COMPETITIVE AND SUSTAINABLE GROWTH (GROWTH) PROGRAMME

UNITE

UNIfication of accounts and

marginal costs for Transport Efficiency

Deliverable 11, Appendix

Marginal Cost Case Study 9a: Urban Passenger Car for Finland

Draft, Version 1.0
02 April 2002

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Contract: 1999-AM.11157
Project Coordinator: ITS, University of Leeds

Funded by the European Commission
5th Framework – Transport RTD

UNITE Partner Organisations
ITS/UNIVLEEDS (UK), DIW (De), NEI (Nl), CES/KUL (Be), TIS.PT (Pt), IWW/UNIKARL (De), VTI (Se), IER/USTUTT (De), CERAS/ENPC (Fr), HERRY (Au), EIET/ULPGC (Es), ISIS (It), STRATEC (Be), SYSTEMA (Gr), VATT (Fi), ECOPLAN (Ch), INFRAS (Ch), JP TRANSPLAN (Fi), EKONO (Fi), EKI (Se)

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1999-AM.11157
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This document should be referenced to as:
Tervonen, J., Hämekoski, K., Otterström, T., Peter, A., Bickel, P. & Schmid, S. (2002). Marginal Cost Case Study 9a: Urban Passenger Car for Finland. UNITE (UNIfication of accounts and marginal costs for Transport Efficiency). Deliverable 11, Appendix. Funded by 5th Framework RTD Programme. Electrowatt-Ekono Oy, March 2002.

02 April 2002

Version No: 1.0

Authors: as above

PROJECT INFORMATION

Contract no: 1999-AM.11157:
UNIfication of accounts and marginal costs for Transport Efficiency

Website: www.its.leeds.ac.uk/unite

Commissioned by: European Commission – DG TREN; Fifth Framework Programme

Lead Partner: Institute for Transport Studies, University of Leeds (UK)

Partners: ITS/UNIVLEEDS (UK), DIW (De), NEI (Nl), CES/KUL (Be), TIS.PT (Pt), IWW/UNIKARL (De), VTI (Se), IER/USTUTT (De), CERAS/ENPC (Fr), HERRY (Au), EIET/ULPGC (Es), ISIS (It), STRATEC (Be), SYSTEMA (Gr), VATT (Fi), JP TRANSPLAN (Fi), ECOPLAN (Ch), INFRAS (Ch), EKONO (Fi), EKI (Se)

DOCUMENT CONTROL INFORMATION

Status: 1st submission to DG TREN
Distribution: UNITE partners only
Availability: Public – but only once status above is 'Accepted'
Quality assurance: Chris Nash, ITS, 25 September 2002
Co-ordinator's review:ditto
Signed: **Date:**

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Executive Summary

This case study analyses the marginal environmental costs (direct and indirect emission and noise) of a petrol fuelled passenger car traveling 9 kilometers in the center of Helsinki. Marginal costs mean the environmental costs caused by an additional vehicle driving on a certain route.

Estimation of the marginal costs is based on the Impact Pathway Method. Emission costs are estimated by using the *EcoSense* computer model. Noise costs are estimated by using a model specifically developed for this project. The vehicles are analysed with respect to emission characteristics, both a EUROII and a EUROIII emission norm vehicle, with average cold start characteristics considered.

The results show, that the total environmental marginal costs per vehicle kilometer are in the range of €cent 0.6 – 1.0, depending on the variation of the marginal costs of noise by the time of day. If the impacts of the fuel chain are allocated to vehicle-km, the marginal emission costs rise by 10 %. Global warming and noise are the most significant marginal environmental costs. Local health impacts due to emissions are also of significance.

During the coldest winter days, preheating of the engines with marginal electricity produced by coal fired reserve power plants causes additional indirect emissions costs of approximately €cent 2.4 per start.

The results are subject to uncertainty, most importantly concerning the value used for estimating the impacts of global warming, and the methodology as well as end point values used for estimating the marginal costs of noise. The damage cost estimates of global warming vary significantly by source study, whereas the methodology used for estimating marginal noise costs is new and specifically developed for UNITE, and may be subject to changes in the future.

The results presented can be generalized and used for representing the approximate marginal cost best at urban/sub-urban locations where the average vehicle technology is of the EUROII and EUROIII norm levels, and the population density corresponds with the center of Helsinki. The noise costs apply at locations where traffic volumes and the number of noise receptors are identical to urban/sub-urban Helsinki. Amenity (property) value is however, is a site dependent issue, which must be taken into account in generalization. Purchasing power adjustments are needed for performing benefit transfers from Finland to other countries.

A.1 Introduction

This case study estimates the marginal emission and noise costs caused by the movement of a single passenger car in urban environment. Estimation of the marginal costs is based on the Impact Pathway Method. Emission costs are estimated by using the *EcoSense* computer model. Noise costs are estimated by using a model specifically developed for this project.

The analysis covers a single trip of a passenger car on a route traversing central Helsinki. Both a standard EUROII and a EUROIII average emission norm vehicle with respect to fuel quality (petrol), engine technology and emission abatement technology (catalytic converter) are analyzed. The emission factors are adjusted to represent the Finnish circumstances with respect to cold starts. As a Nordic feature, the additional costs of indirect emissions due to electrical preheating of the engine at wintertime are also considered.

The estimation of the emission costs is made at Electrowatt-Ekono Oy with the *EcoSense* model, methodologically supported by IER at the University of Stuttgart. For estimating marginal noise cost input data has been supplied by Electrowatt-Ekono Oy and IER has carried out the estimation. The tools for estimating both marginal emission costs and marginal noise costs have been developed by IER.

The methodological background of marginal emission cost estimation can be examined in closer detail in European Commission (1999) and Friedrich & Bickel (2001). The methodology of marginal noise cost estimation is discussed in closer detail in Metroeconomica (2001).

A.2 Description of case study

A.2.1 Location

The case study route is located in the most densely populated parts of Helsinki (Figure A-1). The starting point of the route is in the southwestern part of central Helsinki (Kamppi). The route traverses the city center, arriving at the northeast suburban belt surrounding (Koskela). The length of the route is 9 km. Maximum speed limits vary between 40 to 60 km/hour.

The urban area along the route is relatively flat, with minor sloping at some sections. There are only a few blocks along the route that can be considered street canyons, but otherwise housing is located on the very proximity of the route most of the way.

Figure A-1. Route of case vehicle in Helsinki (from Kamppi – southwest – to Koskela – northeast).

A.2.2 Methodology

Marginal costs in this case study means the environmental costs caused by an additional vehicle driving on a certain route. For noise costs the time of day is relevant as well, due to the sensitivity of the receptors (which is different at night than during the day) and the high importance of the background noise level for the results.

This approach of looking at the impacts of one additional vehicle requires a detailed bottom-up approach as it has been developed in the ExternE project series. The methodology follows as far as possible this Impact Pathway Approach, which is described in the following sections. For more detailed information see European Commission (1999a and 1999b), Friedrich and Bickel (2001).

A.2.2.1 Air Pollution

The starting point for the bottom-up approach for quantification of marginal costs is the micro level, i.e. the traffic flow on a particular route segment. Then, the marginal external costs of one additional vehicle are calculated for a single trip on this route segment. This is made by modelling the path from emissions to impacts and the respective costs. Results of recent bottom-up calculations have shown that the value of externalities may differ substantially from one transport route to another (see e.g. Friedrich and Bickel 2001).

For quantifying the costs due to airborne pollutants the Impact Pathway Approach was applied. It comprises the steps:

– emission calculation,
– dispersion and chemical conversion modelling,
– calculation of physical impacts, and
– monetary valuation of these impacts.

These steps are described in more detail in the following sections.

Emissions/burdens

In the first step the emissions from an additional vehicle on a specific route are calculated.

For comparisons between modes, the system boundaries considered are very important. For instance, when comparing externalities of goods transport by electric trains and heavy duty road vehicles, the complete chain of fuel provision has to be considered for both modes. Obviously, it makes no sense to treat electric trains as having no airborne emissions from operation. Instead, the complete chain from coal, crude oil, etc. extraction up to the fuel or electricity consumption has to be taken into account.

Concentrations

To obtain marginal external costs, the changes in the concentration and deposition of primary and secondary pollutants due to the additional emissions caused by the additional vehicle have to be calculated. The relation between emission and concentration of pollutants are highly non-linear for some species (e.g. primary particles). So, air quality models that simulate the transport as well as the chemical transformation of pollutants in the atmosphere are used.

Depending on the range and type of pollutant considered different models are applied: The Gaussian dispersion model ROADPOL for calculation of pollutant concentrations from line sources on the local scale up to 25 km from the road (Vossiniotis et al. 1996); the Wind rose Trajectory Model (WTM) is used to quantify the concentration and deposition of non-reactive pollutants and acid species on a European scale (Trukenmüller and Friedrich 1995); the Source-Receptor Ozone Model (SROM), which is based on source-receptor (S-R) relationships from the EMEP MSC-W oxidant model for five years of meteorology (Simpson et al. 1997), is used to estimate changes in ozone concentrations on a European scale.

Impacts

Concentrations then translate into impacts through the application of exposure-response functions, which relate changes in human health, material corrosion, crop yields etc. to unit changes in ambient concentrations of pollutants.

Exposure-response functions come in a variety of functional forms. They may be linear or non-linear and contain thresholds (e.g. critical loads) or not. Those describing effects of various air pollutants on agriculture have proved to be particularly complex, incorporating both positive and negative effects, because of the potential for certain pollutants, e. g. those containing sulphur and nitrogen, to act as fertilisers.

The dose-response functions used within UNITE are the final recommendations of the expert groups in the final phase of the ExternE Core/Transport project (Friedrich and Bickel 2001). Table A-1 gives a summary of the dose-response functions as they are implemented in the EcoSense version used for this study.

Table A-1
Health and environmental effects included in the analysis of air pollution costs

Impact category	Pollutant	Effects included
Public health – mortality	$PM_{2.5}$, PM_{10} [1)] SO_2, O_3	Reduction in life expectancy due to acute and chronic mortality Reduction in life expectancy due to acute mortality
Public health – morbidity	$PM_{2.5}$, PM_{10}, O_3	respiratory hospital admissions
		restricted activity days
	$PM_{2.5}$, PM_{10} only	cerebrovascular hospital admissions
		congestive heart failure
		cases of bronchodilator usage
		cases of chronic bronchitis
		cases of chronic cough in children
		cough in asthmatics
		lower respiratory symptoms
	O_3 only	asthma attacks
		symptom days
Material damage	SO_2, acid deposition	Ageing of galvanised steel, limestone, natural stone, mortar, sandstone, paint, rendering, zinc
Crops	SO_2	Yield change for wheat, barley, rye, oats, potato, sugar beet
	O_3	Yield loss for wheat, potato, rice, rye, oats, tobacco, barley, wheat
	Acid deposition	increased need for liming
	N, S	fertiliser effects

[1)] including secondary particles (sulphate and nitrate aerosols).

