


"How are hotspots identified at the railway, and how should the IM cope with the variable levels of risks?"

UIC, Paris, 25.03.2019

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Master  
thesis 2018,  
HSE, NTNU  
& Bane NOR

Title:

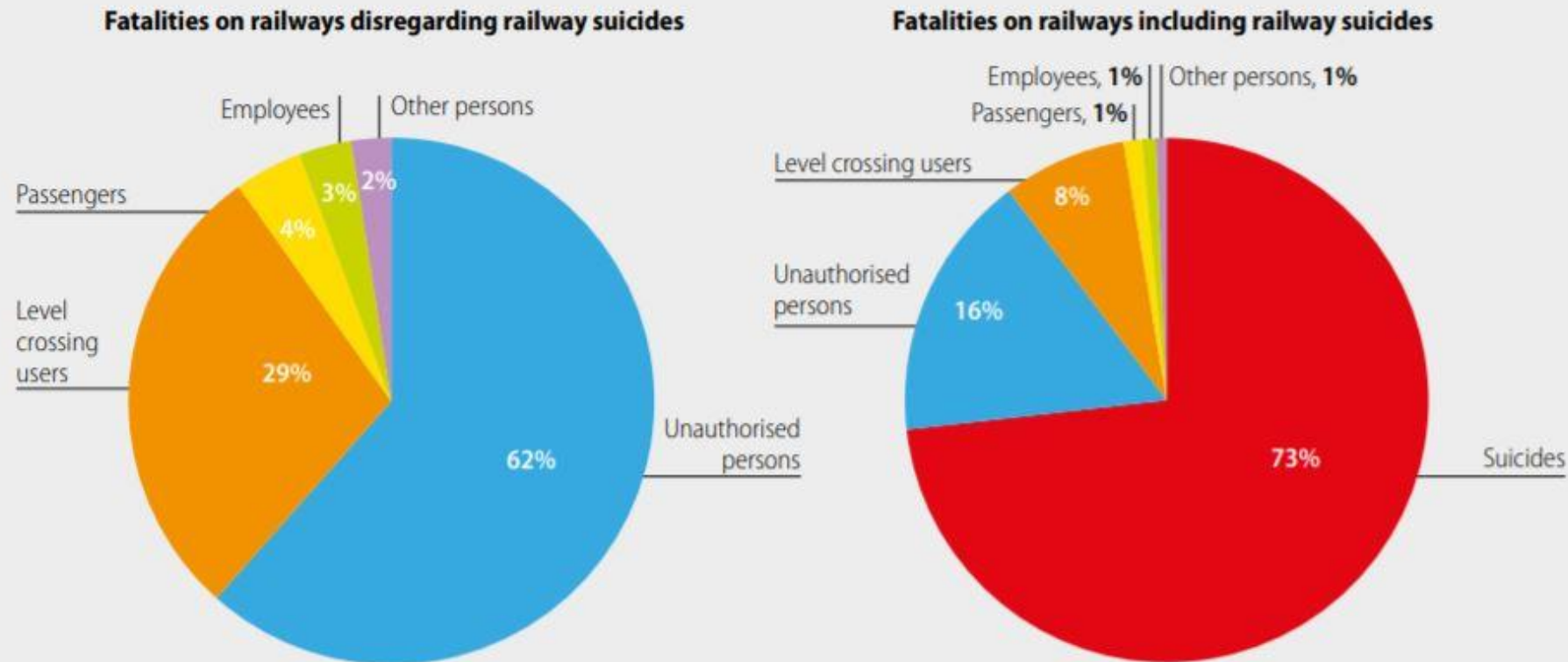
«Unwanted occurrences at the Norwegian railway where third persons are hit by Train».

Excludes fatalities due to voltage and working accidents

# Approx. ¾ of fatalities are suicides

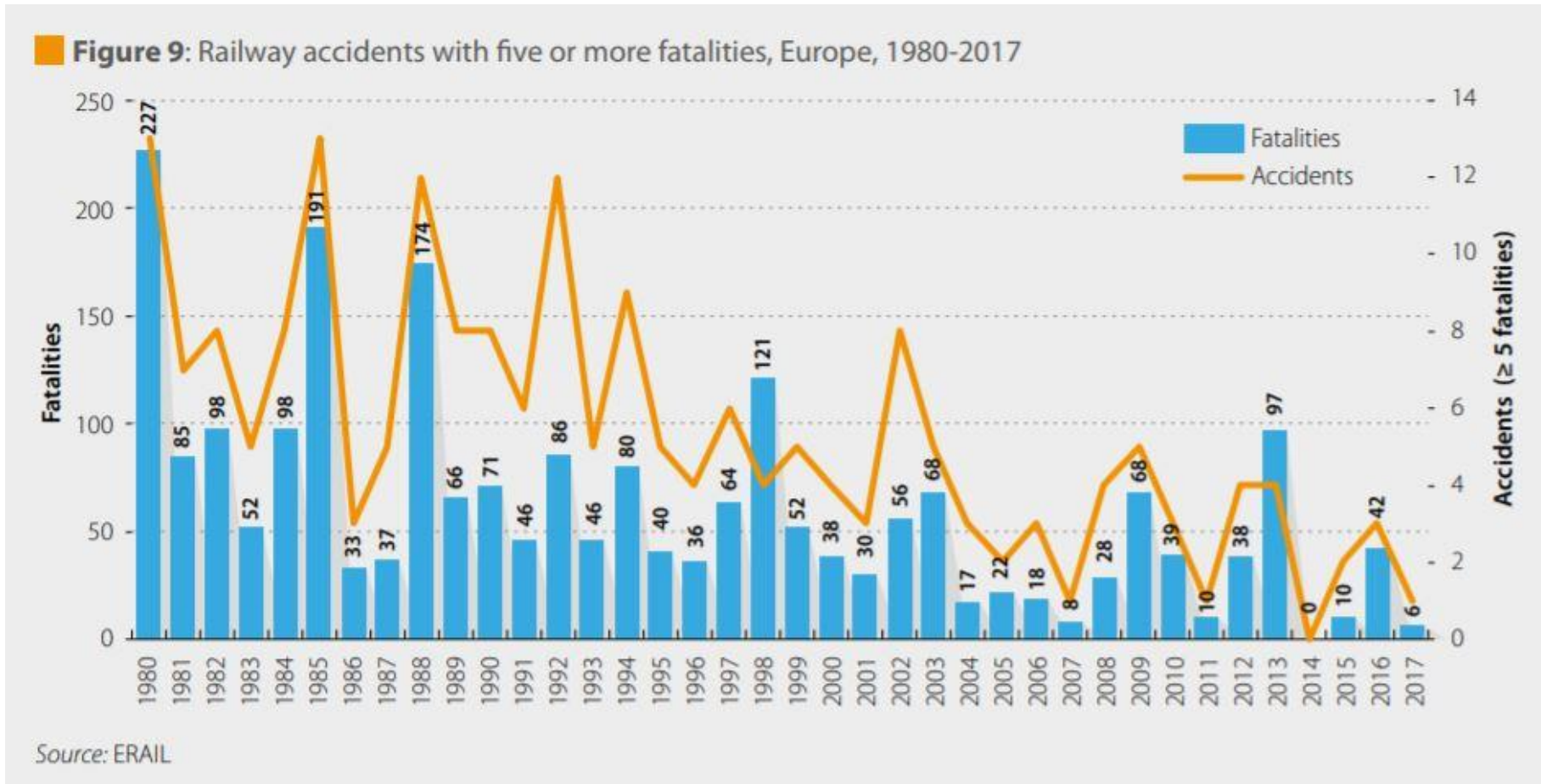
- Third persons represent more than 90% of the remaining

**Figure 8:** Relative share of fatalities per victim category among all fatalities with (right) and without (left) suicides, EU 28, 2012-2016

