



**FINNISH ROAD
ADMINISTRATION**

How much?

Road management costs in 2001





**FINNISH ROAD
ADMINISTRATION**

THE FINNISH ROAD ADMINISTRATION'S OPERATING PRINCIPLE:

The Finnish Road Administration (Finnra) is responsible for the public roads in Finland. We offer smooth, safe and environmentally friendly road connections to meet our clients' transport needs in co-operation with various actors in the traffic sector.

VALUES OF THE FINNISH ROAD ADMINISTRATION

Societal responsibility: As experts, we are responsible for the road network and road traffic. Our goal is to develop the entire traffic system in order to enhance well-being in society and among its members. We operate economically and efficiently to promote the sustainable development of the road traffic conditions.

Client-centred activities: The needs and satisfaction of our customers are the basis for our work. We engage in interactive collaboration with our clients and associates.

Know-how and co-operation: We appreciate versatility, experience and creativity. We will meet future challenges by emphasizing co-operation, mutual trust and respect for the individual.

At the end of year 2000
Finnra had 1,060
permanent employees.



How much?

Road management costs in 2001

This brochure introduces road management costs based partly on estimate and partly on accumulated data.

These data can be applied in making general costs estimates. Costs often vary largely, based on the scope of measures and local conditions.

The amounts of money in this brochure are in euros (€) and Finnish marks (FIM). The figures are rounded off and slight inaccuracies are possible due to conversion.

The information has been compiled by Mr. Heikki Heiniö, Special Researcher at Finnra Central Administration

in Helsinki, October 2001

Sources: Central Administration Units
Road Regions
Individual projects
The EDP reports on project construction costs in pre- and general planning

ROADFACTS

Finnra is in charge of public roads, whose capital value is about 15 billion euros (FIM 90 billion).

In 2002, a sum of 789 million euros (FIM 4,687 million) will be spent on road management in the Finnish public road network

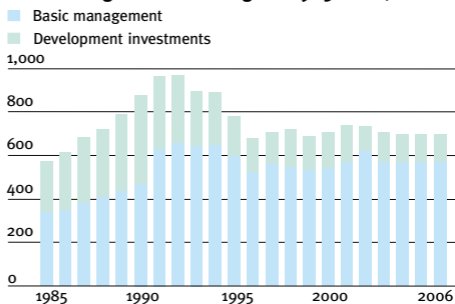
Public roads on 1 Jan. 2001	78,000 km
* Paved roads, 64 %	50,300 km
* Main roads (class I and II)	13,300 km
* Motorways	549 km
* Pedestrian and bicycle ways	4,300 km
* Illuminated roads	10,700 km
* Bridges	13,800

Traffic performance on public roads in 2000 was 30.5 billion automobile kilometres, which accounts for 65 per cent of road traffic in Finland.



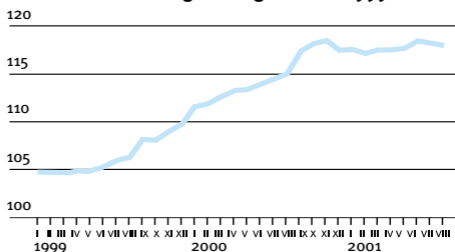
ROAD MANAGEMENT

Road management financing^{a)} in 1985-2006, Mill.€



^{a)} price level of the year in question

Cost index of civil engineering works in 1999-2001



Financing

Financing	2001 actual (forecast)		2002 projected	
	mill.€	FIM mill.	mill.€	FIM mill.
Road management financing, total	778	4,624	786	4,667
Basic management	588	3,493	604	3,589
Road network develop.	88	525	60	356
Postponed and comprehensive financ. proj.	75	446	88	523
E 18 Lohja-Lohjanharju	-	-	10	59
Acquisition and mainten. of land areas	27	160	24	140
Other financing	9	54	3	20
FINANCING, TOTAL	787	4,678	789	4,687

