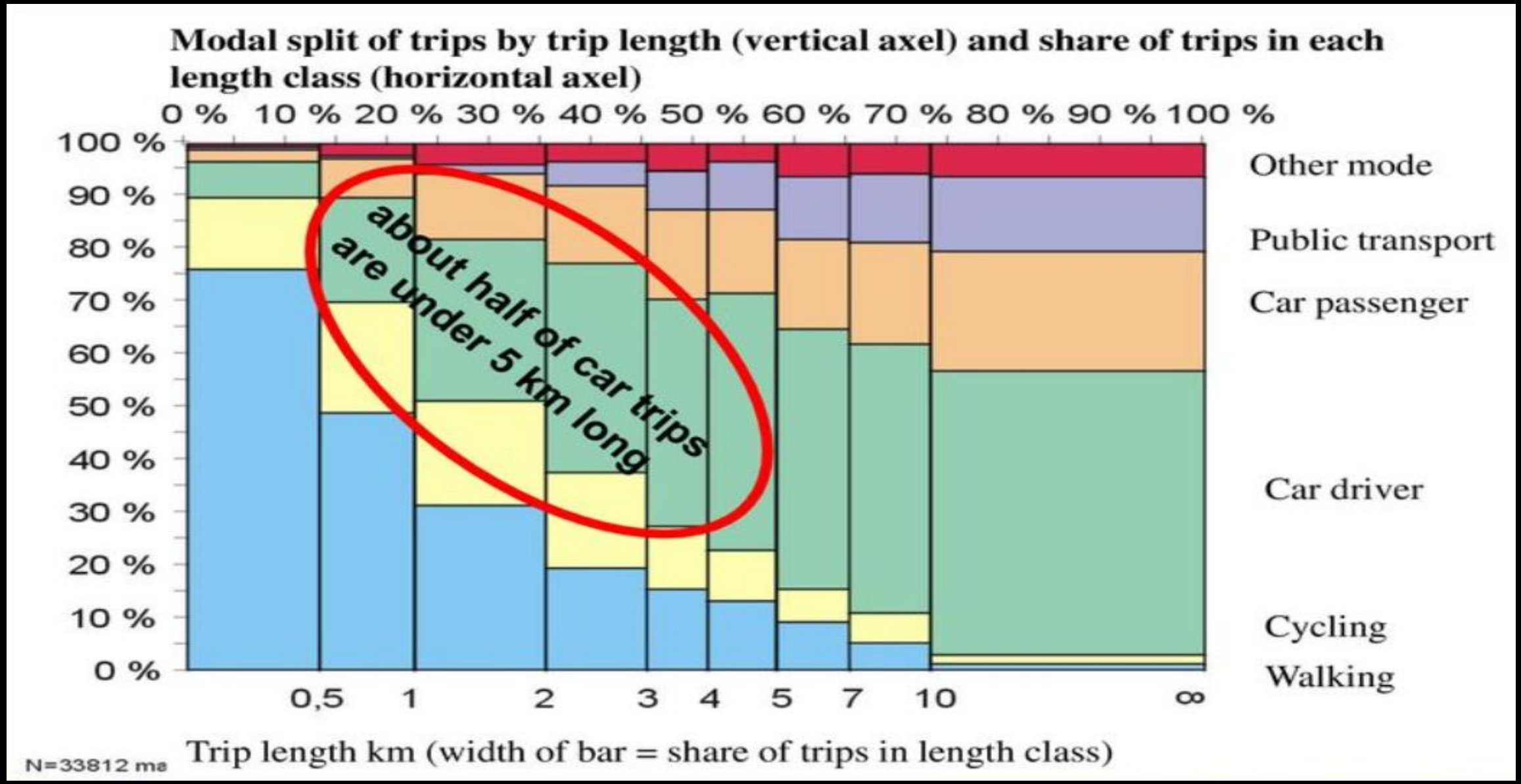
Average daily traffic (automobiles/day)