Source: IER

Impacts on human health

Table A-2 lists the exposure response functions used for the assessment of health effects. The exposure response functions are taken from the 2nd edition of the ExternE Methodology report (European Commission 1999a), with some modifications resulting from recent recommendations of the health experts in the final phase of the ExternE Core/ Transport project (Friedrich and Bickel 2001).

Table A-2
Quantification of human health impacts due to air pollution[1)]

Receptor	Impact Category	Reference	Pollutant	f_{er}
ASTHMATICS (3.5% of population)				
Adults	Bronchodilator usage	Dusseldorp et al., 1995	PM_{10} Nitrates $PM_{2.5}$ Sulphates	0.163 0.163 0.272 0.272
	Cough	Dusseldorp et al., 1995	PM_{10}, Nitrates $PM_{2.5}$ Sulphates	0.168 0.168 0.280 0.280
	Lower respiratory symptoms (wheeze)	Dusseldorp et al., 1995	PM_{10} Nitrates $PM_{2.5}$ Sulphates	0.061 0.061 0.101 0.101
Children	Bronchodilator usage	Roemer et al., 1993	PM_{10} Nitrates $PM_{2.5}$ Sulphates	0.078 0.078 0.129 0.129
	Cough	Pope and Dockery, 1992	PM_{10} Nitrates $PM_{2.5}$ Sulphates	0.133 0.133 0.223 0.223
	Lower respiratory symptoms (wheeze)	Roemer et al., 1993	PM_{10} Nitrates $PM_{2.5}$ Sulphates	0.103 0.103 0.172 0.172
All	Asthma attacks (AA)	Whittemore and Korn, 1980	O_3	4.29E-3
ELDERLY 65+ (14% of population)				
	Congestive heart failure	Schwartz and Morris, 1995	PM_{10} Nitrates $PM_{2.5}$ Sulphates CO	1.85E-5 1.85E-5 3.09E-5 3.09E-5 5.55E-7
CHILDREN (20% of population)				
	Chronic cough	Dockery et al., 1989	PM_{10} Nitrates $PM_{2.5}$ Sulphates	2.07E-3 2.07E-3 3.46E-3 3.46E-3
ADULTS (80% of population)				
	Restricted activity days (RAD)	Ostro, 1987	PM_{10} Nitrates $PM_{2.5}$ Sulphates	0.025 0.025 0.042 0.042
	Minor restricted activity days (MRAD)	Ostro and Rothschild, 1989	O_3	9.76E-3
	Chronic bronchitis	Abbey et al., 1995	PM_{10} Nitrates $PM_{2.5}$ Sulphates	2.45E-5 2.45E-5 3.9E-5 3.9E-5
ENTIRE POPULATION				
	Chronic Mortality (CM)	Pope et al., 1995	PM_{10} Nitrates $PM_{2.5}$ Sulphates	0.129% 0.129% 0.214% 0.214%
	Respiratory hospital admissions (RHA)	Dab et al., 1996	PM_{10} Nitrates $PM_{2.5}$ Sulphates	2.07E-6 2.07E-6 3.46E-6 3.46E-6
		Ponce de Leon, 1996	SO_2 O_3	2.04E-6 3.54E-6
	Cerebrovascular hospital admissions	Wordley et al., 1997	PM_{10} Nitrates $PM_{2.5}$ Sulphates	5.04E-6 5.04E-6 8.42E-6 8.42E-6
	Symptom days	Krupnick et al., 1990	O_3	0.033
	Cancer risk estimates	Pilkington et al., 1997; based on US EPA evaluations	Benzene Benzo-[a]-Pyrene 1,3-buta-diene Diesel particles	1.14E-7 1.43E-3 4.29E-6 4.86E-7
	Acute Mortality (AM)	Spix et al. / Verhoeff et al.,1996	PM_{10} Nitrates $PM_{2.5}$ Sulphates	0.040% 0.040% 0.068% 0.068%
		Anderson et al. / Touloumi et al., 1996	SO_2	0.072%
		Sunyer et al., 1996	O_3	0.059%

[1)] The exposure response slope, f_{er}, has units of [cases/(yr-person-µg/m^3)] for morbidity, and [%change in annual mortality rate/(µg/m^3)] for mortality. Concentrations of SO_2, PM_{10} , PM_{10}, sulphates and nitrates as annual mean concentration, concentration of ozone as seasonal 6-h average concentration.
Source: Friedrich and Bickel 2001.

Impacts on building materials

Impacts on building material were assessed using the most recent exposure-response functions developed in the last phase of the ExternE Core/Transport project (Friedrich and Bickel 2001). This work includes the latest results of the UN ECE International Co-operative Programme on Effects on Materials (ICP Materials) for degradation of materials, based on the results of an extensive 8-year field exposure programme that involved 39 exposure sites in 12 European countries, the United States and Canada (Tidblad et al. 1998).

Limestone:

maintenance frequency: $1/t = [\ (2.7[SO_2]^{0.48}e^{-0.018T} + 0.019Rain[H^+])/R\ ]^{1/0.96}$

Sandstone, natural stone, mortar, rendering:

maintenance frequency: $1/t = [\ (2.0[SO_2]^{0.52}e^{f(T)} + 0.028Rain[H^+])/R\ ]^{1/0.91}$

f(T) $f(T) = 0$ *if* $T < 10\ ^oC$; $f(T) = -0.013(T-10)$ *if* $T \geq 10\ ^oC$

Zinc and galvanised steel:

maintenance frequency: $1/t = 0.14[SO_2]^{0.26}e^{0.021Rh}e^{f(T)}/R^{1.18} + 0.0041Rain[H^+]/R$

f(T) $f(T) = 0.073(T-10)$ *if* $T < 10\ ^oC$; $f(T) = -0.025(T-10)$ *if* $T \geq 10\ ^oC$

Paint on steel:

maintenance frequency: $1/t = [\ (0.033[SO_2] + 0.013Rh + f(T) + 0.0013Rain[H^+])/5\ ]^{1/0.41}$

f(T) $f(T) = 0.015(T-10)$ *if* $T < 10\ ^oC$; $f(T) = -0.15(T-10)$ *if* $T > 10\ ^oC$

Paint on galvanised steel:

maintenance frequency:

$1/t = [\ (0.0084[SO_2] + 0.015Rh + f(T) + 0.00082Rain[H^+])/5\ ]^{1/0.43}$

f(T) $f(T) = 0.04(T-10)$ *if* $T < 10\ ^oC$; $f(T) = -0.064(T-10)$ *if* $T \geq 10\ ^oC$

Carbonate paint:

maintenance frequency: $$1/t = 0.12 \cdot \left(1 - e^{\frac{-0.121 \cdot Rh}{100 - Rh}}\right) \cdot [SO_2] + 0.0174 \cdot [H^+] \Big/ R$$

with

	$1/t$	*maintenance frequency in 1/a*
	$[SO_2]$	*SO_2 concentration in $\mu g/m^3$*
	T	*temperature in ^oC*
	Rain	*precipitation in mm/a*
	[H+]	*hydrogen ion concentration in precipitation in mg/l*
	R	*surface recession in μm*
	Rh	*relative humidity in %*

Impacts on crops

Effects from SO2

For the assessment of effects from SO_2 on crops, an adapted function from the one suggested by Baker et al. (1986) is used as recommended in ExternE (European Commission 1999c). The function assumes that yield will increase with SO_2 from 0 to 6.8 ppb, and decline thereafter. The function is used to quantify changes in crop yield for wheat, barley, potato, sugar beet, and oats. The function is defined as

$$y = 0.74 \cdot C_{SO2} - 0.55 \cdot (C_{SO2})^2 \quad \text{for } 0 < C_{SO2} < 13.6 \text{ ppb}$$
$$y = -0.69 \cdot C_{SO2} + 9.35 \quad \text{for } C_{SO2} > 13.6 \text{ ppb}$$

with y = relative yield change
C_{SO2} = SO_2-concentration in ppb

Effects from ozone

For the assessment of ozone impacts, a linear relation between yield loss and the AOT 40 value (Accumulated Ozone concentration above Threshold 40 ppb) is assumed. The relative yield loss is calculated by using the following equation, and the sensitivity factors given in Table A-3:

$$y = 99.7 - \alpha \cdot C_{O3}$$

with y = relative yield change
α = sensitivity factors
C_{O3} = AOT 40 in ppmh

Table A-3: Sensitivity factors for different crop species

Sensitivity	α	Crop species
Slightly sensitive	0.85	rye, oats, rice
Sensitive	1.7	wheat, barley, potato, sunflower
Very sensitive	3.4	tobacco

Acidification of agricultural soils

The amount of lime required to balance acid inputs on agricultural soils across Europe will be assessed. The analysis of liming needs should be restricted to non-calcareous soils. The additional lime requirement is calculated as:

$$\Delta L = 50 \cdot A \cdot \Delta D_A$$

with ΔL = additional lime requirement in kg/year
A = agricultural area in ha
ΔD_A = annual acid deposition in meq/m^2/year

Fertilisational effects of nitrogen deposition

Nitrogen is an essential plant nutrient, applied by farmers in large quantity to their crops. The deposition of oxidised nitrogen to agricultural soils is thus beneficial (assuming that the dosage of any fertiliser applied by the farmer is not excessive). The reduction in fertiliser requirement is calculated as:

$$\Delta F = 14.0067 \cdot A \cdot \Delta D_N$$

with ΔF = reduction in fertiliser requirement in kg/year
A = agricultural area in ha
ΔD_N = annual nitrogen deposition in meq/m^2/year

A.2.2.2 Discussion of uncertainties

In spite of considerable progress made in recent years the quantification and valuation of environmental damage is still linked to significant uncertainty. This is the case for the Impact Pathway Methodology as well as for any other approach. While the basic assumptions underlying the work in ExternE are discussed in detail in (European Commission 1999a), below an indication of the uncertainty of the results is given as well as the sensitivity to some of the key assumptions.

Within ExternE, Rabl and Spadaro (1999) made an attempt to quantify the statistical uncertainty of the damage estimates, taking into account uncertainties resulting from all steps of the impact pathway, i.e. the quantification of emissions, air quality modelling, dose-effect modelling, and valuation. They show that - due to the multiplicative nature of the impact pathway analysis - the distribution of results is likely to be approximately lognormal, thus it is determined by its geometric mean and the geometric standard deviation σ_g.