ROAD MANAGEMENT

Road management (price level of the year in question)	2001		2002	
	actual (forec.)		protected	
	Million FIM		Million FIM	
	€	mill.	€	mill. ²⁾
REVENUES	17.8	106	14.3	85
Rev. from activit. subj. to charge	1.3	8	0.9	5
External financing	13.4	80	13.4	80
Other revenues	3.0	18	-	-
EXPENSES	764.7	4,550	802.0	4,772
Maintenance	232.7	1,385	225.4	1,341
Area contracts	211.4	1,258	204.4	1,216
Ferry transport	21.3	127	21.0	125
Upkeep and replacem. investm.	118.7	706	167.6	997
Paved roads	90.1	536	135.8	808
Gravel roads	15.1	90	14.3	85
Bridges	13.5	80	17.5	104
Expansion and new investments	106.2	632	91.4	544
Regional projects	66.6	396	50.6	301
Bridges replacing ferries	7.1	42	8.1	48
EU projects	13.4	80	7.6	45
Employment projects	3.2	19	3.4	20
Intersection projects	6.7	40	15.1	90
Publ. transp. in Greater Helsinki	8.4	50	5.0	30
Kuusankoski-Pessankoski	0.8	5	1.7	10
Development investments	145.4	865	157.6	938
Network developm. projects	86.2	513	59.8	356
Comprehensive financ. proj.	43.2	257	71.1	423
Järvenpää-Lahti postp. financ.	16.0	95	16.8	100
E 18 Lohja-Lohjanharju	-	-	9.9	59
Planning	29.4	175	26.1	155
Basic road management	22.7	135	18.5	110
Development projects	6.7	40	7.6	45
Traffic management	6.4	38	5.9	35
Acquis. and maint. of land areas	21.2	126	23.5	140
Road Administration	78.7	468	78.2	465
Administration	70.1	417	68.7	409
Investments	1.9	11	1.9	11
R&D	6.7	40	7.6	45
Service projects	24.2	144	21.8	130
Adjustments in Road Enterprise personnel	1.8	11	4.5	27
EXPENSES, TOTAL	764.7	4,550	802.0	4,772
NET EXPENSES	746.9	4,444	787.7	4,687

¹⁾ October 2001 ²⁾ In 2002, the Finnish mark ceases to exist, to be replaced by the euro

ROAD MAINTENANCE

Average maintenance costs in 2000

VAT is not included.

Winter maintenance/km	920...2,910 € 5,500...17,300 FIM
Motorways	6,050...11,260 € 36,000...67,000 FIM
Main roads (class I and II)	2,350...4,880 € 14,000...29,000 FIM
Regional roads	450...3,030 € 2,700...18,000 FIM
Connecting roads	620...2,190 € 3,700...13,000 FIM
Pedestrian and bicycle way	670...1,430 € 4,000...8,500 FIM
Maintenance of the traffic environment/km	470...1,610 € 2,800...9,600 FIM
Traffic signs	24...170 € 140...1,000 FIM
Greenbelt maintenance	90...220 € 550...1,300 FIM
Waste collection and disposal	50...170 € 300...1,000 FIM
Road markings/length of pavement	190...670 € 1,100...4,000 FIM
Lighting, power/ length of illuminated roads	710...5,700 € 4,200...34,000 FIM

ROAD MAINTENANCE

Maintenance of structure and equipment/km

90...440 €

550...2,600 FIM

(Incl. drainage, railings, fences, kerbs, bridges, maintenance of road lighting and patching of pavement)

Maintenance of gravel roads/km

490...1,445 €

2,900...8,600 FIM

(Incl. levelling, dust binding and ballast as well as repair of frost damage)

Costs involved in traffic control and the use and maintenance of road lighting and illumination in 2000

Energy, maintenance of light fixtures

Traffic signals/intersection/year

2,100 €

12,500 FIM

Road lighting/km/year

- 2+2-lane roads

2,690...5,550 €

16,000...33,000 FIM

- 2-lane roads

(main roads, class I and II)

1,680...4,030 €

10,000...24,000 FIM

- 2-lane roads

(other highways, local roads)

1,340...2,390 €

8,000...14,200 FIM

- pedestrian and bicycle ways

1,000...1,680 €

6,000...10,000 FIM

At the beginning of 2001, the length of the gravel roads in the public road network was 27,700 km (36%), carrying only four per cent of traffic on public roads.