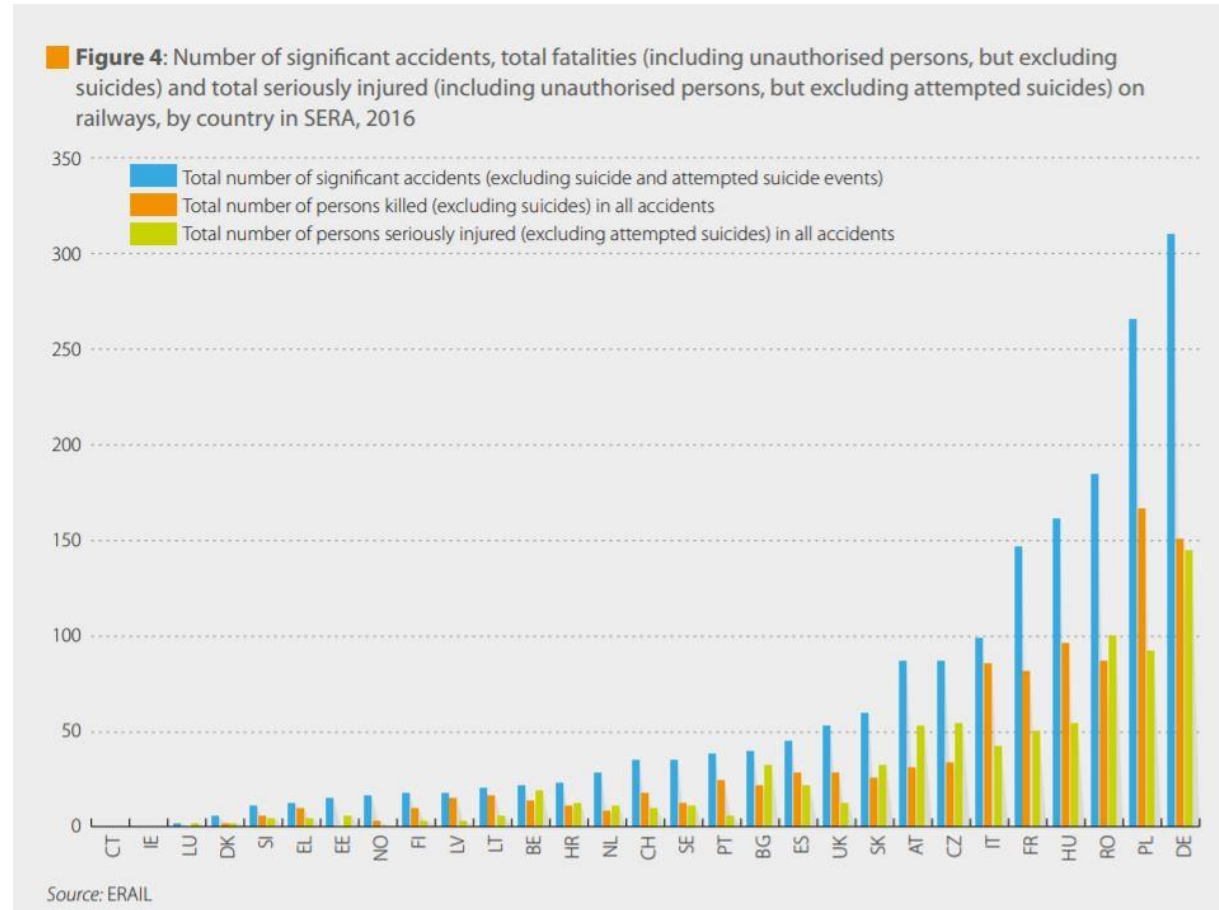


Source: ERAIL

Trend: 1-fatality-accidents constitute for a greater share of the total fatalities

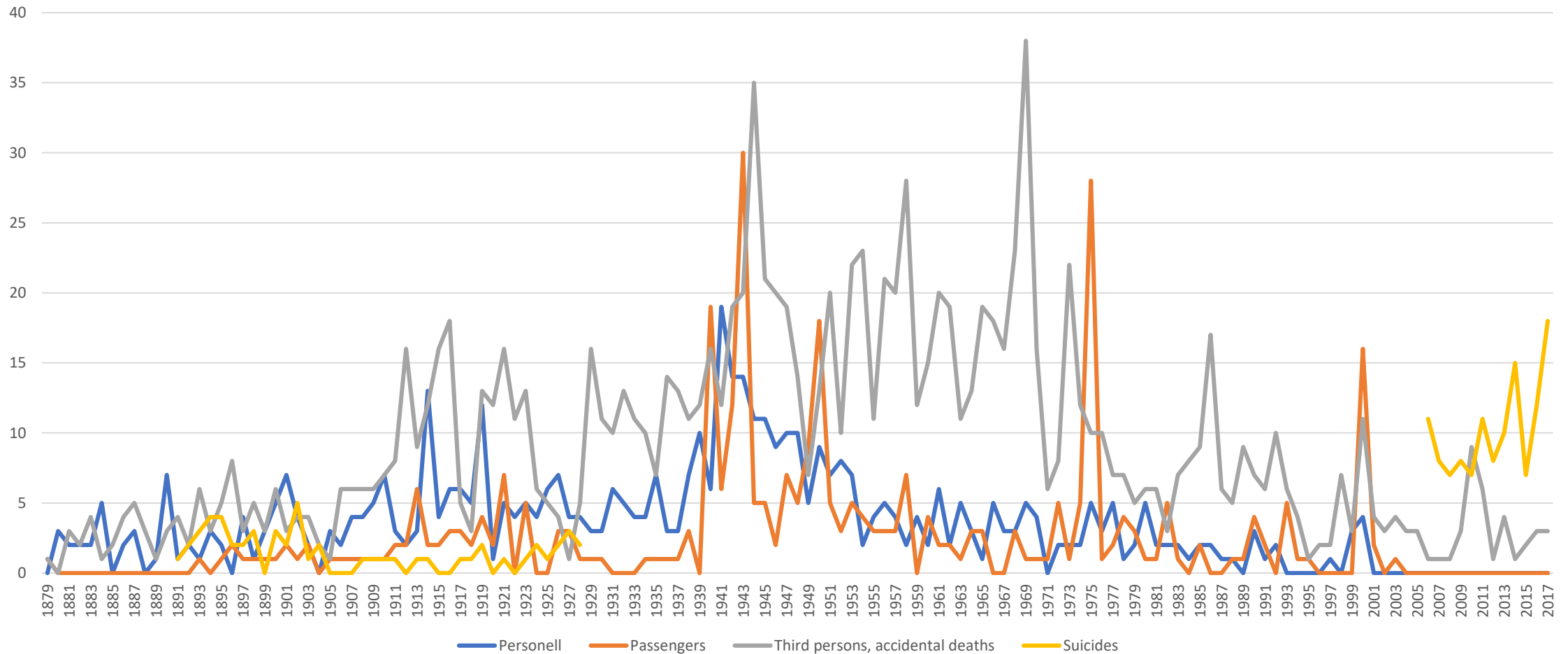


# Norway amongst the European countries with fewest fatalities at the railway



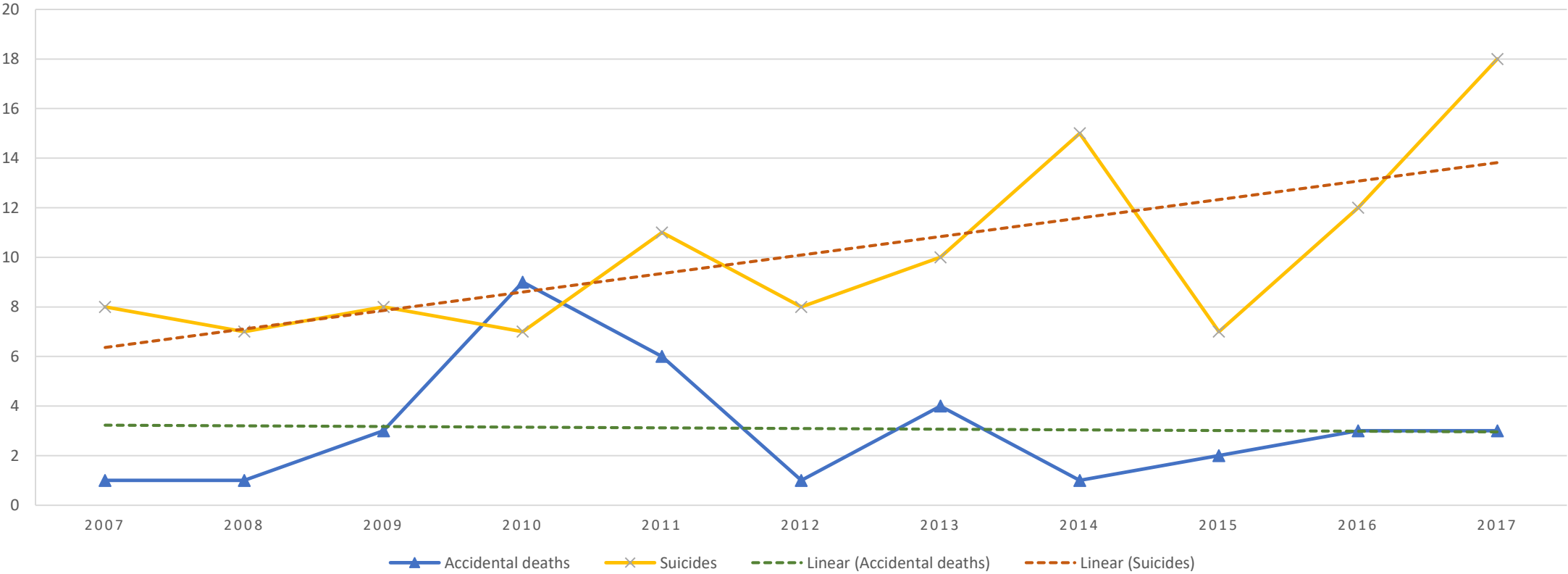
# Historical overview: (Sources; SSB, NSB, JBV, ERAIL)