In ExternE, uncertainties are reported by using uncertainty labels, which can be used to make a meaningful distinction between different levels of confidence, but at the same time do not give a false sense of precision, which seems to be unjustified in view of the need to use subjective judgement to compensate the lack of information about sources of uncertainty and probability distributions (Rabl and Spadaro 1999).

The uncertainty labels are:

A = high confidence, corresponding to σ_g = 2.5 to 4;
B = medium confidence, corresponding to σ_g = 4 to 6;
C = low confidence, corresponding to σ_g = 6 to 12.

According to ExternE recommendations, the following uncertainty labels are used to characterise the impact categories addressed in this report:

Mortality:	B
Morbidity:	A
Crop losses:	A
Material damage:	B.

Beside the statistical uncertainty indicated by these uncertainty labels, there is however a remaining systematic uncertainty arising from a lack of knowledge, and value choices that influence the results. Some of the most important assumptions and their implications for the results are briefly discussed in the following.

- **Effects of particles on human health**
  The dose-response models used in the analysis are based on results from epidemiological studies, which have established a statistical relationship between the mass concentration of particles and various health effects. However, at present it is still not known whether it is the number of particles, their mass concentration or their chemical composition, which is the driving force. The uncertainty resulting from this lack of knowledge is difficult to estimate.
- **Effects of nitrate aerosols on health**
  We treat nitrate aerosols as a component of particulate matter, which we know cause damage to human health. However, in contrast to sulphate aerosol (but similar to many other particulate matter compounds) there is no direct epidemiological evidence supporting the harmfulness of nitrate aerosols, which partly are neutral and soluble.
- **Valuation of mortality**
  While ExternE recommends using the Value of a Life Year Lost *rather than the* Value of Statistical Life *for the valuation of increased mortality risks from air pollution (see European Commission 1999a for a detailed discussion), this approach is still controversially discussed in the literature. The main problem for the* Value of a Life Year Lost *approach is that up to now there is a lack of empirical studies supporting this valuation approach.*
- **Impacts from ozone**
  As the EMEP ozone model, which is the basis for the Source-Receptor Ozone Model (SROM) included in EcoSense does not cover the full EcoSense modelling domain, some of the ozone effects in Eastern Europe are omitted. As effects from ozone are small compared to those from other pollutants, the resulting error is expected to be small compared to the overall uncertainties.
- **Omission of effects**
  The present report is limited to the analysis of impacts that have shown to result in major damage costs in previous ExternE studies. Impacts on e.g. change in biodiversity, potential effects of chronic exposure to ozone, cultural monuments, direct and indirect economic effects of change in forest productivity, fishery performance, and so forth, are omitted because they currently cannot be quantified.

EcoSense model

EcoSense is a standardised integrated computer model developed for the assessment of environmental impacts and resulting external costs of emissions from transport and energy generation systems.[1] It is a computer version of alternatively applying the

[1] EcoSense. User Guide. Version 2.0. Institut fur Energiewirtschaft und Rationelle Energieanwendung. (IER). Universität Stuttgart.

Impact Pathway Method by separate dispersion modelling and spreadsheet calculations of impacts.

EcoSense can assess the impacts of small 'doses' of emissions created by the movement of a single vehicle, and the resulting rise in pollutant concentrations. This coincides with the principle of assessing the marginal cost of vehicle movement. *EcoSense* has separate line and point source models for assessing mobile and stationary sources of pollutants, vehicles, energy production plants and industrial objects respectively. In this case study the line source model is used.

EcoSense provides relevant meteorological data, dispersion models, receptor data, dose-response functions and unit values for damages, all required for an integrated impact assessment related to airborne pollutants. Only a small set of site and case specific input data is required to be added by the user, namely emission characteristics of the vehicle and route trajectory for the line source model.

EcoSense analyses local and regional impacts separately according to the dispersion and damage characteristics of each pollutant. The environmental impacts assessed include health impacts, damage to forest and crop growth, material damage and climate change.

A.2.2.3 Global Warming

The method of calculating costs of CO_2 emissions basically consists of multiplying the amount of CO_2 emitted by a cost factor. Due to the global scale of the damage caused, there is no difference how and where the emissions take place.

A European average shadow value of €20 per tonne of CO_2 emitted was used for valuing CO_2 emissions. This value represents a central estimate of the range of values for meeting the Kyoto targets in 2010 in the EU based on estimates by Capros and Mantzos (2000). They report a value of €5 per tonne of CO_2 avoided for reaching the Kyoto targets for the EU, assuming a full trade flexibility scheme involving all regions of the world.

For the case that no trading of CO_2 emissions with countries outside the EU is permitted, they calculate a value of €38 per tonne of CO_2 avoided. It is assumed that measures for a reduction in CO2 emissions are taken in a cost effective way. This implies that reduction targets are not set per sector, but that the cheapest measures are implemented, no matter in which sector.

Looking further into the future, more stringent reductions than the Kyoto aims are assumed to be necessary to reach sustainability. Based on a reduction target of 50% in 2030 compared to 1990, INFRAS/IWW (2000) use avoidance costs of € 135 per t of CO_2; however one could argue that this reduction target has not yet been accepted.

A valuation based on the damage cost approach, as e.g. presented by ExternE (Friedrich and Bickel 2001), would result in substantially lower costs. Due to the enormous uncertainties involved in the estimation process, such values have to be used very cautiously.

A.2.2.4 Noise

The Impact Pathway Method is applied also for assessing the marginal damage costs of noise. IER at the University of Stuttgart has developed a computer model for this purpose (Metroeconomica 2001).

The marginal cost of noise exposure is caused by an additional vehicle in an average hourly traffic flow considered as a mix of different vehicle types. The traffic flow is split into vehicle categories: light duty vehicles, motorcycles, passenger cars, heavyduty vehicles and buses.

Changes in the average hourly flow are assessed in the following periods: day (07:00 – 19:00), evening (19:00 – 23:00), night (23:00 – 07:00) and day aggregate (07:00 – 23:00). The average hourly flow by vehicle mix for the above periods is provided for each homogenous street segment of the case route. In this case study the 9 km route consists of 37 segments.

Exposure by definition considers the inhabitants living in the apartments with facades directly towards each street segment of the route. This means that only the most exposed apartments are assessed, not the ones on side streets. This simplistic choice is made due to the experimental feature of marginal noise cost assessment here.

The harmful impacts of noise exposure include health impacts (myocardinal infarction; fatal/non-fatal, angina pectoris and hypertension), subjectively valued sleeping quality and property values with rent as a proxy indicator.

A.2.2.5 Other effects

Air pollution, global warming and noise represent the most important and relevant cost categories for marginal environmental costs. Costs due to “habitat losses and biodiversity” represent the economic assessment of damages the presence traffic infrastructure and its use is causing to the habitats of rare species, and thus to biodiversity. The costs are mostly related to the separation effects due to the existence of roads, rail tracks, airports and artificial waterways and thus are fixed in the short run. They are not marginal and therefore not relevant for the quantification of marginal costs. The same is true for visual intrusion in urban areas.

Most of the damages to soil and water are expected to be small or not relevant for marginal cost estimation. For instance, solid emissions by tyre, brake and wheels (emission of Cd, Zn, Cu) and infrastructure (PAH, heavy metals) abrasion can be expected to cause only small marginal costs, as well as de-icing agents. For practical reasons these impacts are only considered in the accounts approach, assuming that additional contamination of one car or train takes place within a certain range along road and railway infrastructure and is not important with concern to marginal costs. It is assumed that soil is already contaminated within a certain reach along frequently used roads/railways. The effect of an additional vehicle can therefore be neglected.

Airborne exhaust emissions and their impacts on soil and water (acidification, eutrophication) are relevant, but currently cannot be quantified in monetary terms

consistently. The emissions of sulphur dioxide are small from the (diesel) fuels used in motor transport and trains and unlikely to have a significant impact even adjacent to the highest density traffic routes (Friedrich and Bickel 2001). Nitrogen oxides emissions could to some extent contribute to acidification. Particulate nitrogen deposition could act as a fertiliser and contribute to eutrophication. For practical reasons these minor impacts are not considered for the marginal costs approach.

Solid non-recyclable waste resulting from vehicle and infrastructure disposal could be considered in the ideal approach. Yet, large part of the solid waste is recyclable (e.g. metals). Non-recyclable waste is either deposited or burnt in incineration plants. Only deposited waste products (waste not being burnt) has finally an impact on soil (soil sealing and possible contamination) or on groundwater (leaking of the disposal sites). The quantification of these costs is beyond the scope of UNITE and was therefore neglected.

A.2.3 Data

General data for the calculation of costs due to air pollution

Besides the emissions of the transport modes in the different countries, a large number of additional information was required for the cost calculations. This includes data on the receptor distribution, meteorology, and on the background emissions from all sources in all European countries. Such data is available in the computer tool EcoSense's database (table A-4) and is briefly described in the following.

Table A-4
Environmental data in the EcoSense database

	Resolution	Source
Receptor distribution		
Population	administrative units, EMEP 50 grid	EUROSTAT REGIO Database, The Global Demography Project
Production of wheat, barley, sugar beat, potato, oats, rye, rice, tobacco, sunflower	administrative units, EMEP 50 grid	EUROSTAT REGIO Database, FAO Statistical Database
Inventory of natural stone, zinc, galvanized steel, mortar, rendering, paint	administrative units, EMEP 50 grid	Extrapolation based on inventories of some European cities
Meteorological data		
Wind speed	EMEP 50 grid	European Monitoring and Evaluation Programme (EMEP)
Wind direction	EMEP 50 grid	European Monitoring and Evaluation Programme (EMEP)
Precipitation	EMEP 50 grid	European Monitoring and Evaluation Programme (EMEP)
Emissions		
SO_2, NO_x, NH_3, NMVOC, particles	administrative units, EMEP 50 grid	CORINAIR 1994/1990, EMEP 1998 TNO particulate matter inventory (Berdowski et al. 1997)
Source: IER.		

Receptor data

- *Population data*

  Population data was taken from the EUROSTAT REGIO database (base year 1996), which provides data on administrative units (NUTS categories). For impact assessment, the receptor data is required in a format compatible with the output of the air quality models. Thus, population data was transferred from the respective administrative units to the 50 x 50 km^2 EMEP grid by using the transfer routine implemented in EcoSense.

- *Crop production*

  The following crop species were considered for impact assessment: barley, oats, potato, rice, rye, sunflower seed, tobacco, and wheat. Data on crop production were again taken from the EUROSTAT REGIO database (base year 1996). For impact assessment, crop production data were transferred from the administrative units to the EMEP 50 x 50 km^2 grid.