ROAD MAINTENANCE

Running and maintenance costs of ferries in 2000

Wages, running costs of vessels and ferries, excluding capital costs

Ferry vessel ¹⁾	0.77...2.24 Mill.€	
		4.6...13.3 FIM mill.
average	1.66 Mill.€/location	
		9.9 FIM mill./location
Ferry ²⁾	0.12...0.47 Mill.€	
		0.7...2.8 FIM mill.
average	0.29 Mill.€	
		1.7 FIM mill./ location

¹⁾ free navigation, total 5 locations; traffic by 1-2 vessels depending on the season

²⁾ cable steered, total 42 locations

Costs of ferry transport	23.5 Mill.€	140 FIM mill.
-Ferries	9.2 Mill.€	55 FIM mill.
-Ferryboats	14.3 Mill.€	85 FIM mill.
Cost per vehicle	5€	0 FIM
-Ferries	11€	65 FIM
-Ferryboats	4.20€	25 FIM
Costs per crossing	15€	90 FIM
-Ferries	77€	460 FIM
-Ferryboats	10.5€	62 FIM

Traffic in 2000:

- 4,500,000 automobiles per year, of which 850,000 on ferries, 3,650,000 on ferryboats.
- 4,100 crossings per day, of which 320 on ferries and 3,780 on ferryboats (crossings without vehicles on board: 25-30% in winter and 10-15% in summer)
- an average of three cars on deck per crossing; ferries 7 cars per crossing and ferryboats 2.5 cars per crossing.

ROAD NETWORK MAINTENANCE INVESTMENTS

Average paving costs on different types of roads

The prices include the costs of work, aggregate and binder. VAT is not included.

	1999	2000
	€/km	€/km
	FIM/km	FIM/km
Motorway (2 x 10 m)		
- overlay (SMA)	87,400	100,800
	520,000	600,000
- remixing (SMA)	50,400	77,300
	300,000	460,000
Main road, class I and II (8 m)		
- overlay (AC)	29,600	37,600
	176,000	224,000
- remixing (AC)	18,800	23,400
	112,000	139,000
Other highway (7 m)		
- overlay (SAC-V)	16,500	20,000
	98,000	147,000
Local road (6 m)		
- surface dressing on a gravel road	7,060	12,100
	42,000	72,000
Pedestrian and bicycle way (3 m)		
- overlay (AC)	10,600	13,600
	63,000	81,000

Unit prices of the most used pavements

The prices include estimated costs of binder, aggregate and anti-stripping agent (if necessary).

VAT is not included.

	€/m ²	€/m ²
	FIM/m ²	FIM/m ²
Asphalt concrete (AC) 100 kg/m ²	3.70	4.54
	22.00	27.00
Stone mastic asphalt (SMA) 100 kg/m ²	4.37	5.55
	26.00	33.00
Soft asphalt concrete (SAC-V) 100 kg/m ²	2.35	3.53
	14.00	21.00
Surface dressing on a gravel road	1.18	2.02
	7.00	12.00



ROAD NETWORK MAINTENANCE INVESTMENTS

Improving old roads in 2000

Costs include general work, cutting; loading and shipping, acquisition and handling of embankments, paving SMA (stone mastic asphalt), AC (asphalt concrete), ground concrete layer, broken rock layer, drainage-course, non-freezing ground layer, grassplanting and landscaping of slopes. VAT is not included.

Upgrading semi-motorways to motorways

	0.74...2.40 Mill.€/km		
	4.4...14.3 FIM mill./km		
Mill.€/km	easy	average	difficult
Urban area	0.92	1.29	2.40
Built-up area	0.86	1.23	2.03
Rural area	0.74	0.92	1.48

Upgrading a 2-lane main road (class I)

to 2+2 lane road	0.37...1.58 Mill.€/km		
	2.2...9.4 FIM mill./km		
Mill.€/km	easy	average	difficult
Urban area	0.47	1.01	1.58
Built-up area	0.47	0.92	1.29
Rural area	0.37	0.66	0.92

Straightening of a 2-lane main road (class I)

	0.24...1.01 Mill.€/km		
	1.4...6.0 FIM mill./km		
Mill.€/km	easy	average	difficult
Urban area	0.42	0.61	1.01
Built-up area	0.27	0.50	0.87
Rural area	0.24	0.42	0.69

In November 2001, the Porvoo–Koskenkylä motorway will be completed. The project has been implemented as a turnkey contract. The contractor has planned and constructed a second driveway along the existing motor-traffic way between Porvoo and Koskenkylä. The section extends for 25 kilometres. This project, including additional works, cost about 37.8 million euros (FIM 225 million).