## Fatalities at the norwegian railway, 1879-2017



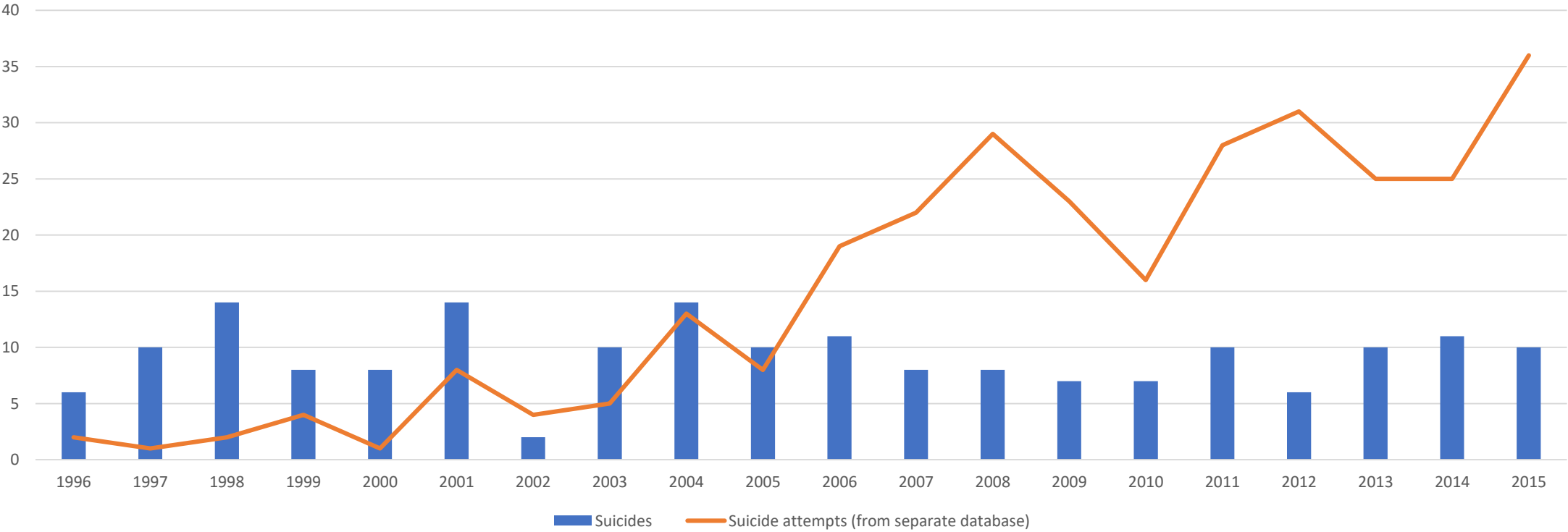
# Trend; increased no. of suicides

## FATALITIES AT THE NORWEGIAN RAILWAY, 2007-2017



# Are all attempted suicides registered?

No. of registered suicides and attempted at the Norwegian railway  
1996-2015 (Source: JBV (IM))





# Who collects data on suicides?

( DNV GL 2015; *Assessment of the Impact of Rail Suicides on EU Railways:*

[https://www.era.europa.eu/library/studies\\_en](https://www.era.europa.eu/library/studies_en) )

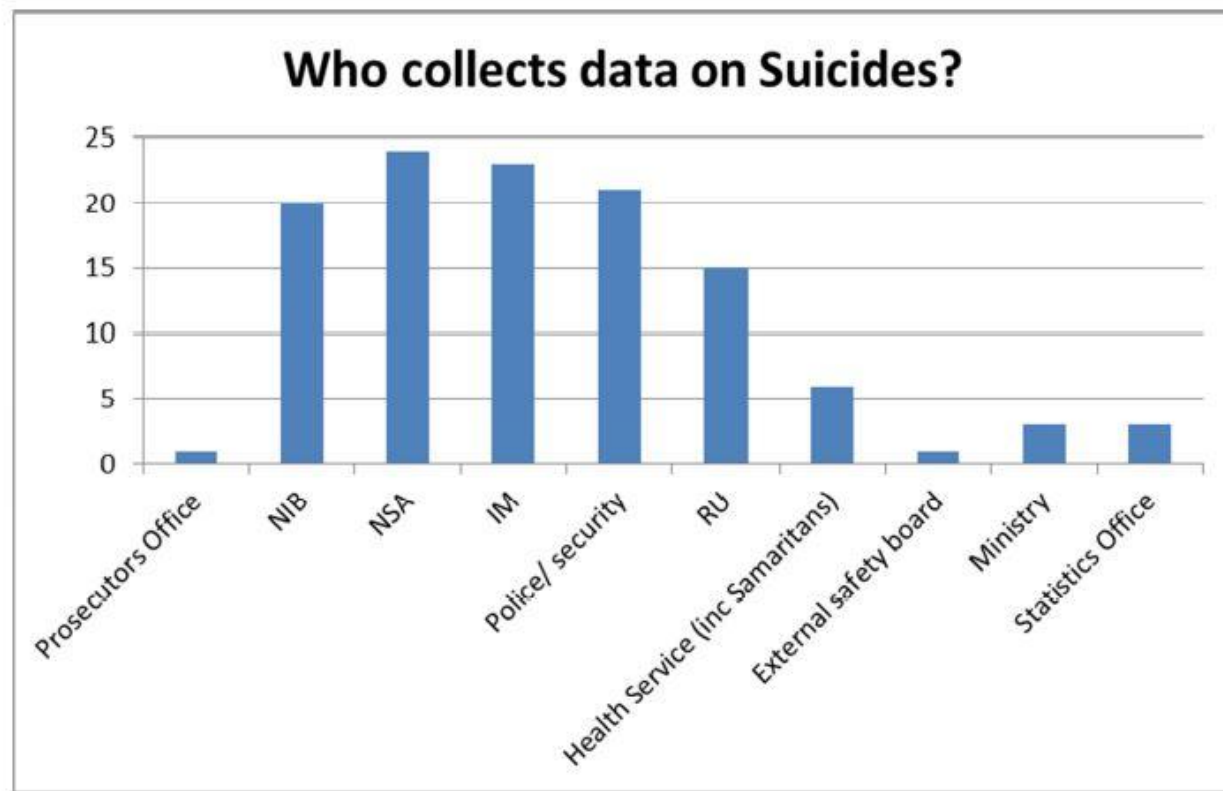


Figure 1 – A Count of the Responses to the Identity of Those Organisations Collecting Data on Suicide on Railway Premises

In Norway, the IM use the conclusions the police determinate regarding if the death is a suicide or not.

The probability of suicide can be a lot more than 50% without being categorized as suicide.