The Finnish road network

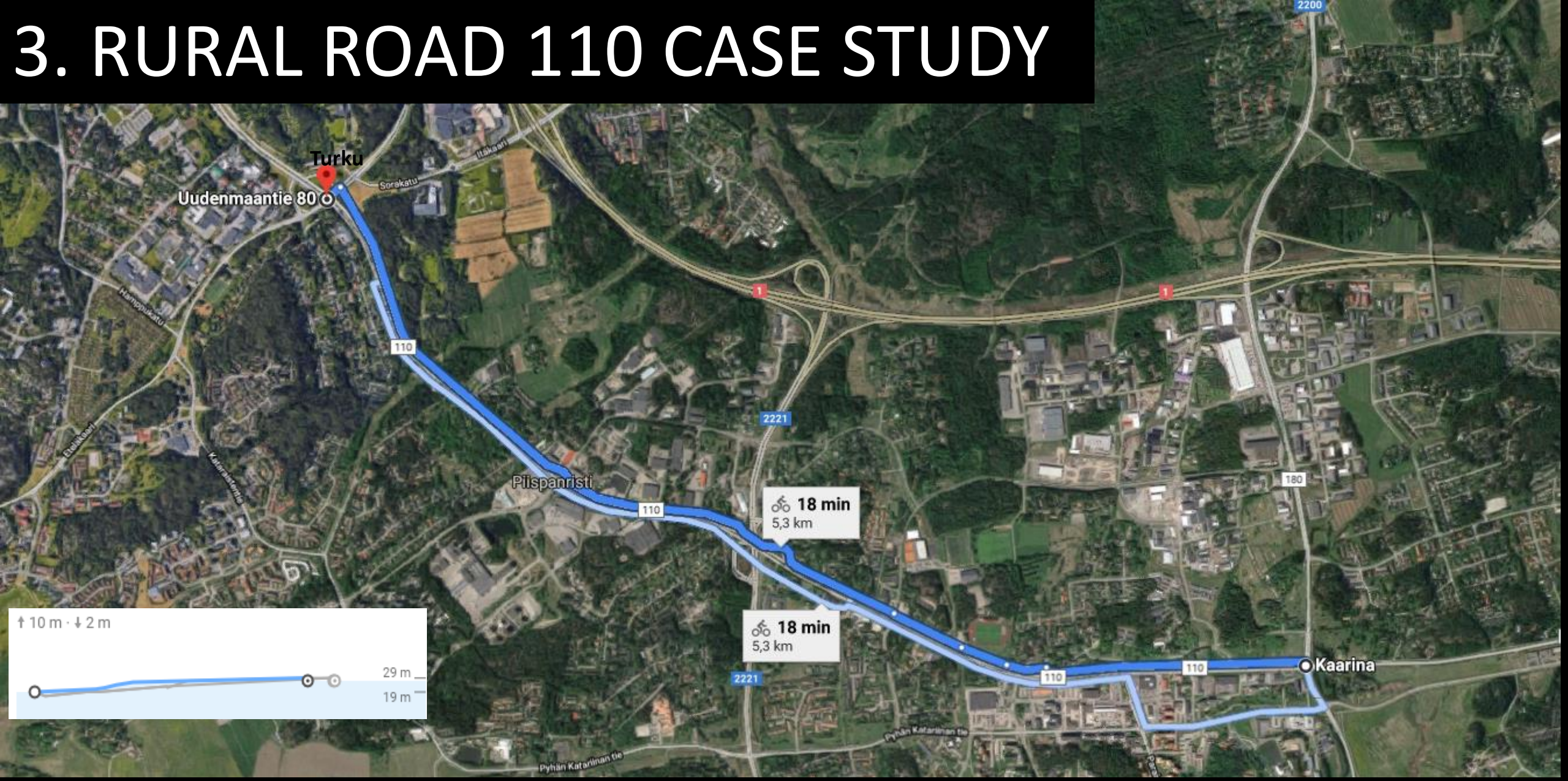
- 454 000 km long in total
- 5 000 km of pedestrian and bicycle paths.