ROAD NETWORK MAINTENANCE INVESTMENTS

Straightening of a 2-lane main road

(class II) 0.18...0.77 Mill.€/km

1.1...4.6 FIM mill./km

Mill.€/km	easy	average	difficult
Urban area	0.34	0.52	0.77
Built-up area	0.24	0.39	0.66
Rural area	0.18	0.34	0.47

Straightening of a 2-lane regional road

0.15...0.55 Mill.€/km

0.9...3.3 FIM mill./km

Mill.€/km	easy	average	difficult
Urban area	0.24	0.42	0.55
Built-up area	0.18	0.34	0.42
Rural area	0.15	0.24	0.34

Improving the structure of a 2-lane

main road (class I) 0.10...0.34 Mill.€/km

0.6...2.0 FIM mill./km

Mill.€/km	easy	average	difficult
Urban area	0.13	0.20	0.34
Built-up area	0.12	0.18	0.25
Rural area	0.10	0.15	0.20

Improving the structure of a 2-lane

main road (class II) 0.07...0.27 Mill.€/km

0.4...1.6 FIM mill./km

Mill.€/km	easy	average	difficult
Urban area	0.12	0.18	0.27
Built-up area	0.10	0.15	0.24
Rural area	0.07	0.12	0.17

An important transport development project in the Greater Helsinki Area, Ring Road II in Kauniainen went into service in 2000. The project involved the 485-metre-long Hiidenkallio tunnel, which is the longest road tunnel in Finland. The length of this road is 6.8 kilometres and it cost 52 million euros (FIM 310 million).



ROAD NETWORK MAINTENANCE INVESTMENTS

Improving the structure of a 2-lane regional road

		0.05...0.22 Mill.€/km	
		0.3...1.3 FIM mill./km	
Mill.€/km	easy	average	difficult
Urban area	0.10	0.17	0.22
Built-up area	0.10	0.15	0.17
Rural area	0.05	0.10	0.15

Widening the road (1-2 meters)

		0.12...0.47 Mill.€/km	
		0.7...2.8 FIM mill./km	
Mill.€/km	easy	average	difficult
Urban area	0.13	0.24	0.47
Built-up area	0.12	0.20	0.42
Rural area	0.12	0.17	0.37

Improving the vertical alignment of a 2-lane main road (class I)

		0.29...1.21 Mill.€/km	
		1.7...7.2 FIM mill./km	
Mill.€/km	easy	average	difficult
Urban area	0.52	0.74	1.21
Built-up area	0.37	0.61	1.08
Rural area	0.29	0.52	0.84

Improving the vertical alignment of a 2-lane main road (class II)

		0.24...0.89 Mill.€/km	
		1.4...5.3 FIM mill./km	
Mill.€/km	easy	average	difficult
Urban area	0.37	0.61	0.89
Built-up area	0.29	0.47	0.74
Rural area	0.24	0.37	0.52

Improving the vertical alignment of a 2-lane regional road

		0.17...0.61 Mill.€/km	
		1.0...3.6 FIM mill./km	
Mill.€/km	easy	average	difficult
Urban area	0.29	0.37	0.61
Built-up area	0.24	0.37	0.47
Rural area	0.17	0.24	0.37

DEVELOPMENT OF THE ROAD NETWORK

Costs of the road construction in 2000

Costs include general work, cutting; loading and ship ping, acquisition and handling of embankments, paving SMA (stone mastic asphalt), AC (asphalt concrete), ground concrete layer, broken rock layer, drainage-course, non-freezing ground layer, grassplanting and landscaping of slopes. VAT is not included.

Motorway	1.11...7.39 Mill.€/km		
	6.6...44.0 FIM mill./km		
Mill.€/km	easy	average	difficult
Urban area	1.48	3.70	7.39
Built-up area	1.29	2.03	3.14
Rural area	1.11	1.48	2.22

Semi-motorway	0.75...2.40 Mill.€/km		
	4.4...14.3 FIM mill./km		
Mill.€/km	easy	average	difficult
Urban area	1.02	1.48	2.40
Built-up area	0.84	1.29	2.03
Rural area	0.75	0.97	1.48

3+3 lane road	0.92...4.62 Mill.€/km		
	5.5... 27.5 FIM mill./km		
Mill.€/km	easy	average	difficult
Urban area	1.48	2.59	4.62
Built-up area	1.21	2.03	3.70
Rural area	0.92	1.48	2.22

2+2 lane road	0.55...2.77 Mill.€/km		
	3.3...16.5 FIM mill./km		
Mill.€/km	easy	average	difficult
Urban area	0.92	1.85	2.77
Built-up area	0.74	1.39	2.22
Rural area	0.55	1.11	1.85

Finland's longest continuous motorway (161 km) between Helsinki and Tampere was completed in 2000. Its construction costs were in present-day money some 672 million euros (FIM 4 billion).