- *Material inventory*

  The following types of materials are considered for impact assessment: galvanised steel; limestone; mortar; natural stone; paint; rendering; sandstone; and, zinc. As there is no database available that provides a full inventory of

materials, the stock at risk was extrapolated in ExternE from detailed studies carried out in several European cities.

Emission data

As the formation of secondary pollutants such as ozone or secondary particles depends heavily on the availability of precursors in the atmosphere, the EcoSense database provides a European wide emission inventory for SO_2, NO_x, NH_3, NMVOC, and particles as an input to air quality modelling. The emission data are disaggregated both sectorally ('Selected Nomenclature for Air Pollution' - SNAP categories) and geographically ('Nomenclature of Territorial Units for Statistics' - NUTS categories).

As far as available, EcoSense uses data from the EMEP 1998 emission inventory (Richardson 2000, Vestreng 2000, Vestreng and Støren 2000). Where required, data from the CORINAIR 1994 inventory (http://www.aeat.co.uk/netcen/corinair/94/) and the CORINAIR 1990 inventory (McInnes 1996) are used. For Russia, national average emission data from the LOTOS inventory (Builtjes 1992) were included. Emission data for fine particles are taken from the European particle emission inventory established by Berdowski et al. (1997).

Meteorological data

The Windrose Trajectory Model requires annual average data on wind speed, wind direction, and precipitation as an input. The EcoSense database provides data from the European Monitoring and Evaluation Programme (EMEP) for the base year 1998.

Emission factors

The vehicles analysed are average petrol fuelled passenger cars fulfilling both EUROII and EUROIII emission norms (European Council 1998). The emission factors now used are presented in table A-5. These factors have been adjusted to represent the average Finnish vehicle fleet and circumstances. This includes the additional emissions caused by starting cold engines, considering also starts at different seasons, i.e. the wintertime freezing temperatures without preheating.[2]

[2] The emission factors adopted from Mäkelä et al. (2001) are ones that have been specified according to the EURO norm levels, but which include additional finetuning by taking the Finnish circumstances, climate in partcular, into consideration.

Table A-5
Emission factors for EUROII and EUROIII norm passenger cars (petrol)

Pollutant component	Emission factors (g/km)	
	EUROII	**EUROIII**
CO	2	1.5
HC	0.6	0.4
NOx	0.25	0.1
PM	0.007	0.007
CH_4	0.03	0.02
SO_2	0.0075	0.0074
CO^2	181	179
Source: Mäkelä et al. 2001		

Beside the emissions from vehicle operation the emissions due to fuel provision was considered. The emission factors for crude oil extraction, refining and transport of petrol, diesel and kerosene are given in table A-6.

Table A-6
Emissions caused by fuel production processes in g/kg fuel

Type of fuel	CO_2	PM_{10}	NO_x	SO_2	NMVOC
Petrol	560	0.105	1.10	1.90	1.80
Diesel; Kerosene	400	0.047	0.96	1.40	0.62
Source: PM_{10}: Friedrich and Bickel (2001); other pollutants: IFEU (1999)					

In the winter, it is typical that the engine is preheated prior to start for reducing the unfavourable impacts of cold starts in freezing temperatures (increased engine wear, fuel consumption and emissions). Technically this means that either the engine block or the cooling liquid is heated for a period with a fixed electric heating device attached to the engine.

This additional indirect emission cost of electricity used for preheating is estimated based on the emissions of so-called marginal electricity production from convential coal fired condensing power plants.[3] This represents the electricity mix and emissions of the coldest winter periods when reserve power stations are in use, compared to the emissions of 'average electricity production'. Input data is presented in table A-7. As the monetary weights for the cost of these emissions, the regional environmental costs of pollutants presented in tables A10 to A13 are used.

[3] The emission costs of marginal electicity have been assessed in an earlier research project on the benefits of electric vehicles (Hämekoski & Anttila 2001).

Table A-7
Input data for the assessment of emission costs due to electrical preheating of the engine

Specifics	
Output of the heater	600 W
Time used prior to starting the engine	2 hours
Resulting energy use	1.2 kWh_e
Emission factors of coal based marginal electricity production (g/kWe)	NOx 1.6 SO_2 0.9 PM 0.1 CO_2 840
Source: Mäkelä (1993), Laurikko (1998), Hämekoski & Anttila (2001)	

Population

The route traverses the most densely populated areas of Helsinki. Population density ranges between approximately 4 000 people per km^2 in the southern parts (Kamppi) of the route, 15 000 people per km^2 in the middle parts (Kallio – Sörnäinen) and 1 000 people per km^2 in northern districts (Koskela). An average population density along the route is at approximately 5 200 inhabitants per km^2. As a reference figure, the average population density in Helsinki is 3 000 inhabitants per km^2.

Noise exposure[4]

For the assessment of marginal noise cost, detailed traffic data was obtained on the route by segment, hour, speed, and by traffic mix in vehicle categories. An inventory of noise receptors was made for the route by street section, identifying each building (most exposed facade) on both side of the street, along with details on distance of each building from the street, building height and number of households in the building. An assumption of an average of 2,5 residents per apartment was made.

[4] Input data on traffic flows was provided by JP Transplan Oy. Input data on noise receptors was provided by the Finnish Acoustics Centre Ltd.

Values used for assessing marginal costs

Monetary values for health impacts

Table A-8 summarizes the monetary values used for health impacts of air pollution. Average European values should be used for air pollution costs for generalization purposes. Country specific values can be calculated from the European averages for any country according to the benefit transfer rules given in Nellthorp et al. (2001).

Table A-8
Monetary values (factor costs, rounded) for health impacts (€$_{1998}$)

Impact	European average	Finland	
Year of life lost (chronic effects)	74 700	76,500	€ per YOLL
Year of life lost (acute effects)	128 500	131,600	€ per YOLL
Chronic bronchitis	137 600	140,900	€ per new case
Cerebrovascular hospital admission	13 900	14,230	€ per case
Respiratory hospital admission	3 610	3,700	€ per case
Congestive heart failure	2 730	2,800	€ per case
Chronic cough in children	200	200	€ per episode
Restricted activity day	100	100	€ per day
Asthma attack	69	71	€ per day
Cough	34	35	€ per day
Minor restricted activity day	34	35	€ per day
Symptom day	34	35	€ per day
Bronchodilator usage	32	33	€ per day
Lower respiratory symptoms	7	7	€ per day

Source: Own calculations based on Friedrich and Bickel (2001) and Nellthorp et al. (2001).

Unit values for pollutants at local scale

The above unit values for health impact end points yield health damage costs as presented in table A-9 by a tonne of pollutant in each pollutant category. These values are used for estimating the marginal cost of local health impacts caused by the movement (emissions) of the case vehicles.

Table A-9
Local (health) costs per tonne of pollutant in Helsinki, €$_{1998}$

Health impact/pollutant	**€$_{1998}$/tonne EUROII**	**€$_{1998}$/tonne EUROIII**
Morbidity		
- $PM_{2.5}$	28 609	28 479
- SO_2	25	25
- CO	0.7	0.7
Mortality		
- $PM_{2.5}$	66 914	66 616
- SO_2	2 364	2 353
Source: Own calculations		

Unit values for pollutants at regional and global scale

Tables A10 to A13 present the unit values by pollutant category used for assessing the marginal costs of the regional impacts caused by the movement of the case vehicle. These values are also applied for valuing the impacts of preheating of the engine. In addition, the impact of global warming is valued according to the UNITE convention as 20 euros per tonne by the volume of CO_2 emissions.

Table A-10
Regional costs per tonne of NO_2 in south Finland, €$_{1998}$

	Via nitrates (€$_{1998}$)	**Via ozone (€$_{1998}$)**	**Total (€$_{1998}$)**
Crops	-	126	126
Materials	-	-	-
Morbidity	372	112	484
Mortality	856	76	932
Health, total	1 228	188	1 417
Total	**1 228**	**314**	**1 542**
Source: IER			

Table A-11
Regional costs per tonne of SO_2 in south Finland €$_{1998}$

	Via SO_2 and sulfates (€$_{1998}$)
Crops	-8
Materials	69
Morbidity	212
Mortality	540
Health, total	752
Total	**813**
Source: IER	

Table A-12
Regional costs per tonne of NMVOC in south Finland, €$_{1998}$

	Via ozone (€$_{1998}$)
Crops	90
Materials	-
Morbidity	87
Mortality	59
Health, total	145
Total	**236**
Source: IER	

Table A-13
Regional costs per tonne of $PM_{2.5}$ in south Finland, €$_{1998}$

	$PM_{2.5}$ (€$_{1998}$)
Morbidity	848
Mortality	1 952
Total	**2 800**
Source: IER	

Unit values for noise impact end points

Table A-14 presents the European average unit values used for valuing health impacts of noise exposure. While presenting the end results for Finland, these values are adjusted according to the benefit transfer rules given in Nellthorp et al. (2001).

Table A-14
Monetary values (factor costs, rounded) for impacts due to noise in Finland (€$_{1998}$)

Impact	Finland
Myocardial infarction (fatal, 7 YOLL)	
Total per case	**535,400**
Myocardial infarction (non-fatal, 8 days in hospital, 24 days at home)	
Medical costs	4,830
Absentee costs	2,880
WTP	15,420
Total per case	**23,130**
Angina pectoris (severe, non-fatal, 5 days in hospital, 15 days at home)	
Medical costs	3,030
Absentee costs	1,800
WTP	9,660
Total per case	**14,500**
Hypertension (hospital treatment, 6 days in hospital, 12 days at home)	
Medical costs	1,870
Absentee costs	1,620
WTP	560
Total per case	**4,050**
Medical costs due to sleep disturbance (per year)	201
Average (net) rent per person per year (basis of calculation of WTP for avoiding amenity losses)	2,173
Source: Own calculations based on Metroeconomica (2001), Nellthorp et al. (2001) and Statistics Finland (2001).	

A large number of hedonic pricing studies have been conducted, giving NSDI values (Noise Sensitivity Depreciation Index – the value of the percentage change in the logarithm of house price arising from a unit increase in noise) ranging from 0.08% to 2.22% for road traffic noise.

Soguel (1994) conducted a hedonic pricing study in Switzerland. Rather than using housing prices, the dependent variable was monthly rent, net of charges for heating etc. The coefficient on the noise variable in this study suggested a NSDI of 0.9. This value is similar to the average derived from European studies, and it is now used for the calculations of UNITE.

A.3 Results

Marginal emission costs

The marginal emission costs of the movement of a EUROII and EUROIII norm passenger car from the center to sub-urban Helsinki are in the range of €cent 0.45 – €cent 0.48 per vehicle-km (table A-15). The difference in marginal costs between the emission norm levels is small.