2. STARTING POINTS FOR THE RESEARCH AND ITS OBJECTIVES




Cars
Bikes
Pedestrians

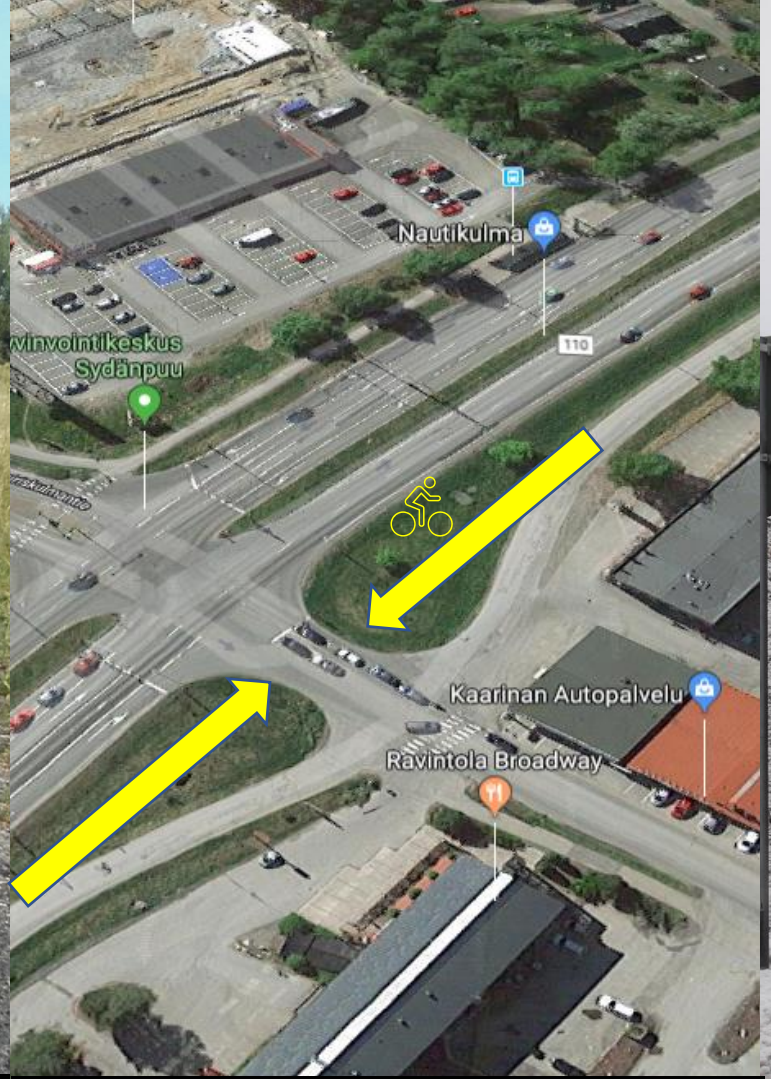
3. RURAL ROAD 110 CASE STUDY



The target research area of Rural road 110 is highlighted in blue.

Report phase 1: https://urn.fi/URN:ISBN:978-952-314-706-5

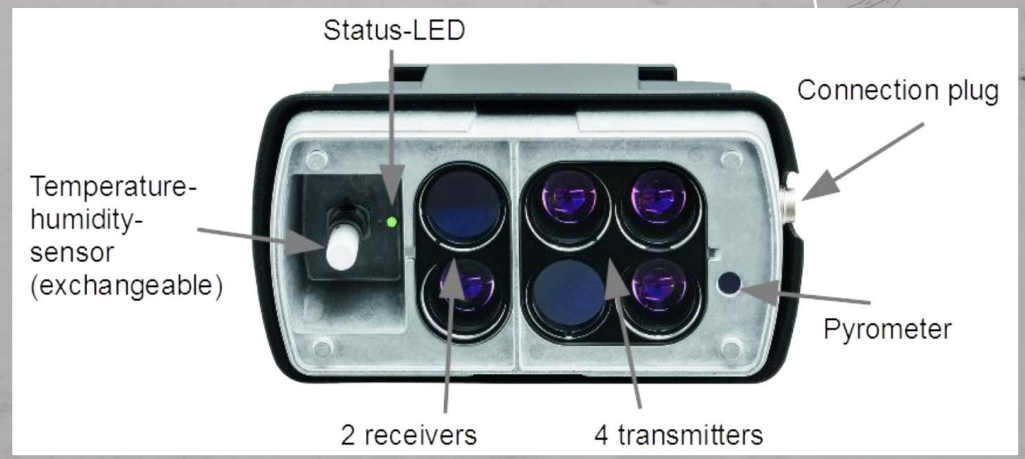
1. Fixing the path surface in areas requiring repair or complete resurfacing
2. Separation of travel modes



3. Changing or completing incomplete sections of the route to improve the continuity of the route
4. Pedestrian and cycling oriented arrangements for increasing safety and comfort