DEVELOPMENT OF THE ROAD NETWORK

2-lane main road (class I) 0.37...1.48 Mill.€/km
2.2...8.8 FIM mill./km

Mill.€/km	easy	average	difficult
Urban area	0.66	0.92	1.48
Built-up area	0.47	0.74	1.29
Rural area	0.37	0.66	1.03

2-lane main road (class II) 0.29...1.11 Mill.€/km
1.7...6.6 FIM mill./km

Mill.€/km	easy	average	difficult
Urban area	0.47	0.74	1.11
Built-up area	0.37	0.55	0.92
Rural area	0.29	0.47	0.66

2-lane regional road 0.18...0.74 Mill.€/km
1.1...4.4 FIM mill./km

Mill.€/km	easy	average	difficult
Urban area	0.34	0.55	0.74
Built-up area	0.29	0.47	0.55
Rural area	0.18	0.29	0.47

2-lane connecting road 0.15...0.55 Mill.€/km
0.9...3.3 FIM mill./km

Mill.€/km	easy	average	difficult
Urban area	0.18	0.37	0.55
Built-up area	0.17	0.29	0.47
Rural area	0.15	0.24	0.37

Construction of a pedestrian and bicycle way 0.07...0.29 Mill.€/km
0.4...1.7 FIM mill./km

Mill.€/km	easy	average	difficult
Urban area	0.15	0.18	0.29
Built-up area	0.12	0.15	0.18
Rural area	0.07	0.12	0.13

An annual sum of 13-22 million euros (FIM 80-130 million) is invested in building pedestrian and bicycle ways. Having expanded by 500 kilometres during the past five years, the network length is now 4,300 km.

DEVELOPMENT OF THE ROAD NETWORK

Bridge construction and upkeep in 2000

VAT is not included.

Bridge overhaul/m ²	170...370 € 1,000...2,000 FIM
New pavement/m ²	370...500 € 2,000...3,000 FIM
Widening a bridge/m ²	1,010...1,680 € 6,000...10,000 FIM
Underpass, one-lane road	84,000...135,000 € 500,000...800,000 FIM
Overpass, one-lane road	135,000...185,000 € 800,000...1,100,000 FIM
Bridges at crossings/m ² bridgespan 15...25 m	590...760 € 3,500...4,500 FIM
Bridges across waterways/m ² bridgespan 15 ...25 m	670...1,010 € 4,000...6,000 FIM
bridgespan 30...50 m	920...1,260 € 5,500...7,500 FIM
Railway overpasses/m ²	670...1,180 € 4,000...7,000 FIM

The costs of bridge construction are affected by:

- substructure and circumstances
- bridge geometry
- bridgespan, effective width and headroom
- materials used
- aesthetic considerations

The pylons of the longest bridge in Finland, Raippaluoto Bridge (1,045 m), extend to 82.5 metres above sea level. Completed in 1997, the bridge cost some 25 million euros (FIM 150 million).

Vihantasalmi Bridge, which is the world's largest timber-work bridge in terms of surface area (2,528 m²), cost 4 million euros (FIM 24 million), i.e. 1,610 euros/m² (FIM 9,600/m²); roadwork included.



DEVELOPMENT OF THE ROAD NETWORK

Traffic signals and road illumination in 2000

Traffic signals/intersection	50,400...168,000 €
	300,000...1,000,000 FIM
Crosswalk lights /site	21,900...30,300 €
	30,000...180,000 FIM
Road illumination/km	
Metal posts, ground cable	
- 2+2-lane roads	60,500...75,600 €
(motorway, highway)	360,000...450,000 FIM
- 2-lane roads	55,500...70,600 €
	330,000...420,000 FIM
- pedestrian and bic. ways	35,300...43,700 €
	210,000...260,000 FIM
Metal posts, conversion into flexible/pc.	170 €
	1,000 FIM
Wooden posts, air wire	
- 2-lane roads	20,200...33,600 €
(semi- motorways, highw.)	120,000...200,000 FIM
- padestrian and bic. ways	15,100...18,500 €
	90,000...110,000 FIM
- channeled intersection lighting	18,500...33,600 €
	110,000...200,000 FIM
Wooden posts, conversion into flexible/pc.	85 €
	500 FIM
Changing signs	
- fiber optic sign	5,000...6,700 €
	30,000...40,000 FIM
- prism sign	5,000...6,700 €
	30,000...40,000 FIM