Global warming is the dominant marginal emission cost, with a share of three quarters of the total marginal cost. The remaining marginal emission cost attributes almost entirely to local and regional health impacts. The marginal costs of impacts on crops and materials are negligible.

Table A-15
Marginal emission costs for the EUROII and EUROIII norm passenger car in urban traffic by damage category, €cent$_{1998}$

	EUROII		EUROIII	
Impact category	**Cent/case**	**Cent/vkm**	**Cent/case**	**Cent/vkm**
Local impacts				
Morbidity	0.178	0.0197	0.177	0.0196
Mortality	0.448	0.0498	0.445	0.0495
Regional impacts				
Crops & material	0.074	0.0082	0.042	0.00468
Morbidity	0.158	0.0176	0.08	0.00888
Mortality	0.255	0.0283	0.122	0.01353
Global warming	3.183	0.3537	3.148	0.35
Total	**4.3**	**0.477**	**4.0**	**0.446**

Marginal emission costs of preheating the engine

The preheating of an engine electrically produces a marginal emission cost of €cent 2.4 per a winter start. The environmental cost is relatively high compared to the total marginal cost caused by the movement of the vehicle (table A-16). This is due to the assumptions made. The length of the heating period (2 hours) is the maximum generally considered useful, and the electricity used is of the most polluting kind. These assumptions apply only to the coldest winter days. With an assumption of a shorter heating period and average electricity mix, the cost would be considerably lower.

Table A-16
Regional and global emission costs of marginal electricity production for preheating the engine of a passenger car, €cent$_{1998}$ (energy used: 1.2 kWh)

Damage category	**NO_x**	**SO_2**	**PM**	**CO_2**	**Total**
Crops	0.02	0	0	-	0.02
Material	0	0	0	-	0
Morbidity	0.09	0.02	0.01	-	0.12
Mortality	0.12	0.06	0.02	-	0.2
Climate change	-	-	-	2.0	2.0
Total	**0.2**	**0.08**	**0.03**	**2.0**	**2.4**

Marginal emission costs of the fuel production chain

Based on the fuel consumption of the EUROII and EUROIII norm passenger cars and the emission factors for the fuel chain presented in table A-6, the respective marginal costs have been presented in table A-17. The costs are expressed according to Finnish valuation, although the impacts of the chain take partially place in other countries. The main marginal cost element is, however, global warming (75 %).

Table A-17
Marginal emission costs of the fuel chain, €cent$_{1998}$

	EUROII passenger car (fuel consumed: 0.522 kg)	**EUROIII passenger car (fuel consumed: 0.513 kg)**
Cent/case	0.76	0.75
Cent/vkm	0.085	0.084

Marginal noise costs

The marginal noise costs of an additional passenger car in an average daytime flow is €cent 0.22, in an average evening flow €cent 0.24 and in an average nighttime flow €cent 0.53 per vehicle kilometer (Table A-18).

In the daytime flow, amenity losses are the dominant costs, whereas at nighttime sleeping disturbance is significant. It should be noted, that these costs are an average for the whole route, i.e. at some locations the marginal cost may peak well above the average, and at some locations it may be close to zero. Noise impacts and its costs are by nature very point specific, depending of the proximity and number of the receptors to the source of street noise.

Table A-18
Marginal noise cost for passenger car in Helsinki by time of day and impact category, €cent$_{1998}$

Impact category	**- Day - Cent/vkm**	**- Evening - Cent/vkm**	**- Night - Cent/vkm**
Health effects	0.01	0.02	0.06
Amenity losses	0.22	0.22	
Sleep disturbance			0.47
Total	**0.22**	**0.24**	**0.53**

Summary of marginal environmental costs

The total marginal environmental costs (direct emission costs and noise) of a passenger car in the center of Helsinki are approximately €cent 0.7 per vehicle kilometer with day and evening noise exposure, and approximately €cent 1.0 per vehicle kilometer with nighttime noise exposure (table A-19). Global warming and noise are the dominant marginal cost categories for both EURO norm vehicles.

At wintertime, the additional indirect emission cost of preheating the engine is up to €cent 2.4 per one start, with the assumptions of maximum heating period and electricity supplied by marginal coal fired condensing power. The additional cost of the impacts of the fuel chain allocated to vehicle-km are €cent 0.0845, which means an approximate 10 % rise in the total marginal cost.

Table A-19
Marginal environmental costs for passenger car in Helsinki, €cent$_{1998}$

Impact category	EUROII Cent/vkm	EUROIII Cent/vkm
Direct emissions		
Health	0.115	0.09
Crops and material	0.008	0.005
Global warming	0.354	0.349
Noise	0.22 – 0.53	
Total	**0.698 – 1.008**	**0.664 – 0.974**
Indirect emissions		
Preheating of engine	2.4 €cent/one start	
Fuel chain (average for EUROII and EUROIII)	0.755 €cent/case 0.0845 €cent/vkm	

A.4 Discussion and conclusions

This case study has analysed the marginal environmental costs (direct and indirect emission and noise) of a petrol fuelled passenger car in the center of Helsinki. The evidence shows, that the total marginal environmental costs per vehicle kilometer are in the range of €cent 0.6 – 1.0. If the impacts of the fuel chain are allocated to vehicle-km, the marginal emission costs rise by 10 %. Global warming and noise are the most significant marginal environmental costs. Local health impacts are also of significance.

During the coldest winter days, preheating of the engines with marginal electricity produced by coal fired reserve power plants causes additional indirect emissions costs of approximately €cent 2.4 per start.

The results are subject to uncertainty, most importantly concerning the value used for estimating the impacts of global warming, and the methodology as well as end point values used for estimating the marginal costs of noise. The damage cost estimates of global warming vary significantly by source study, whereas the methodology used for estimating marginal noise costs is new and specifically developed for UNITE, and is subject to changes in the future.

These results can be generalized and used for representing the approximate marginal cost best at urban/sub-urban locations where the average vehicle technology is of the

EUROII and EUROIII norm levels, and the population density corresponds with the center of Helsinki. The noise costs apply at locations where traffic volumes and the number of noise receptors are identical to urban/sub-urban Helsinki. Amenity (property) value is however, is a site dependent issue, which must be taken into account in generalization. Purchasing power adjustments are needed for performing benefit transfers from Finland to other countries.

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Annex A1 Traffic and receptor data for noise cost assessment

Data on traffic volumes and noise receptors (Tables 1 and 2) is collected according to the following principles. (Source of data: The City Planning Office, The City of Helsinki.)

Road traffic related data

A. Four time periods (Tmp) are distinguished:

Tmp id	Description
30	day: 7:00 – 19:00
31	evening: 19:00 – 23:00
32	night: 23:00 – 7:00
33	day, agg 7:00 – 23:00

B. Vehicle categories (fzk) are distinguished:

Fzk	vehicle type
2	light duty vehicle
5	motorcycles
7	passenger cars
9	heavy duty vehicles
11	busses

C. The number of vehicles per hour within the time periods are given by vehicle categories.

D. The speed of the vehicles are specified by vehicle categories.

E. Information on road surface is needed (in general or per road segment).

Noise propagation and receptor related data

Noise exposure is calculated for each individual receptor point. A receptor point may represent a dwelling or a whole facade as long as attributes don't change. A receptor point is defined on the most exposed facade of a dwelling to the road.

F. Receptor data.

receptor id
road_id gives the link between traffic data and receptor point
h_dist horizontal distance between middle of carriage way and receptor point
recep_height height of receptor point on dwelling (usually 4.5m, might be different for higher houses)
households number of households for which the noise level is representative

Also the number of people common for a household in Finland is needed in order to calculate the number of people exposed. For urban case studies, it should be taken into account if the street is in a canyon.

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Table 1: Noise Receptor Data

Average size of a household: 2,5 people

Street name	from	to	Street id	Receptor id	m to start	m to end	side	**h_dist**	opposite	floors with apartments	lowest receptor	windows
Voudintie	end	Antti Korpin tie	37	1	***8***	***15***	***L***	***11***	***0***	***2***	***0***	***4***
Voudintie	end	Antti Korpin tie	37	2	***22***	***28***	***L***	***12***	***9***	***2***	***-1,5***	***4***
Voudintie	end	Antti Korpin tie	37	3	***31***	***37***	***L***	***11***	***9***	***2***	***-1,5***	***4***
Voudintie	end	Antti Korpin tie	37	4	***41***	***49***	***L***	***13***	***0***	***2***	***-1,5***	***4***
Voudintie	end	Antti Korpin tie	37	5	***54***	***60***	***L***	***10***	***0***	***2***	***-1***	***4***
Voudintie	end	Antti Korpin tie	37	6	***65***	***74***	***L***	***15***	***0***	***2***	***-3***	***4***
Voudintie	end	Antti Korpin tie	37	7	***25***	***60***	***R***	***9***	***0***	***5***	***2,5***	***5***
Juhana-Herttuan tie	Herttuanpolku	Antti Korpin tie	35	8	***20***	***63***	***L***	***9***	***0***	***6***	***-1***	***6***
Juhana-Herttuan tie	Herttuanpolku	Antti Korpin tie	35	9	***189***	***198***	***L***	***21***	***0***	***5***	***1,5***	***5***
Juhana-Herttuan tie	Herttuanpolku	Antti Korpin tie	35	10	***213***	***222***	***R***	***11***	***0***	***6***	***4***	***12***
Juhana-Herttuan tie	Herttuanpolku	Antti Korpin tie	35	11	***253***	***263***	***L***	***20***	***0***	***5***	***1***	***5***
Juhana-Herttuan tie	Herttuanpolku	Antti Korpin tie	35	12	***275***	***285***	***R***	***6***	***0***	***5***	***5***	***5***
Juhana-Herttuan tie	Herttuanpolku	Antti Korpin tie	35	13	***297***	***306***	***L***	***20***	***0***	***6***	***1,5***	***6***
Antti Korpin tie	Juhana-Herttuan tie	Juhana-Herttuan tie	36	14	***102***	***151***	***L***	***20***	***0***	***6***	***4***	***50***
Juhana-Herttuan tie	Antti Korpin tie	Herttuanpolku	35	15	***32***	***42***	***R***	***36***	***0***	***8***	***3***	***0***
Juhana-Herttuan tie	Antti Korpin tie	Herttuanpolku	35	16	***78***	***103***	***L***	***31***	***33***	***6***	***4***	***0***
Juhana-Herttuan tie	Antti Korpin tie	Herttuanpolku	35	17	***74***	***97***	***R***	***33***	***31***	***8***	***5***	***8***
Juhana-Herttuan tie	Antti Korpin tie	Herttuanpolku	35	18	***154***	***171***	***L***	***35***	***32***	***6***	***5***	***6***
Juhana-Herttuan tie	Antti Korpin tie	Herttuanpolku	35	19	***151***	***167***	***R***	***32***	***35***	***8***	***6***	***0***
Juhana-Herttuan tie	Antti Korpin tie	Herttuanpolku	35	20	***213***	***261***	***L***	***11***	***0***	***6***	***4***	***48***
Antti Korpin tie	Juhana-Herttuan tie	Kunnalliskodintie	36	21	***38***	***154***	***L***	***35***	***0***	***8***	***3***	***378***
Koskelantie	Kullervonkatu	Intiankatu	32	22	***0***	***24***	***L***	***38***	***0***	***4***	***3***	***0***
Koskelantie	Kullervonkatu	Intiankatu	32	23	***65***	***89***	***L***	***38***	***0***	***4***	***3***	***0***
Koskelantie	Kullervonkatu	Intiankatu	32	24	***117***	***141***	***L***	***38***	***0***	***4***	***4***	***24***
Koskelantie	Kullervonkatu	Intiankatu	32	25	***178***	***191***	***L***	***38***	***0***	***4***	***3,5***	***4***
Koskelantie	Kullervonkatu	Intiankatu	32	26	***232***	***257***	***L***	***38***	***0***	***3***	***4***	***6***
Koskelantie	Valtimontie	Kullervonkatu	32	27	***68***	***96***	***L***	***46***	***0***	***4***	***2***	***32***
Intiankatu	Allastie	Kymintie	31	28	***14***	***22***	***R***	***9***	***0***	***2***	***4***	***5***