RESTRAIL;

Identification of hotspots:

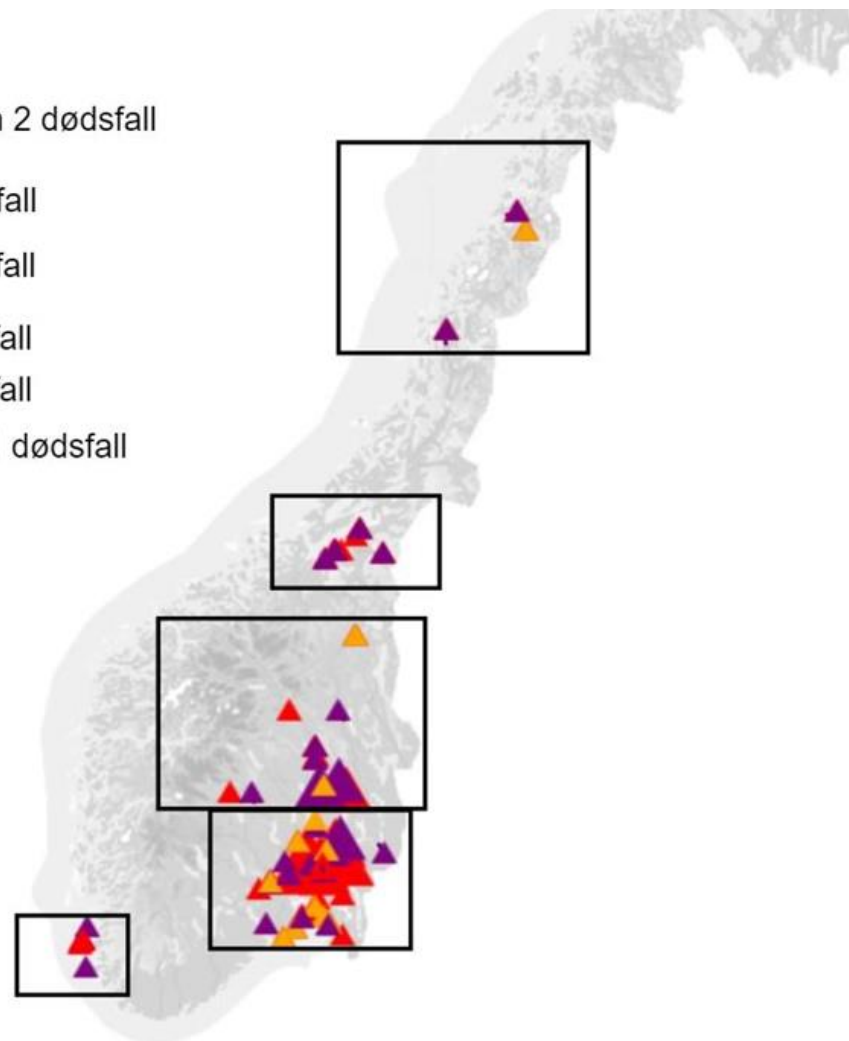
<http://restrail.eu/toolbox/sip.php?article80>

# Black-spot analysis; suicides (2007-2016)

- ▲ Stasjon, fler enn 2 dødsfall
- ▲ Stasjon, 2 dødsfall
- ▲ Stasjon, 1 dødsfall
- ▲ Fri linje, 2 dødsfall
- ▲ Fri linje, 1 dødsfall
- ▲ Planovergang, 1 dødsfall



Kartverket

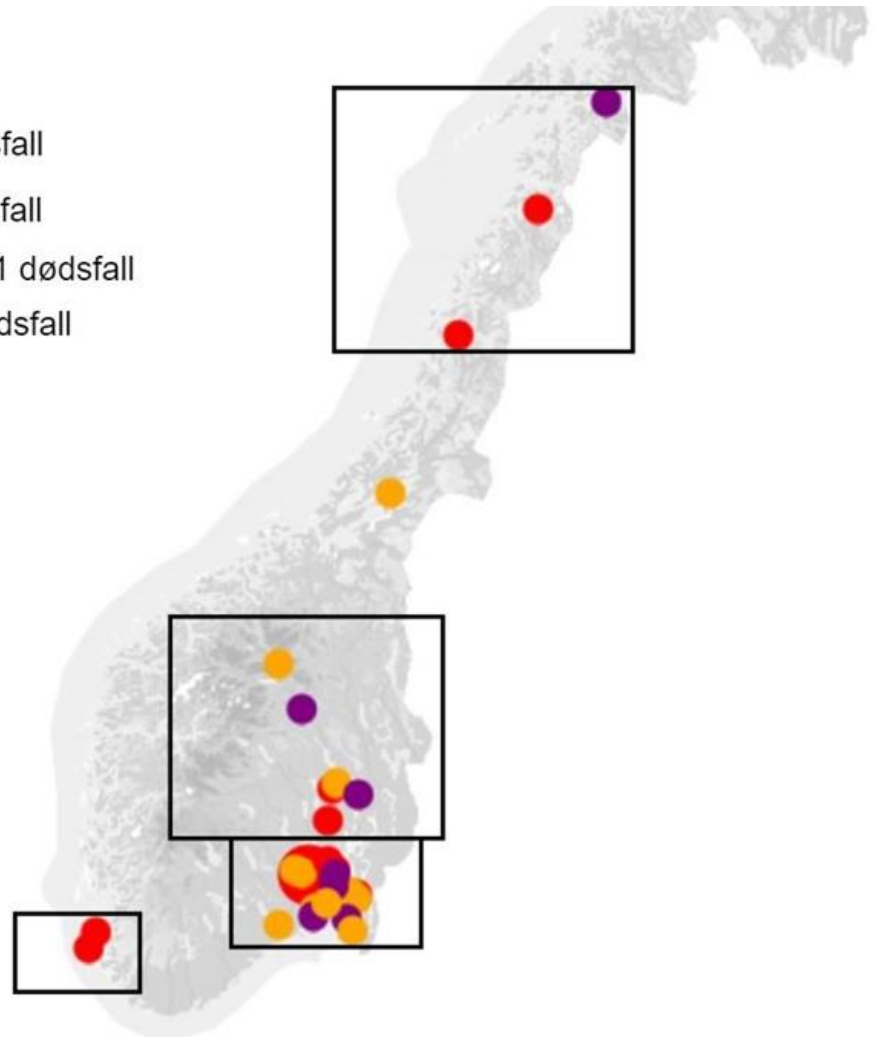


200 km

# Black-spot analysis; trespasses (fatalities)

- Stasjon, 2 dødsfall
- Stasjon, 1 dødsfall
- Planovergang, 1 dødsfall
- Strekning, 1 dødsfall

  
Kartverket



# Large stretches without fatalities (2007-2016)

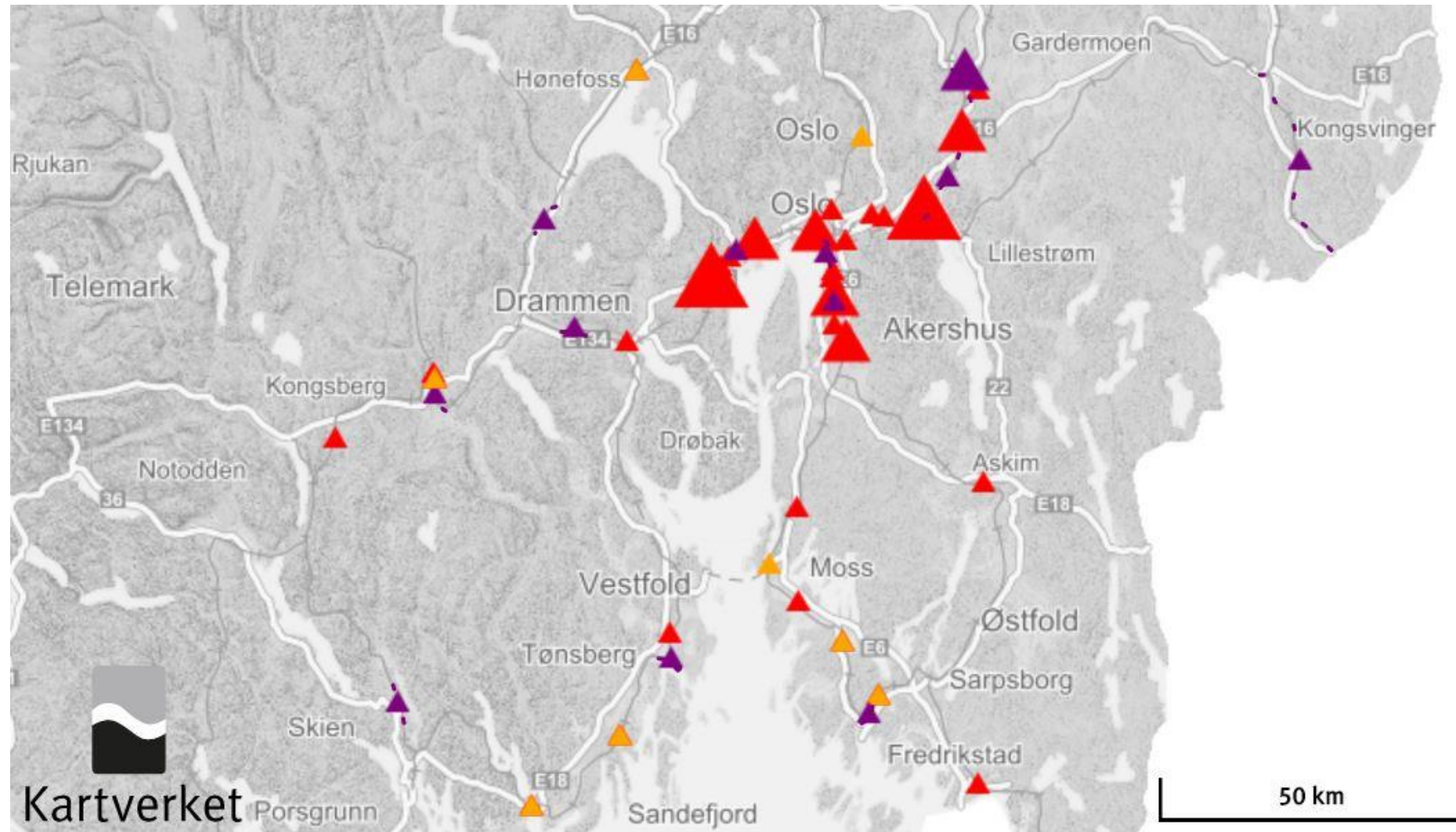
The picture is taken at Finse  
(1222 m. above sea level)