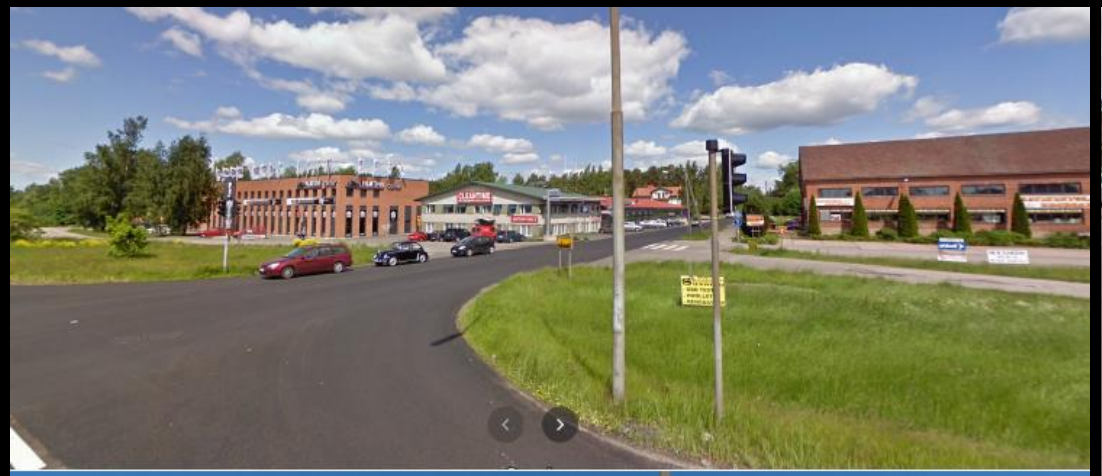
5. Considering maintenance needs when designing underpasses and junctions
6. Snow storage

Fixed optical measuring station for driving conditions



4. WHAT DEVELOPMENT PROPOSALS WERE IMPLEMENTED AFTER PHASE 1?

2018



2021

Before 2018 and after 2021. Walking and cycling paths have now been rebuilt in line with the phase 1. recommendations. They were completely reasphalted and the northern path was widened from 3 to 5 m.

Underpasses and interchanges were made safer and easier to maintain. € 1.7 million was spent on pedestrian and cycling path improvements (€ 170 000 /km).

MAP

Time

14.03.18 07:46:54 - 14.03.18 08:23:30

select a channel

Friction

Alarm (0.3)

Warning (0.5)

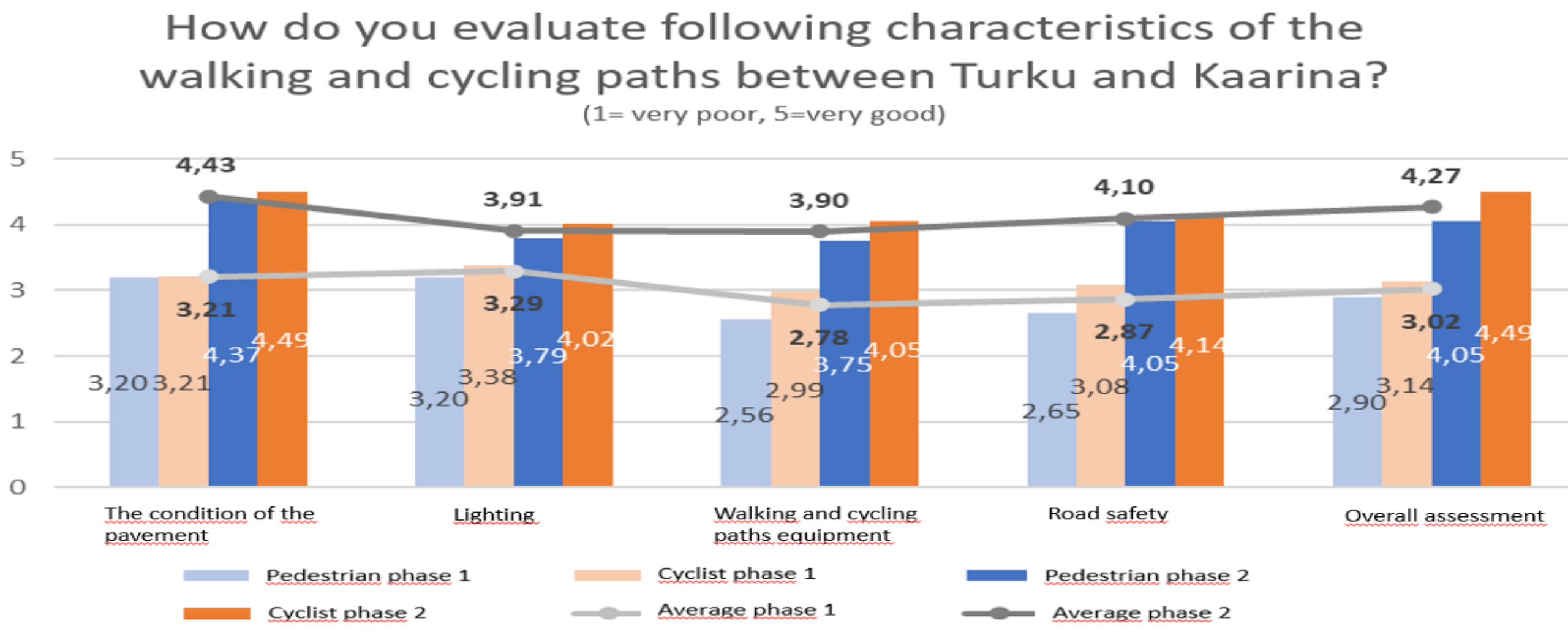
Ok (1.0)