Intiankatu	Allastie	Kymintie	31	29	***35***	***44***	***R***	***9***	***0***	***2***	***4***	***4***
Intiankatu	Kymintie	Limingantie	31	30	***6***	***31***	***R***	***5***	***5***	***2***	***3,5***	***10***
Intiankatu	Kymintie	Limingantie	31	31	***5***	***27***	***L***	***5***	***5***	***2***	***3***	***16***
Intiankatu	Kymintie	Limingantie	31	32	***52***	***81***	***L***	***6***	***6***	***2***	***2***	***14***
Intiankatu	Kymintie	Limingantie	31	33	***52***	***85***	***R***	***6***	***6***	***1***	***5***	***9***
Intiankatu	Limingantie	Väinö Auerin katu	31	34	***0***	***25***	***R***	***6***	***6***	***2***	***3***	***9***
Intiankatu	Limingantie	Väinö Auerin katu	31	35	***4***	***28***	***L***	***6***	***6***	***2***	***3***	***14***
Intiankatu	Limingantie	Väinö Auerin katu	31	36	***93***	***117***	***R***	***5***	***5***	***2***	***5***	***12***
Intiankatu	Limingantie	Väinö Auerin katu	31	37	***94***	***115***	***L***	***5***	***5***	***2***	***5,5***	***14***
Intiankatu	Limingantie	Väinö Auerin katu	31	38	***123***	***161***	***R***	***5***	***5***	***2***	***5***	***12***
Intiankatu	Limingantie	Väinö Auerin katu	31	39	***123***	***161***	***L***	***5***	***5***	***2***	***5***	***12***
Väinö Auerin katu	Intiankatu	Koskelantie	31	40	***0***	***23***	***L***	***9***	***0***	***3***	***5***	***6***
Väinö Auerin katu	Intiankatu	Koskelantie	31	41	***35***	***52***	***L***	***9***	***0***	***3***	***3***	***16***
Väinö Auerin katu	Intiankatu	Koskelantie	31	42	***80***	***97***	***L***	***9***	***0***	***3***	***3***	***16***
Kustaa Vaasan tie	Syyriankatu	Intiankatu	30	43	***25***	***33***	***L***	***19***	***0***	***2***	***4***	***2***
Kustaa Vaasan tie	Syyriankatu	Intiankatu	30	44	***40***	***47***	***L***	***22***	***0***	***2***	***4***	***2***
Kustaa Vaasan tie	Syyriankatu	Intiankatu	30	45	***51***	***57***	***L***	***21***	***0***	***2***	***4***	***2***
Kustaa Vaasan tie	Syyriankatu	Intiankatu	30	46	***62***	***67***	***L***	***23***	***0***	***2***	***1,5***	***4***
Kustaa Vaasan tie	Syyriankatu	Intiankatu	30	47	***79***	***85***	***L***	***19***	***0***	***2***	***1,5***	***4***
Kustaa Vaasan tie	Syyriankatu	Intiankatu	30	48	***109***	***121***	***L***	***21***	***0***	***2***	***5***	***2***
Kustaa Vaasan tie	Intiankatu	Japaninkatu	30	49	***0***	***8***	***L***	***35***	***0***	***2***	***3,5***	***0***
Kustaa Vaasan tie	Intiankatu	Japaninkatu	30	50	***62***	***79***	***R***	***39***	***40***	***2***	***5***	***16***
Kustaa Vaasan tie	Intiankatu	Japaninkatu	30	51	***75***	***81***	***L***	***40***	***39***	***2***	***2***	***4***
Kustaa Vaasan tie	Japaninkatu	Jaavantie	30	52	***0***	***32***	***R***	***28***	***0***	***2***	***5,5***	***18***
Kustaa Vaasan tie	Japaninkatu	Jaavantie	30	53	***40***	***47***	***L***	***34***	***0***	***2***	***2***	***1,5***
Kustaa Vaasan tie	Japaninkatu	Jaavantie	30	54	***55***	***64***	***L***	***30***	***0***	***2***	***3***	***1***
Kustaa Vaasan tie	Japaninkatu	Jaavantie	30	55	***68***	***87***	***L***	***30***	***0***	***2***	***4***	***9***
Kustaa Vaasan tie	Jaavantie	Floorantie	30	56	***10***	***16***	***L***	***32***	***0***	***2***	***3,5***	***2***
Kustaa Vaasan tie	Jaavantie	Floorantie	30	57	***65***	***73***	***L***	***32***	***0***	***2***	***0***	***2***
Hämeentie	Haukilahdenkatu	Helminkatu	28	58	***52***	***86***	***L***	***43***	***0***	***5***	***4,5***	***45***
Hämeentie	Helminkatu	Violankatu	27	59	***14***	***57***	***L***	***21***	***0***	***6***	***5***	***66***
Hämeentie	Helminkatu	Violankatu	27	60	***57***	***106***	***L***	***20***	***0***	***5***	***5***	***30***
Hämeentie	Violankatu	Saarenkatu	27	61	***0***	***76***	***L***	***14***	***15***	***6***	***6***	***90***
Hämeentie	Violankatu	Saarenkatu	27	62	***0***	***31***	***R***	***15***	***14***	***5***	***5,5***	***50***
Hämeentie	Violankatu	Saarenkatu	27	63	***31***	***68***	***R***	***15***	***14***	***4***	***6***	***40***
Hämeentie	Saarenkatu	Hauhontie	26	64	***0***	***35***	***L***	***12***	***15***	***6***	***6,5***	***100***

Hämeentie	Saarenkatu	Hauhontie	26	65	***35***	***79***	***L***	***12***	***0***	***5***	***5,5***	***35***
Hämeentie	Saarenkatu	Hauhontie	26	66	***79***	***145***	***L***	***12***	***15***	***5***	***4***	***75***
Hämeentie	Saarenkatu	Hauhontie	26	67	***177***	***203***	***L***	***12***	***15***	***5***	***5***	***30***
Hämeentie	Saarenkatu	Hauhontie	26	68	***203***	***233***	***L***	***12***	***15***	***4***	***6***	***32***
Hämeentie	Saarenkatu	Hauhontie	26	69	***233***	***255***	***L***	***12***	***15***	***4***	***4***	***16***
Hämeentie	Hauhontie	Vellamonkatu	26	70	***13***	***59***	***L***	***16***	***0***	***6***	***2,5***	***48***
Hämeentie	Vellamonkatu	Päijänteentie	25	71	***42***	***91***	***R***	***14***	***0***	***7***	***3***	***84***
Hämeentie	Päijänteentie	Lautatarhankatu	25	72	***0***	***72***	***R***	***13***	***0***	***7***	***3***	***133***
Hämeentie	Päijänteentie	Lautatarhankatu	25	73	***72***	***135***	***R***	***13***	***0***	***7***	***3***	***63***
Hämeentie	Päijänteentie	Lautatarhankatu	25	74	***135***	***196***	***R***	***13***	***0***	***9***	***4***	***115***
Hämeentie	Päijänteentie	Lautatarhankatu	25	75	***204***	***226***	***L***	***26***	***0***	***3***	***2***	***6***
Hämeentie	Pääskylänkatu	Kulmavuorenkatu	24	76	***0***	***34***	***L***	***14***	***0***	***8***	***4***	***58***
Hämeentie	Pääskylänkatu	Kulmavuorenkatu	24	77	***34***	***66***	***L***	***14***	***0***	***6***	***4***	***48***
Hämeentie	Kinaporinkatu	Vilhonvuorenkatu	24	78	***0***	***22***	***R***	***12***	***12***	***3***	***8***	***18***
Hämeentie	Kinaporinkatu	Vilhonvuorenkatu	24	79	***22***	***55***	***R***	***12***	***12***	***4***	***5***	***32***
Hämeentie	Kinaporinkatu	Vilhonvuorenkatu	24	80	***55***	***147***	***R***	***12***	***12***	***4***	***5***	***56***
Hämeentie	Vilhonvuorenkatu	Vaasanpolku	24	81	***26***	***113***	***R***	***13***	***13***	***4***	***7***	***4***
Hämeentie	Helsinginkatu	Torkkelinkatu	23	82	***0***	***35***	***R***	***11***	***11***	***6***	***7***	***46***
Hämeentie	Helsinginkatu	Torkkelinkatu	23	83	***0***	***33***	***L***	***11***	***11***	***6***	***5***	***68***
Hämeentie	Helsinginkatu	Torkkelinkatu	23	84	***35***	***71***	***R***	***11***	***11***	***6***	***4***	***44***
Hämeentie	Helsinginkatu	Torkkelinkatu	23	85	***33***	***66***	***L***	***11***	***11***	***6***	***8***	***48***
Hämeentie	Helsinginkatu	Torkkelinkatu	23	86	***71***	***106***	***R***	***11***	***11***	***6***	***4***	***66***
Hämeentie	Helsinginkatu	Torkkelinkatu	23	87	***66***	***99***	***L***	***11***	***11***	***6***	***5***	***54***
Hämeentie	Helsinginkatu	Torkkelinkatu	23	88	***106***	***144***	***R***	***11***	***11***	***7***	***8***	***56***
Hämeentie	Helsinginkatu	Torkkelinkatu	23	89	***99***	***135***	***L***	***11***	***11***	***6***	***7***	***102***
Hämeentie	Torkkelinkatu	Sakarinkatu	23	90	***0***	***51***	***L***	***10***	***10***	***6***	***2,5***	***108***
Hämeentie	Torkkelinkatu	Sakarinkatu	23	91	***0***	***14***	***L***	***10***	***10***	***7***	***4***	***21***
Hämeentie	Torkkelinkatu	Sakarinkatu	23	92	***48***	***59***	***L***	***10***	***10***	***7***	***4***	***21***
Hämeentie	Torkkelinkatu	Sakarinkatu	23	93	***100***	***119***	***L***	***10***	***10***	***2***	***5***	***14***
Hämeentie	Torkkelinkatu	Sakarinkatu	23	94	***130***	***146***	***L***	***10***	***10***	***7***	***4***	***21***
Hämeentie	Torkkelinkatu	Sakarinkatu	23	95	***153***	***169***	***L***	***10***	***10***	***7***	***4***	***21***
Hämeentie	Sakarinkatu	Kaikukatu	23	96	***0***	***46***	***R***	***10***	***10***	***6***	***4***	***120***
Hämeentie	Sakarinkatu	Kaikukatu	23	97	***46***	***90***	***R***	***10***	***10***	***6***	***4***	***72***
Hämeentie	Sakarinkatu	Kaikukatu	23	98	***90***	***124***	***R***	***10***	***10***	***6***	***4***	***54***
Hämeentie	Sakarinkatu	Kaikukatu	23	99	***124***	***160***	***R***	***10***	***10***	***4***	***4***	***32***
Hämeentie	Sakarinkatu	Kaikukatu	23	100	***160***	***211***	***R***	***10***	***10***	***4***	***4,5***	***72***