Photo: SNL; <https://snl.no/Bergensbanen>

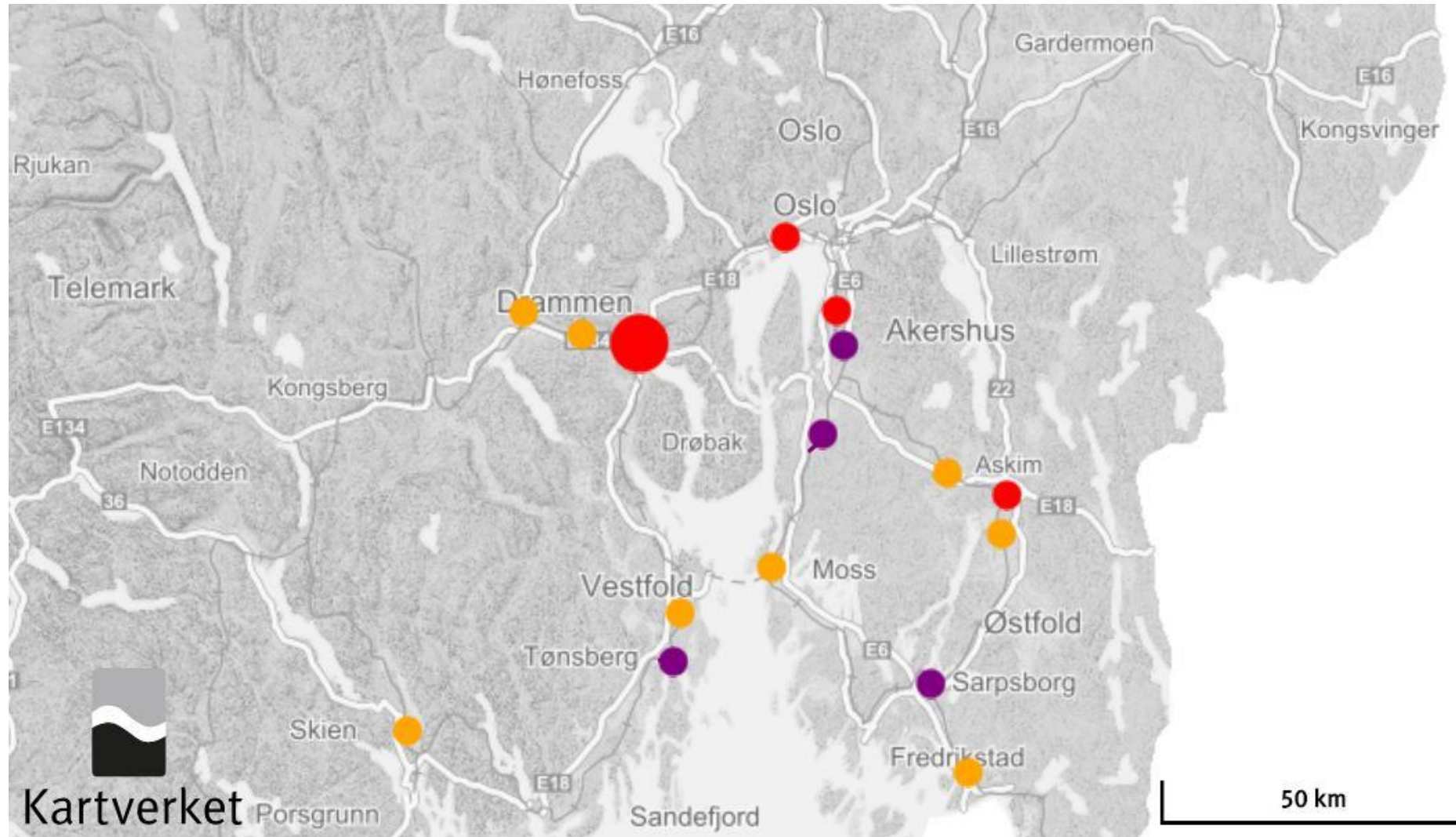




# Concentration around Oslo (Suicides)



# Concentration around Oslo (Trespases)



Togmengde (person- og godstog) - antall tog per døgn (sum begge retninger) /  
Number of trains per day (passenger and freight trains, sum both directions)

- > 130
- 111-130
- 91-110
- 71-90
- 51-70
- 1-50
- Baner uten regulær trafikk/Lines without regular traffic
- Ukjent/unknown

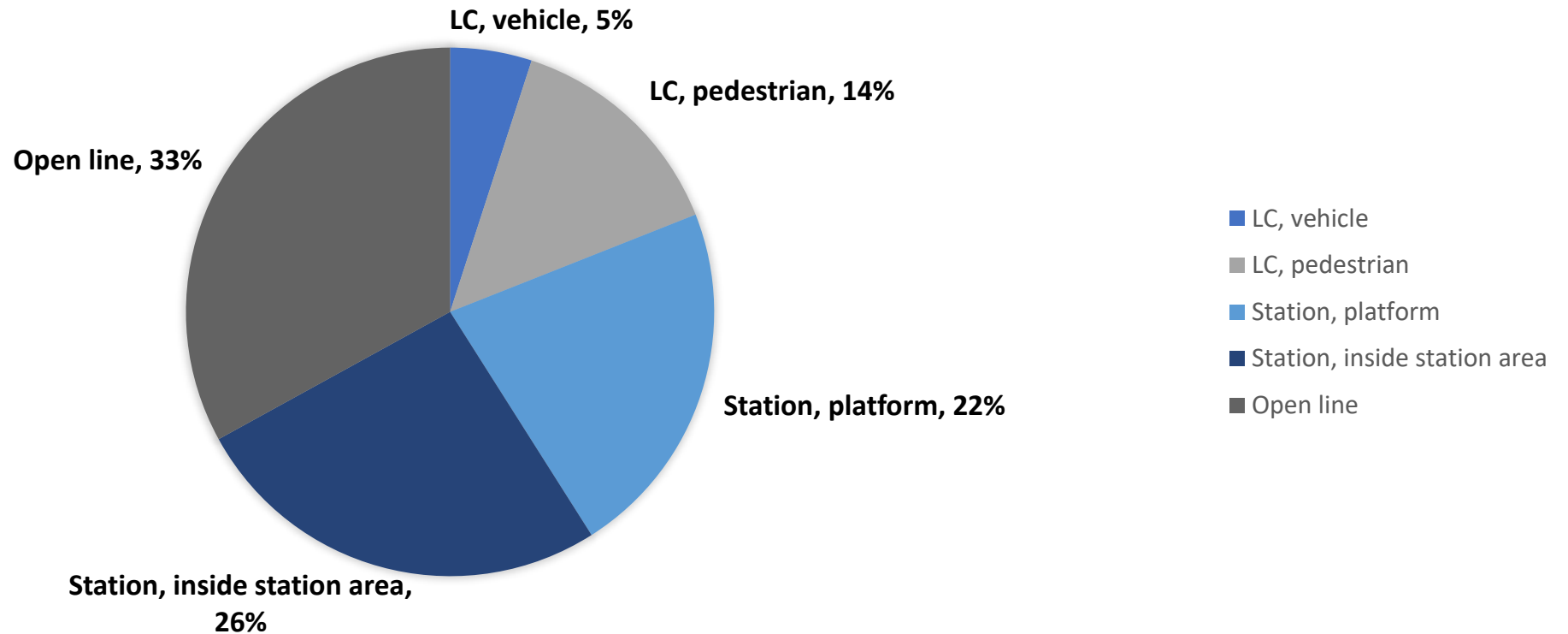


# Suicides and trespasses seems to correlate with traffic and demographics

(Figure: JBV, 2016)