Mobile optical measuring station for driving condition

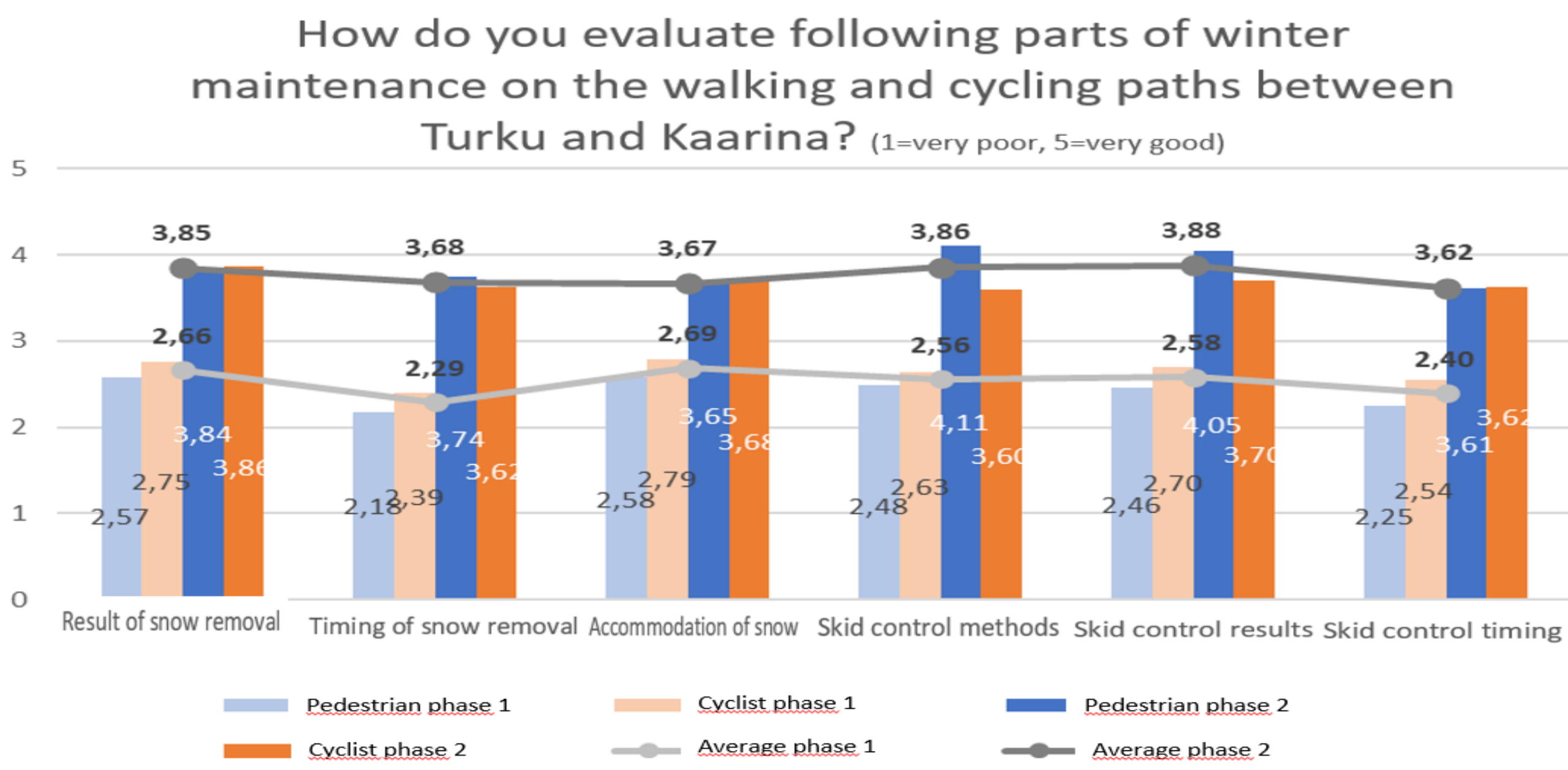
The mobile Marwis device, which was mounted in a car, collected the same road conditions data as the Starwis device, but its data collection targets were also the pedestrian and cycling paths across the research area (5 km). A measurement drive was carried out whenever there was a significant change in the weather.