DEVELOPMENT OF THE ROAD NETWORK

Traffic control and service equipment in 2000

Equipment/railing/km

- normal railing	25,200 €
	150,000 FIM
- other railing	33,600...117,600 €
	200,000...700,000 FIM

Deer fence/fencekm

11,800...20,200 €
70,000...120,000 FIM

Traffic signs/km

- variable speed limit	
- motorway (demanding traffic conditions)	134,500 €
	800,000 FIM
- motorway (countryside)	67,200 €
	400,000 FIM
- 2-lane road	42,000 €
	250,000 FIM
- traffic sign, erected	120...170 €
	700...1,000 FIM

Signpost/m²

- unlit	340 €
	2,000 FIM

Portal illuminated/pc.

2,500...15,100 €
15,000...90,000 FIM

Specific construction activities in 2000

Overtaking lane/km

- with embankments	118,000 €
	700,000 FIM
- open cutting of rock and cliff	319,000 €
	1,900,000 FIM

Rest area/site

134,000...185,000 €
800,000...1,100,000 FIM



DEVELOPMENT OF THE ROAD NETWORK

Bus stop/pc. 1,700...4,200 €
10,000...25,000 FIM

Railroad grade crossing equipment

- light and sound signals 44,000 €
260,000 FIM
- boom barrier 60,000 €
360,000 FIM
- conversion to interchange 0.6...0.9 Mill.€
3.3...5.2 FIM mill.

Traffic control and service equipment in 2000

Road markings/m²

- line painted with water-dilutable paint 1.68 €
10 FIM
- thermoplastic compounds 6.70 €
40 FIM
- two-component 5.04 €
30 FIM
- empedded marking 16.80 €
100 FIM

Construction of an intersection/site average

- yield space 11,700...168,000 €
70,000...100,000 FIM
- turning lane 33,600 €
200,000 FIM
- intersection channelling (main direction) 134,500...170,000 €
800,000...1,000,000 FIM

Grade-separated intersection

- advantageous site 1.7 Mill.€
10 FIM mill.
- on average 3.0 Mill.€
18 FIM mill.
- flat clay land 5 Mill.€
30 FIM mill.
- urban area, multi-lane roads 4...17 Mill.€
25...100 FIM mill.

Groundwater protection around road slopes/km

0.2...0.4 Mill.€
1...2.5 FIM mill.

DEVELOPMENT OF THE ROAD NETWORK

Noise barrier/km

- wall	0.4...1.0 Mill.€	2...6 FIM mill.
- embankment	1,700...336,000 €	10,000...2,000,000 FIM
- retaining wall	0.3...0.7 Mill.€	1.5...4 FIM mill.
- low noise barrier	0.3...0.9 Mill.€	1.5...5 FIM mill.

Redemption costs in 2000

- buildings	8,400...168,100 €	50,000...1,000,000 FIM
- timber stock-cultiv. forest/ hectare	250...750 €	1,500...4,500 FIM
- rocky land/hectare	85...350 €	500...2,100 FIM
- cultivated land/hectare	1,700...7,600 €	10,000...45,000 FIM
- construction sites/m ²	1.7...84.0 €	10...500 FIM
- sites for development, anticipatory value/m ²	0.8...3.4 €	5...20 FIM

TRAFFIC MANAGEMENT AND SERVICES

Services of the Traffic Centres in 2000

Traffic Centre activities incl. facilities, personnel costs	2.0 Mill.€	12 FIM mill.
Monitoring of road and traffic conditions	2.5 Mill.€	15.1 FIM mill.
- traffic monitoring	0.7 Mill.€	4.1 FIM mill.
- weather monitoring, incl. purchase of forecasts	1.9 Mill.€	11 FIM mill.
Traffic control (variable traffic control)	0.9 Mill.€	5.2 FIM mill.
Traffic information (roadside information, network inform.)	0.2 Mill.€	1.2 FIM mill.

The costs of monitoring traffic and road conditions, control and information consist of the use, maintenance and upkeep of these systems.