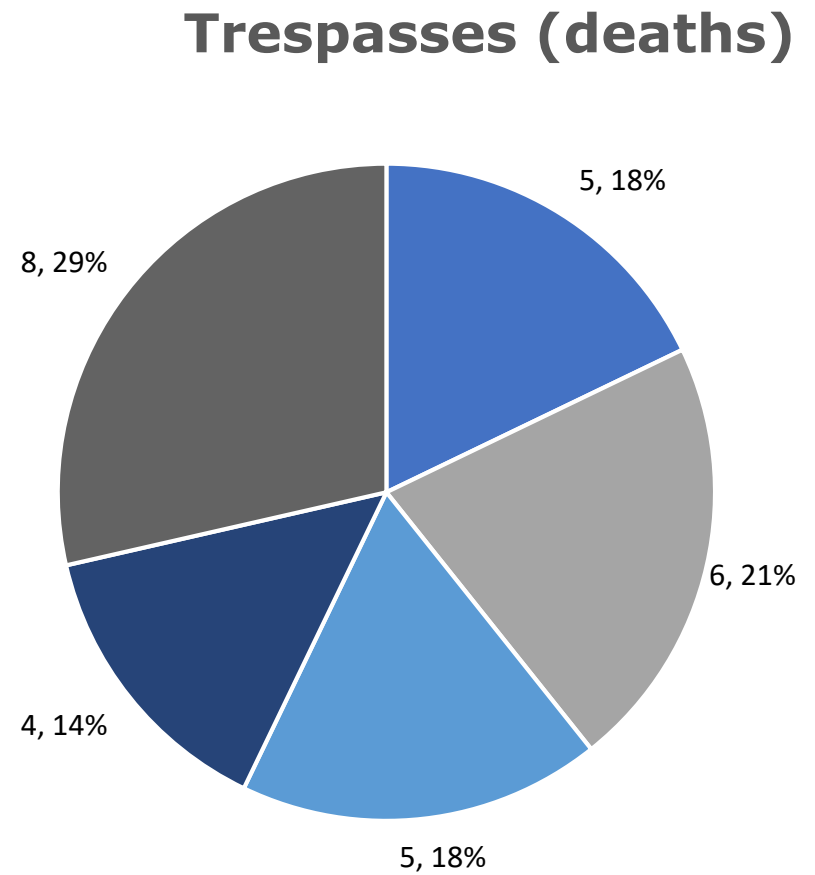
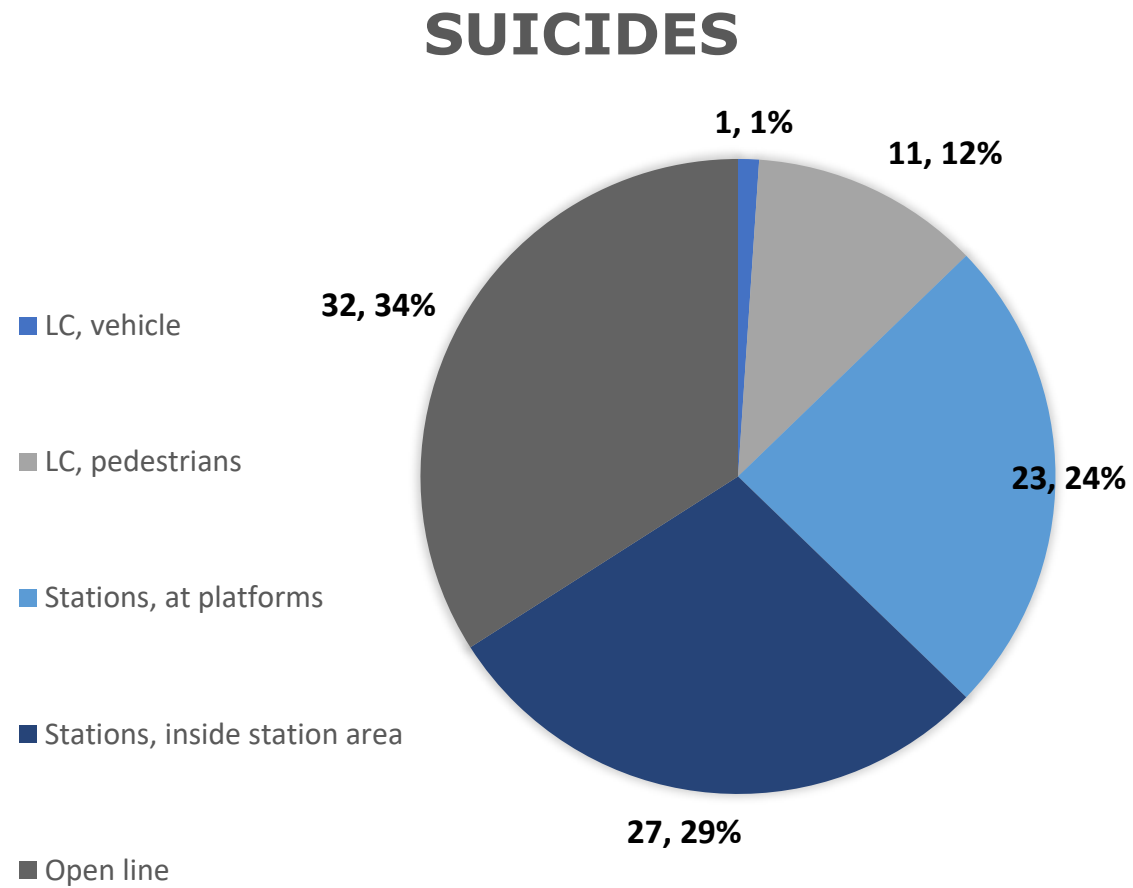
# Distrubution at LCs, stations or open line

## DISTRIBUTION OF DEATHS AT THE NORWEGIAN RAILWAY 2007-2016





# Different distribution of suicides and other fatalities



# Conclusions from black-spot-analysis:

- Nearly 60% of the fatalities in the period 2007-2016 took place at stretches constituting less than 5% of the total railway length.
- Only suicides at the express line Oslo - Oslo Airport
- There were 7 stations with more than 1 fatality in the same period:

Station:	Suicides	Accidental deaths	Comments:
Lillestrøm	5	0	Airport express train
Asker	4	0	2 in adjacent tunnells
Nationaltheatret (Oslo)	2	0	1 of 2 railway stations in Norway below surface
Kløfta	2	0	Trains passing at high speed
Blommenholm	2	0	Smaller station at lower-speed line
Vevelstad	2	0	Smaller station at lower-speed line
Brakerøya	0	2	Industrial surroundings, problem area

# Risk analysis for suicides?



DNV report 2002-0130:  
(Passing trains at speed above 130 km/h)  
Risk for fatality at Lillestrøm station:  
Once every 1000 year



Result 2007-2016:  
5 suicides at station

# How to avoid these incidents?

Selected measures from the RESTRAIL Toolbox:  
(According to Haddon)

- FFCCTV
- Lighting
- Strive for good visibility
- Detection
- Direct help line
- Record and learn from incidents (database)
- **FENCES!! (Both at stations and outside them)**