Hämeentie	Kaikukatu	Viides linja	23	101	***52***	***97***	***R***	***10***	***10***	***4***	***5***	***52***
Hämeentie	Kaikukatu	Viides linja	22	102	***138***	***169***	***R***	***10***	***10***	***6***	***4,5***	***74***
Hämeentie	Viides linja	Neljäs linja	22	103	***0***	***31***	***R***	***8***	***8***	***5***	***5***	***35***
Hämeentie	Viides linja	Neljäs linja	22	104	***0***	***28***	***L***	***8***	***8***	***6***	***4***	***18***
Hämeentie	Viides linja	Neljäs linja	22	105	***31***	***92***	***R***	***8***	***8***	***6***	***7***	***108***
Hämeentie	Viides linja	Neljäs linja	22	106	***28***	***89***	***L***	***8***	***8***	***6***	***4***	***18***
Hämeentie	Neljäs linja	Kolmas linja	22	107	***0***	***32***	***R***	***8***	***9***	***7***	***5***	***56***
Hämeentie	Neljäs linja	Kolmas linja	22	108	***0***	***46***	***L***	***9***	***8***	***5***	***8***	***40***
Hämeentie	Neljäs linja	Kolmas linja	22	109	***32***	***60***	***R***	***8***	***9***	***6***	***5***	***48***
Hämeentie	Neljäs linja	Kolmas linja	22	110	***46***	***69***	***L***	***9***	***8***	***5***	***9***	***40***
Hämeentie	Neljäs linja	Kolmas linja	22	111	***60***	***77***	***R***	***8***	***9***	***6***	***5***	***42***
Hämeentie	Kolmas linja	Toinen linja	21	112	***0***	***30***	***R***	***7***	***7***	***4***	***5***	***32***
Hämeentie	Kolmas linja	Toinen linja	21	113	***0***	***61***	***L***	***7***	***7***	***5***	***8***	***75***
Hämeentie	Kolmas linja	Toinen linja	21	114	***30***	***57***	***R***	***7***	***7***	***6***	***5***	***45***
Hämeentie	Kolmas linja	Toinen linja	21	115	***61***	***98***	***L***	***7***	***7***	***4***	***7***	***60***
Hämeentie	Kolmas linja	Toinen linja	21	116	***57***	***78***	***R***	***7***	***7***	***6***	***6***	***42***
Hämeentie	Toinen linja	Hakaniemen tori	20	117	***0***	***74***	***R***	***6***	***6***	***4***	***9***	***84***
Unioninkatu	Siltavuorenranta	Liisankatu	17	118	***0***	***63***	***L***	***6,5***	***6,5***	***7***	***6,5***	***132***
Unioninkatu	Siltavuorenranta	Liisankatu	17	119	***144***	***179***	***L***	***6,5***	***6,5***	***8***	***4***	***64***
Kaisaniemenkatu	Puutarhakatu	Vilhonkatu	16	120	***65***	***99***	***R***	***8***	***8***	***2***	***7***	***8***
Vilhonkatu	Vuorikatu	Mikonkatu	14	121	***0***	***109***	***R***	***7***	***7***	***4***	***10***	***124***
Vilhonkatu	Vuorikatu	Mikonkatu	14	122	***0***	***40***	***L***	***7***	***7***	***4***	***9***	***32***
Vilhonkatu	Vuorikatu	Mikonkatu	14	123	***40***	***109***	***L***	***7***	***7***	***4***	***4***	***62***
Mikonkatu	Vilhonkatu	Kaisaniemenkatu	14	124	***0***	***31***	***L***	***8***	***0***	***4***	***8***	***36***
Mikonkatu	Vilhonkatu	Kaisaniemenkatu	14	125	***31***	***63***	***L***	***8***	***0***	***4***	***7***	***36***
Mikonkatu	Vilhonkatu	Kaisaniemenkatu	14	126	***63***	***125***	***L***	***8***	***0***	***6***	***9***	***180***
Kaisaniemenkatu	Vuorikatu	Mikonkatu	13	127	***0***	***49***	***R***	***6***	***6***	***5***	***7***	***120***
Kaisaniemenkatu	Vuorikatu	Mikonkatu	13	128	***0***	***54***	***L***	***6***	***6***	***5***	***7***	***65***
Kaisaniemenkatu	Vuorikatu	Mikonkatu	13	129	***49***	***77***	***R***	***6***	***6***	***5***	***8***	***90***
Kaisaniemenkatu	Vuorikatu	Mikonkatu	13	130	***54***	***113***	***L***	***6***	***6***	***5***	***7***	***86***
Kaisaniemenkatu	Vuorikatu	Mikonkatu	13	131	***77***	***121***	***R***	***6***	***6***	***6***	***9***	***180***
Kaivokatu	Mikonkatu	Keskuskatu	12	132	***68***	***102***	***L***	***9***	***0***	***3***	***3***	***64***
Kaivokatu	Keskuskatu	Mannerheimintie	11	133	***0***	***95***	***L***	***9***	***0***	***5***	***9***	***64***
Kaivokatu	Keskuskatu	Mannerheimintie	10	134	***95***	***133***	***L***	***9***	***0***	***6***	***8***	***204***
Kaivokatu	Keskuskatu	Mannerheimintie	10	135	***181***	***219***	***R***	***8***	***8***	***5***	***8***	***130***
Kaivokatu	Keskuskatu	Mannerheimintie	10	136	***166***	***221***	***L***	***8***	***8***	***4***	***9***	***80***

Simonkatu	Mannerheimintie	Yrjönkatu	9	137	***0***	***65***	***L***	***5***	***0***	***4***	***9***	***160***
Simonkatu	Mannerheimintie	Yrjönkatu	9	138	***65***	***98***	***L***	***5***	***0***	***5***	***6***	***65***
Simonkatu	Mannerheimintie	Yrjönkatu	9	139	***98***	***131***	***L***	***5***	***0***	***6***	***6***	***54***
Simonkatu	Yrjönkatu	Annankatu	9	140	***0***	***41***	***L***	***5***	***0***	***5***	***4***	***55***
Simonkatu	Yrjönkatu	Annankatu	9	141	***41***	***51***	***L***	***5***	***0***	***5***	***6***	***55***
Annankatu	Simonkatu	Urho Kekkosen katu	8	142	***26***	***78***	***L***	***4,5***	***0***	***6***	***7***	***144***
Urho Kekkosen katu	Annankatu	Fredrikinkatu	7	143	***0***	***46***	***L***	***6***	***0***	***6***	***6***	***180***
Urho Kekkosen katu	Annankatu	Fredrikinkatu	7	144	***46***	***108***	***L***	***6***	***0***	***6***	***6***	***180***
Urho Kekkosen katu	Annankatu	Fredrikinkatu	6	145	***108***	***153***	***L***	***6***	***0***	***6***	***5***	***86***
Fredrikinkatu	Urho Kekkosen katu	Kansakoulukatu	4	146	***0***	***42***	***L***	***5***	***0***	***7***	***4***	***34***
Kansakoulukatu	Fredrikinkatu	Annankatu	4	147	***0***	***46***	***L***	***4***	***4***	***6***	***3***	***36***
Kansakoulukatu	Fredrikinkatu	Annankatu	4	148	***0***	***30***	***R***	***4***	***4***	***5***	***3***	***45***
Kansakoulukatu	Fredrikinkatu	Annankatu	2	149	***30***	***58***	***R***	***4***	***4***	***4***	***6***	***40***
Malminkatu	Malminrinne	Fredrikinkatu	2	150	***0***	***29***	***R***	***5***	***0***	***6***	***4***	***36***
Malminrinne	Malminkatu	Lapinlahdenkatu	2	151	***0***	***64***	***L***	***4***	***4***	***6***	***4***	***96***
Malminrinne	Malminkatu	Lapinlahdenkatu	2	152	***0***	***64***	***R***	***4***	***4***	***6***	***5***	***78***
Malminrinne	Malminkatu	Lapinlahdenkatu	2	153	***64***	***97***	***L***	***4***	***4***	***6***	***3***	***36***
Malminrinne	Malminkatu	Lapinlahdenkatu	1	154	***64***	***97***	***R***	***4***	***4***	***6***	***6***	***24***
Lapinlahdenkatu	Malminrinne	Lapinrinne	1	155	***0***	***27***	***L***	***9***	***4***	***8***	***4***	***80***
Lapinlahdenkatu	Malminrinne	Lapinrinne	1	156	***4***	***39***	***R***	***4***	***9***	***4***	***4***	***32***
Lapinlahdenkatu	Malminrinne	Lapinrinne	1	157	***39***	***66***	***R***	***4***	***0***	***4***	***5***	***44***
Lapinlahdenkatu	Malminrinne	Lapinrinne	1	158	***66***	***94***	***R***	***4***	***0***	***4***	***3***	***28***
Lapinlahdenkatu	Malminrinne	Lapinrinne	1	159	***94***	***122***	***R***	***4***	***0***	***4***	***5***	***32***
Lapinlahdenkatu	Malminrinne	Lapinrinne	1	160	***122***	***140***	***R***	***4***	***0***	***4***	***3***	***28***
Lapinlahdenkatu	Malminrinne	Lapinrinne	1	161	***140***	***158***	***R***	***4***	***0***	***6***	***9***	***30***
Lapinlahdenkatu	Lapinrinne	Lastenkodinkuja	1	162	***0***	***25***	***R***	***4***	***4***	***4***	***8***	***36***
Lapinlahdenkatu	Lapinrinne	Lastenkodinkuja	1	163	***0***	***29***	***L***	***4***	***4***	***6***	***3,5***	***36***
Lapinlahdenkatu	Lapinrinne	Lastenkodinkuja	1	164	***25***	***43***	***R***	***4***	***4***	***4***	***6***	***32***
Lapinlahdenkatu	Lapinrinne	Lastenkodinkuja	1	165	***29***	***69***	***L***	***4***	***4***	***7***	***5***	***7***
Lapinlahdenkatu	Lapinrinne	Lastenkodinkuja	1	166	***43***	***76***	***R***	***4***	***4***	***4***	***6***	***32***
Lapinlahdenkatu	Lastenkodinkuja	Työmiehenkatu	1	167	***0***	***67***	***L***	***8***	***4***	***4***	***4,5***	***20***
Lapinlahdenkatu	Lastenkodinkuja	Työmiehenkatu	1	168	***3***	***29***	***R***	***4***	***8***	***4***	***5***	***28***
Lapinlahdenkatu	Lastenkodinkuja	Työmiehenkatu	1	169	***29***	***58***	***R***	***4***	***8***	***4***	***5***	***64***
Lapinlahdenkatu	Työmiehenkatu	Mechelinkatu	1	170	***0***	***17***	***R***	***4***	***4***	***4***	***5***	***52***
Lapinlahdenkatu	Työmiehenkatu	Mechelinkatu	1	171	***0***	***25***	***L***	***4***	***4***	***4***	***7***	***32***
Lapinlahdenkatu	Työmiehenkatu	Mechelinkatu	1	172	***17***	***42***	***R***	***4***	***4***	***5***	***7***	***50***