The measures and quality level of winter maintenance are renewed in line with the phase 1 recommendations. The maintenance budget has been increased by € 2 500/km/year.

5. HOW HAVE PEDESTRIANS AND CYCLISTS REACTED TO THE CHANGES?

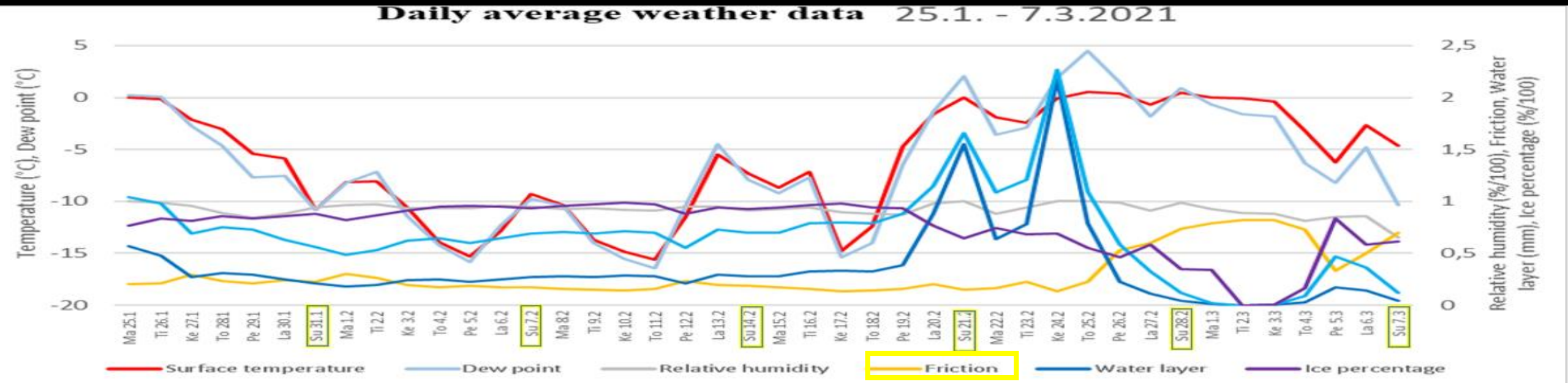


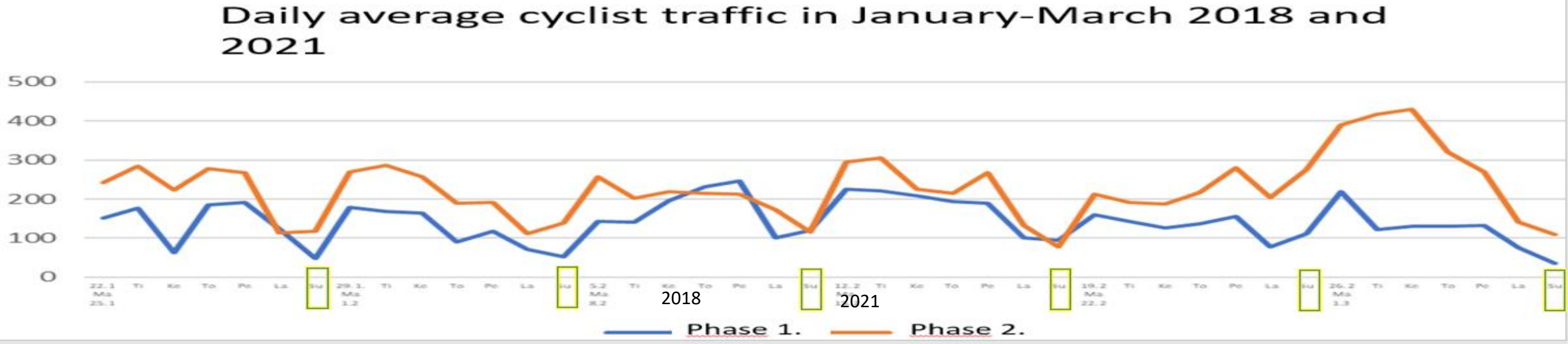
Scores are given by pedestrians and cyclists for different aspects of the research site prior to the improvements in 2018 and since then in 2021.

