Asset Management of Level Crossings

Finnish Transport Infrastructure Agency

Experiences of Asset Management Strategies

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Content

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- Data management
- Safety evaluation tool
- Safety improvement measures
Railway Statistics

2,500 level crossings (main and secondary tracks) and 45 tunnels on the main lines.

350 traffic operating points for passenger and freight transport.

85,7 million journeys made in railway passenger transport and

38,4 million tonnes carried in freight transport.

6,000 kilometres, of which 90% on single track.

Length of the Finnish railway network

3,284 Track kilometres.

High-speed railway network, over 160 km/h on 1,059 Track kilometres.
Statistics

- 2723 level crossings
- 2038 unprotected
- 616 with barriers
- 69 with warning devices
- 20 / year removed
- 2-3M€ /year
Accidents

Accidents 2000 - 2018

Deaths and Seriously injureds
Maintenance of Level Crossings

- 12 maintenance areas
- 4 management areas
- Outsourced
- Maintenance tasks
  - Cleaning and repairing signs
  - Clearing vegetation
  - Repair work (cover, warning devices, barriers)
  - Winter maintenance
  - Inspections, photographing
Data Management

- Systematic inventory since 1999
- Accident history data
- Safety evaluation tool
- Development of new information system
  - Asset database
  - Application for maintenance data
  - Application for planning repair / renovation
- Pilot projects
  - Mobile laser scanning
  - Point cloud data
  - 360° images
Safety Evaluation Tool Tarva LC

- Review factors affecting safety
- Evaluate current safety
- Estimate the effects of improvements
- Study cost-effectiveness

- A study of the effects of various variables on accident numbers
- Research of measures reducing accidents
- Average costs of improvements
Safety Evaluation of Level Crossings

- Data / variables of level crossings
- Accident history data
- Accident prediction models

expected number of accidents

Classification of level crossings into 7 classes (6-7 most dangerous, 5-10%)

accidents after = coefficient * accidents expected

<table>
<thead>
<tr>
<th>Group</th>
<th>Measures</th>
<th>Coefficient</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warning device</td>
<td>Half-barriers (signs)</td>
<td>0.3</td>
<td>150 000€</td>
</tr>
<tr>
<td>Conditions</td>
<td>Speed limit (bad sight)</td>
<td>0.75</td>
<td>10 000€</td>
</tr>
<tr>
<td>Vehicle warning</td>
<td>STOP-sign (bad sight)</td>
<td>0.75</td>
<td>1000€</td>
</tr>
<tr>
<td>Investment</td>
<td>Change of crossing angle</td>
<td>0.9</td>
<td>300 000€</td>
</tr>
</tbody>
</table>
Level Crossing Accident in Raasepori 26th October 2017

- Rail bus and high mobility terrain vehicle
- 4 deaths
- 3 seriously injured
- Total costs 270 000€

- Unprotected level crossing
- Speed limit 120 km/h
- Crossing angle
- Sight conditions
Program to Improve Safety (2018-2021) map

- Additional funding 28M€
- 65 most critical level crossings (Tarva LC)
  - Removal of level crossings
  - Installing half-barriers
  - Improving sight conditions
  - Lowering speed limits
  - Installing STOP-signs
- Data and information systems
- Piloting new technologies (satellite positioning, lighter warning devices)
- Total 220 level crossings

Image: FTIA
Next 10+ years

- Regulation 2015
- Requirements
  - Crossing angle over 70°
  - Barriers (over 100 km/h and 2000 vehicles)
  - Lockable gate or barriers (over 140 km/h)
- Removal of LC or installing warning devices
- National 12-year transport system plan 2020-2031