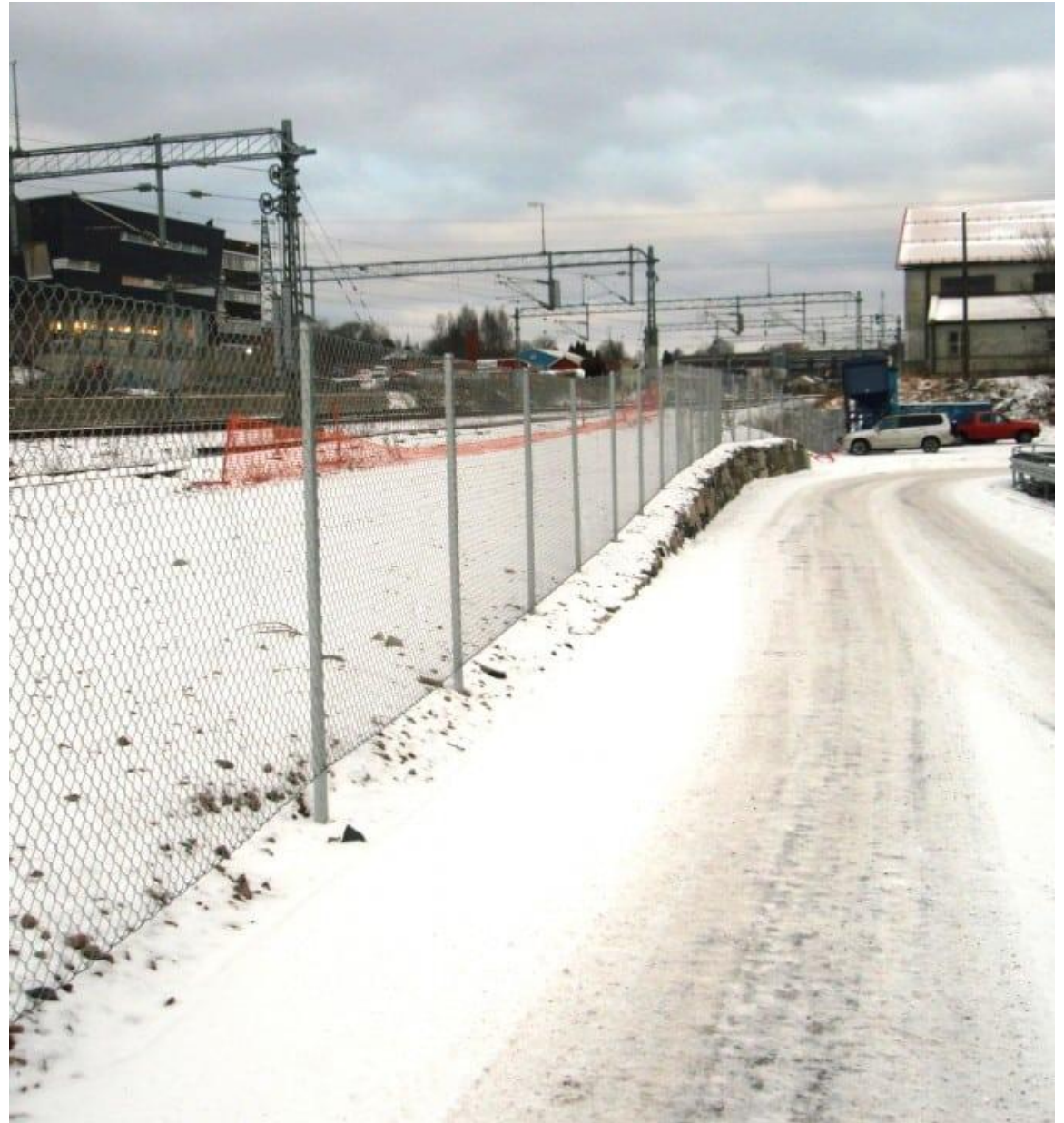




***Source: ProRail / Photo © Erik van 't Woud***



Demand in  
Norway: chain-  
link fences  
(Source;  
Herasnorge.no)



# Fencing in Norway

- Not mandatory along the railway
- Fences installed based on risk analysis + the ALARP-principle

Fences are due to:

- Wild animals
- Livestock
- Snow
- Real estate
- *Persons*
- *Voltage*

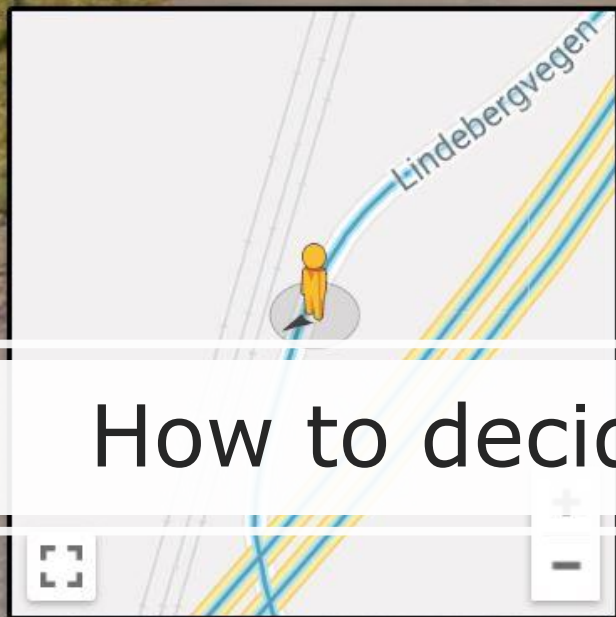


Lindebergvegen

Akershus



Street View – aug. 2018



How to decide how to secure; what is a proper fence?

Google

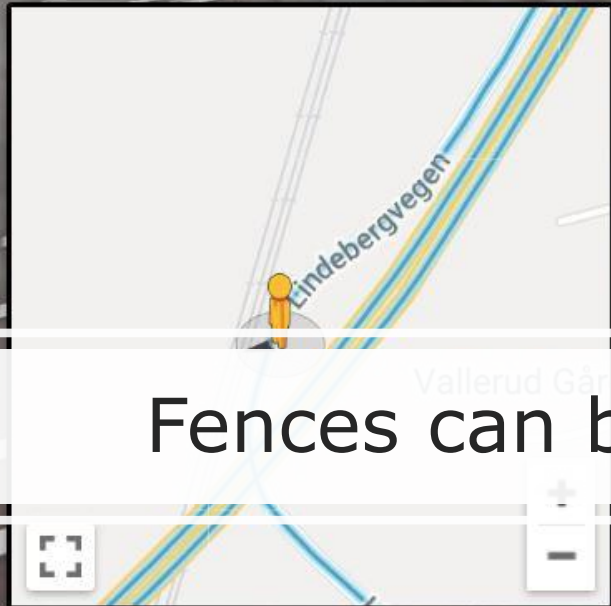


Lindebergvegen

Akershus



Street View – mar. 2010



Fences can be way easier to pass in winter time in Norway

Google



Lindebergvegen

Akershus



Street View – aug. 2018

Somewhere between Oslo and Oslo Airport

Google

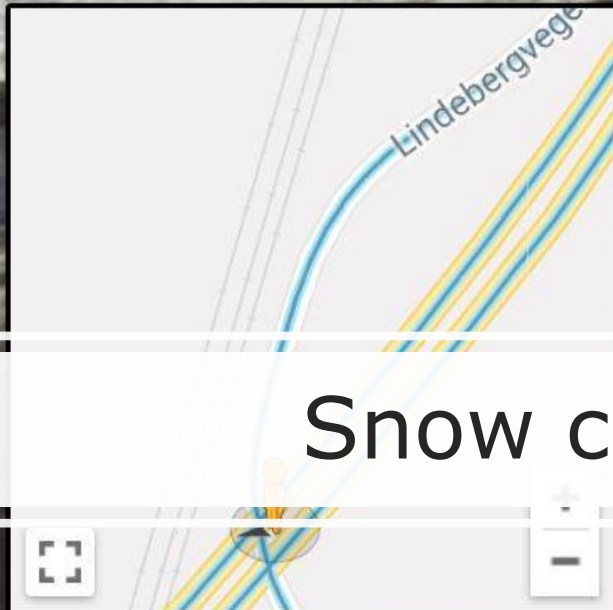


Lindebergvegen

Akershus



Street View – mar. 2010



Snow clearance may induce risks elsewhere

Google



# Oslo, 2009

- 33-year- old man enter the railway at the site in the picture. Survives, with serious injuries.
- The Norwegian state pays 10 billion NOK in compensation

Photo:

VG, 26.02.19, private





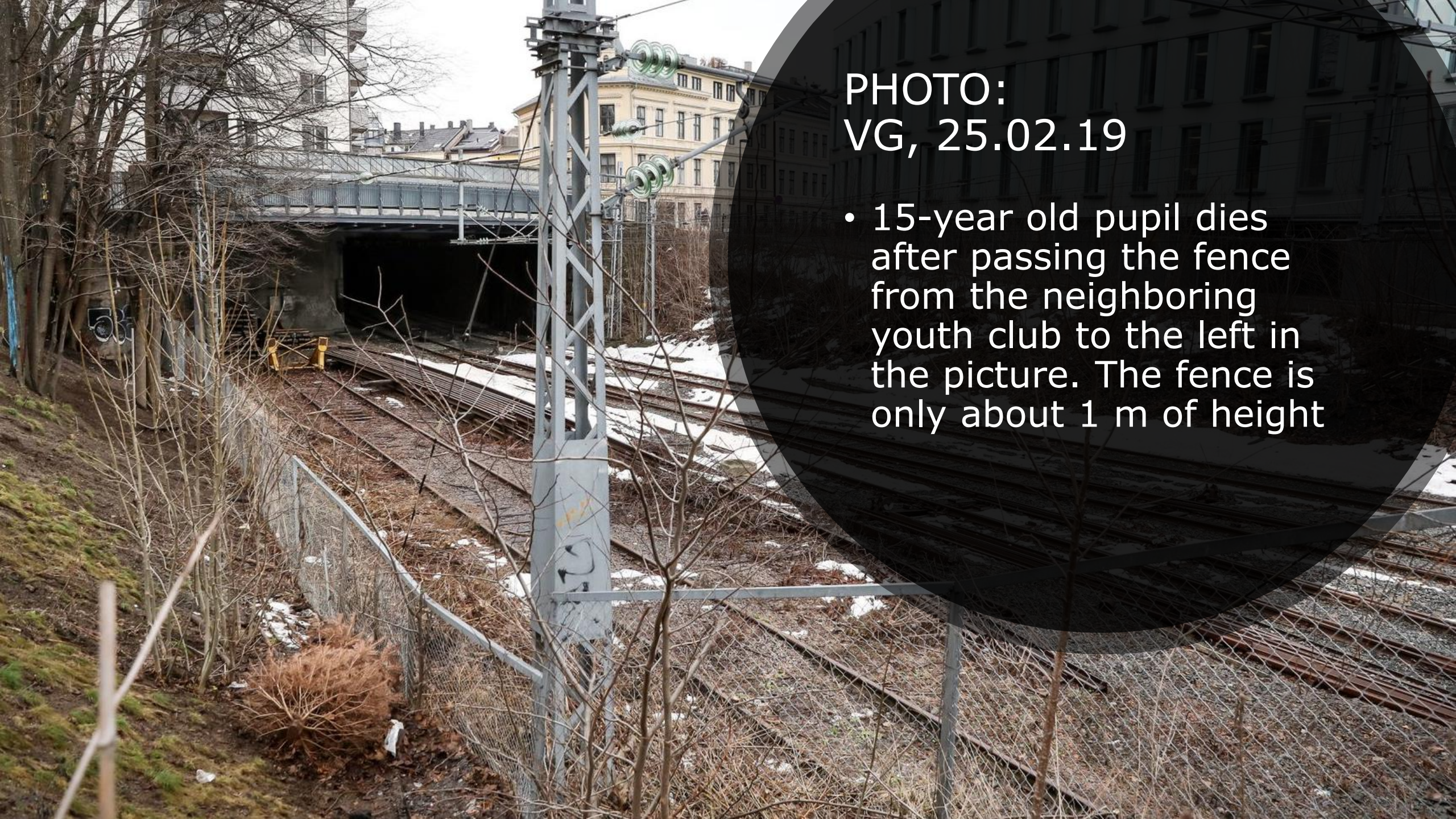


PHOTO:  
VG, 25.02.19

- 15-year old pupil dies after passing the fence from the neighboring youth club to the left in the picture. The fence is only about 1 m of height





Photo: Aftenposten,  
01.03.19; Morten Uglum

- The fence is elevated after the fatality. The new fence is both higher (meets demand of 1,8 m) and more difficult to climb.



# Fencing off objects

**[RESTRAIL:](#)**

**<http://restrail.eu/toolbox/spip.php?article110>**

***Source: ProRail / Photo © Erik van 't Woud***



# Enebekk LC





# Landscaping (Incl. designing and placement of term obstacles)

RESTRAIL;

<http://restrail.eu/toolbox/spip.php?rubrique68>

Brakerøya station

(2 accidental fatalities 2007-2016)

Screenshot; Bane NOR  
(Målevognsbilde)



Høst 2016

Høst 2015

Vår 2015

Høst 2014

Vår 2014

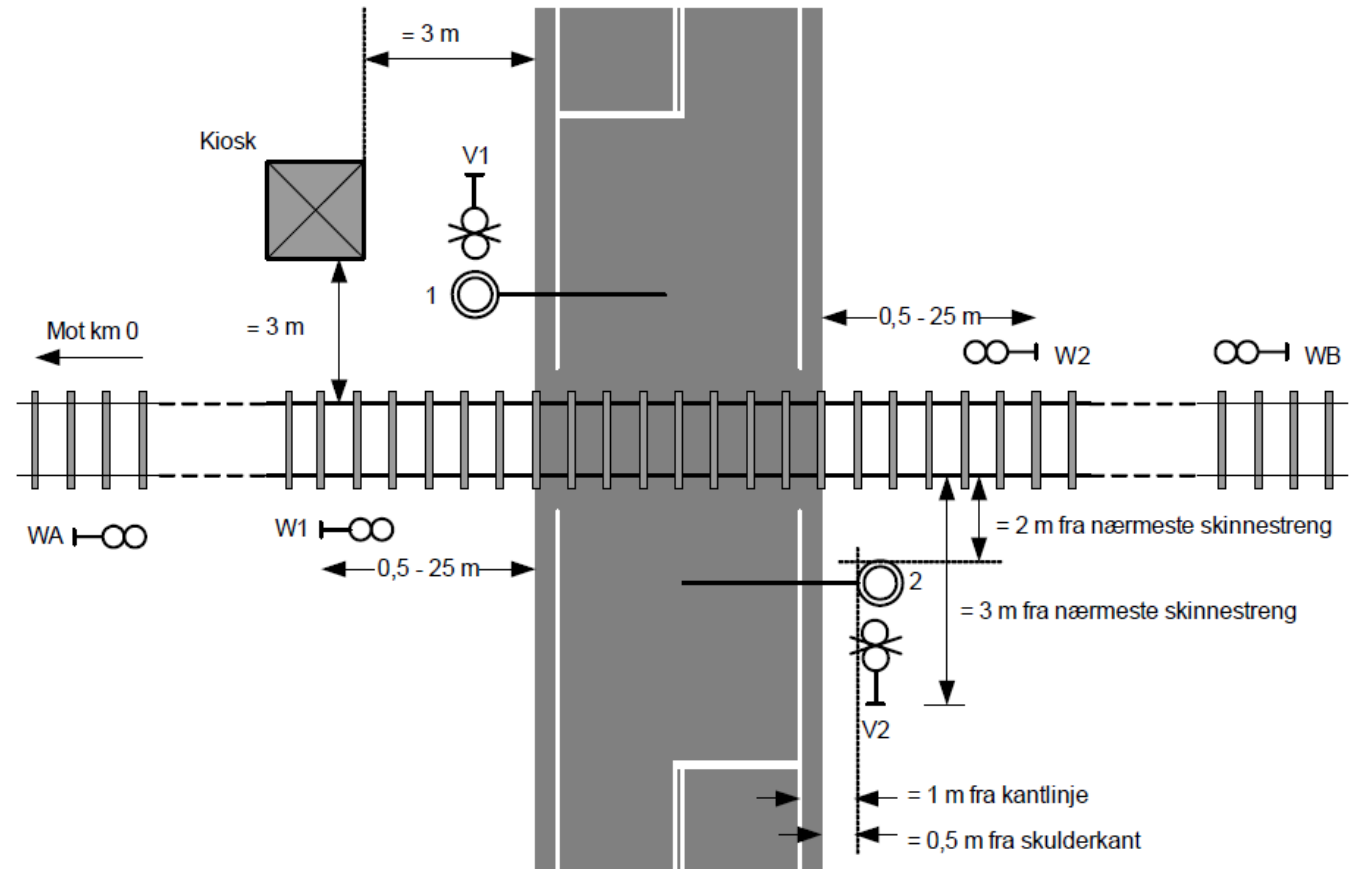
Høst 2013

Vår 2013

Høst

From the IMs  
technical  
legislation:  
No demands of  
sight length when  
the LC is secured.

Source;  
[https://trv.banenor.no/w/images/a/a2/JD55009\\_fig003.png](https://trv.banenor.no/w/images/a/a2/JD55009_fig003.png)



# Trapneset LC (Collision train/car 10.06.2015)

The car driver died,  
the LC was closed  
afterwards.

Sight? No demands  
of sight length  
when the LC is  
secured.

Source; report  
08/2016, JBV (IM)