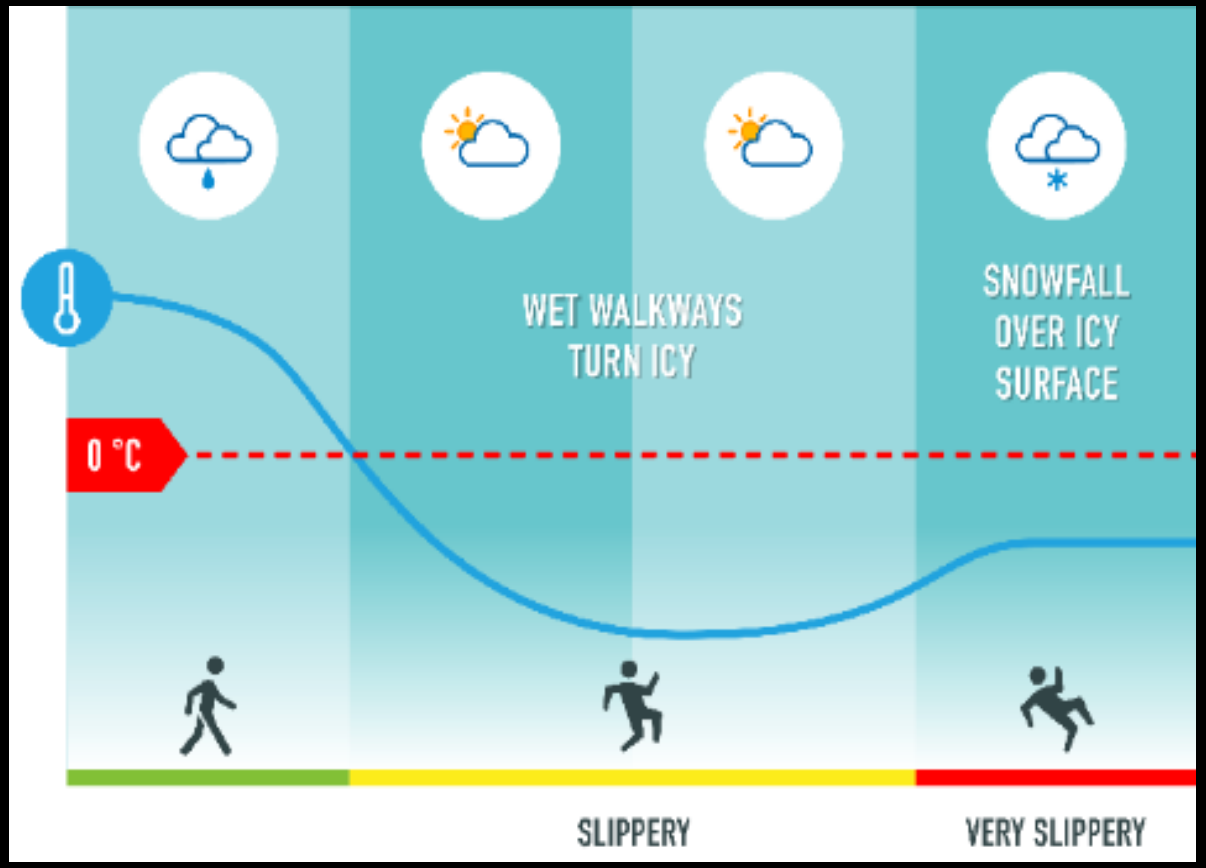


Scores were given by pedestrians and cyclists for different aspects of the winter maintenance of the research site before the improvements in 2018 and since then in 2021.

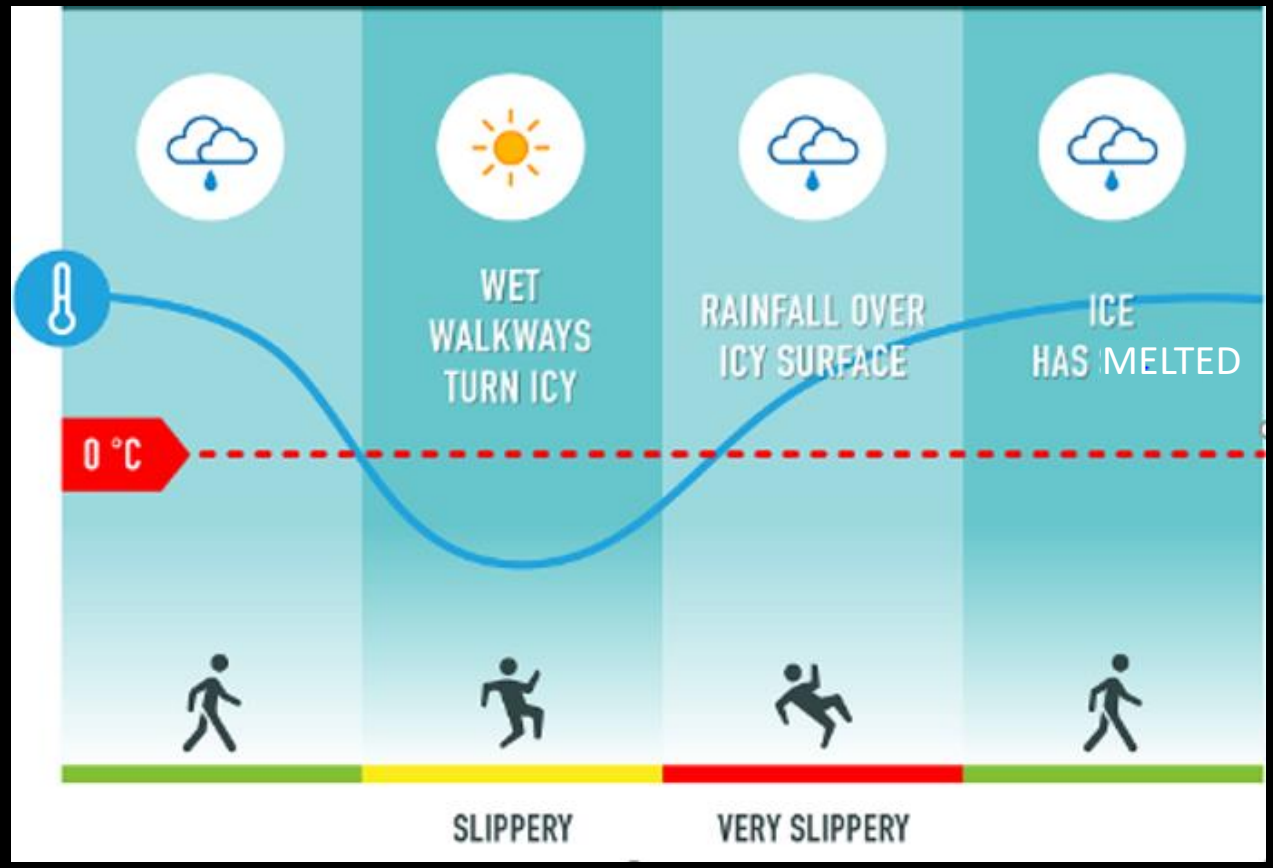
6. HOW DOES THE WINTER AFFECT PATH CONDITIONS AND TRAFFIC VOLUMES?







Scenario 1: before the temperature drops below zero, the weather is wet; either from rain or the streets are wet from melting snow. **The water then turns into a slippery icy surface.** A layer of fallen snow on the ice further reduces the grip levels of the surface.



Scenario 2: the temperature falls below zero degrees Celsius for a short period of time, usually between morning and midday, turning the water on the paths into ice. As the temperature increases further, **the ice starts to melt, creating a layer of water on top of the ice,** which further reduces the level of grip. Rainfall on the ice makes the surface even more slippery.

The data in the pilot project 2018-2021:

- cycling decreased by as much as 85% in winter compared to the busiest summer months
- the results of the study support those obtained in previous studies, where improved winter maintenance was seen to have the effect of increasing commuting by bicycle in winter by up to 18% and reducing commuting by car by 6%
- The coronavirus pandemic did not discourage walkers and cyclists in the research site in the winter of 2021. The pandemic has had an effect in particular on the distribution of weekday and weekend journeys.

7. HOW CAN THE ROUTE´S TRAFFIC ENVIRONMENT AND WINTER MAINTENANCE BE IMPROVED FURTHER?

- better lighting; more litter bins, handrails and benches; separation of the pedestrian and cycling paths by means of painted lines
- standards of winter maintenance should be raised
- alternative antislip / antiskid methods should be introduced
- an interactive information system into one service

Principles of winter maintenance of pedestrian and cycling paths

1. Keep your promises (contracts).
2. Do not try to do everything at once. Select a prioritized route of a suitable length for high-quality maintenance throughout the year.
3. Monitor the level of maintenance throughout the winter and maintain an ongoing dialogue with the contractors.
4. It is easier to develop maintenance when you know the situation on the streets.
5. Take maintenance requirements into account when planning the routes. For example, significant savings can be achieved by planning the places for snow storage.
6. Select the most appropriate maintenance methods for the weather conditions in the city.

Thank you for your attention