Lapinlahdenkatu	Työmiehenkatu	Mechelinkatu	1	173	***25***	***43***	***L***	***4***	***4***	***5***	***8***	***25***
Lapinlahdenkatu	Työmiehenkatu	Mechelinkatu	1	174	***76***	***102***	***L***	***5***	***0***	***3***	***3***	***35***
Lapinlahdenkatu	Työmiehenkatu	Mechelinkatu	1	175	***110***	***139***	***L***	***5***	***0***	***3***	***2***	***42***

UNITE CASE STUDY 9A
Table 2: Number of vehicles per hour (per road segment, time period, vehicle category)

Street name	Beginning of segment	End of segment	road_id	tmp_id	fzk	number of vehicles	vehicles per hour
Lapinlahdenkatu	Marian sairaala	Malminrinne	1	30	2	588	49
Lapinlahdenkatu	Marian sairaala	Malminrinne	1	30	5	6	1
Lapinlahdenkatu	Marian sairaala	Malminrinne	1	30	7	2960	247
Lapinlahdenkatu	Marian sairaala	Malminrinne	1	30	9	375	31
Lapinlahdenkatu	Marian sairaala	Malminrinne	1	30	11	85	7
Lapinlahdenkatu	Marian sairaala	Malminrinne	1	31	2	56	19
Lapinlahdenkatu	Marian sairaala	Malminrinne	1	31	5	3	1
Lapinlahdenkatu	Marian sairaala	Malminrinne	1	31	7	520	173
Lapinlahdenkatu	Marian sairaala	Malminrinne	1	31	9	25	8
Lapinlahdenkatu	Marian sairaala	Malminrinne	1	31	11	11	4
Lapinlahdenkatu	Marian sairaala	Malminrinne	1	32	2	56	7
Lapinlahdenkatu	Marian sairaala	Malminrinne	1	32	5	1	0
Lapinlahdenkatu	Marian sairaala	Malminrinne	1	32	7	520	65
Lapinlahdenkatu	Marian sairaala	Malminrinne	1	32	9	100	13
Lapinlahdenkatu	Marian sairaala	Malminrinne	1	32	11	9	1
Lapinlahdenkatu	Marian sairaala	Malminrinne	1	34	2	644	40
Lapinlahdenkatu	Marian sairaala	Malminrinne	1	34	5	9	1
Lapinlahdenkatu	Marian sairaala	Malminrinne	1	34	7	3480	218
Lapinlahdenkatu	Marian sairaala	Malminrinne	1	34	9	400	25
Lapinlahdenkatu	Marian sairaala	Malminrinne	1	34	11	96	6
Malminrinne	Lapinlahdenkatu	Kampintori	2	30	2	1752	146
Malminrinne	Lapinlahdenkatu	Kampintori	2	30	5	20	2
Malminrinne	Lapinlahdenkatu	Kampintori	2	30	7	11780	982
Malminrinne	Lapinlahdenkatu	Kampintori	2	30	9	279	23
Malminrinne	Lapinlahdenkatu	Kampintori	2	30	11	235	20
Malminrinne	Lapinlahdenkatu	Kampintori	2	31	2	167	56
Malminrinne	Lapinlahdenkatu	Kampintori	2	31	5	6	2
Malminrinne	Lapinlahdenkatu	Kampintori	2	31	7	2069	690
Malminrinne	Lapinlahdenkatu	Kampintori	2	31	9	186	62
Malminrinne	Lapinlahdenkatu	Kampintori	2	31	11	29	10
Malminrinne	Lapinlahdenkatu	Kampintori	2	32	2	167	21
Malminrinne	Lapinlahdenkatu	Kampintori	2	32	5	2	0
Malminrinne	Lapinlahdenkatu	Kampintori	2	32	7	2069	259
Malminrinne	Lapinlahdenkatu	Kampintori	2	32	9	74	9
Malminrinne	Lapinlahdenkatu	Kampintori	2	32	11	26	3
Malminrinne	Lapinlahdenkatu	Kampintori	2	34	2	1919	120
Malminrinne	Lapinlahdenkatu	Kampintori	2	34	5	26	2
Malminrinne	Lapinlahdenkatu	Kampintori	2	34	7	13849	866
Malminrinne	Lapinlahdenkatu	Kampintori	2	34	9	465	29
Malminrinne	Lapinlahdenkatu	Kampintori	2	34	11	264	17
Runeberginkatu (Kampintori)	Malminrinne	Fredrikinkatu	3	30	2	1213	101
Runeberginkatu (Kampintori)	Malminrinne	Fredrikinkatu	3	30	5	10	1
Runeberginkatu (Kampintori)	Malminrinne	Fredrikinkatu	3	30	7	7958	663
Runeberginkatu (Kampintori)	Malminrinne	Fredrikinkatu	3	30	9	195	16
Runeberginkatu (Kampintori)	Malminrinne	Fredrikinkatu	3	30	11	395	33
Runeberginkatu (Kampintori)	Malminrinne	Fredrikinkatu	3	31	2	116	39

Runeberginkatu (Kampintori)	Malminrinne	Fredrikinkatu	3	31	5	5	2
Runeberginkatu (Kampintori)	Malminrinne	Fredrikinkatu	3	31	7	1398	466
Runeberginkatu (Kampintori)	Malminrinne	Fredrikinkatu	3	31	9	13	4
Runeberginkatu (Kampintori)	Malminrinne	Fredrikinkatu	3	31	11	49	16
Runeberginkatu (Kampintori)	Malminrinne	Fredrikinkatu	3	32	2	116	14
Runeberginkatu (Kampintori)	Malminrinne	Fredrikinkatu	3	32	5	1	0
Runeberginkatu (Kampintori)	Malminrinne	Fredrikinkatu	3	32	7	1398	175
Runeberginkatu (Kampintori)	Malminrinne	Fredrikinkatu	3	32	9	52	7
Runeberginkatu (Kampintori)	Malminrinne	Fredrikinkatu	3	32	11	44	5
Runeberginkatu (Kampintori)	Malminrinne	Fredrikinkatu	3	34	2	1328	83
Runeberginkatu (Kampintori)	Malminrinne	Fredrikinkatu	3	34	5	15	1
Runeberginkatu (Kampintori)	Malminrinne	Fredrikinkatu	3	34	7	9356	585
Runeberginkatu (Kampintori)	Malminrinne	Fredrikinkatu	3	34	9	208	13
Runeberginkatu (Kampintori)	Malminrinne	Fredrikinkatu	3	34	11	444	28
Kansakoulukatu	Fredrikinkatu	Annankatu	4	30	2	879	73
Kansakoulukatu	Fredrikinkatu	Annankatu	4	30	5	25	2
Kansakoulukatu	Fredrikinkatu	Annankatu	4	30	7	6229	519
Kansakoulukatu	Fredrikinkatu	Annankatu	4	30	9	148	12
Kansakoulukatu	Fredrikinkatu	Annankatu	4	30	11	325	27
Kansakoulukatu	Fredrikinkatu	Annankatu	4	31	2	84	28
Kansakoulukatu	Fredrikinkatu	Annankatu	4	31	5	13	4
Kansakoulukatu	Fredrikinkatu	Annankatu	4	31	7	1094	365
Kansakoulukatu	Fredrikinkatu	Annankatu	4	31	9	10	3
Kansakoulukatu	Fredrikinkatu	Annankatu	4	31	11	40	13
Kansakoulukatu	Fredrikinkatu	Annankatu	4	32	2	84	10
Kansakoulukatu	Fredrikinkatu	Annankatu	4	32	5	4	0
Kansakoulukatu	Fredrikinkatu	Annankatu	4	32	7	1094	137
Kansakoulukatu	Fredrikinkatu	Annankatu	4	32	9	39	5
Kansakoulukatu	Fredrikinkatu	Annankatu	4	32	11	36	5
Kansakoulukatu	Fredrikinkatu	Annankatu	4	34	2	963	60
Kansakoulukatu	Fredrikinkatu	Annankatu	4	34	5	37	2
Kansakoulukatu	Fredrikinkatu	Annankatu	4	34	7	7324	458
Kansakoulukatu	Fredrikinkatu	Annankatu	4	34	9	158	10
Kansakoulukatu	Fredrikinkatu	Annankatu	4	34	11	365	23
Annankatu	Kansakoulukatu	Simonkatu	5	30	2	907	76
Annankatu	Kansakoulukatu	Simonkatu	5	30	5	26	2
Annankatu	Kansakoulukatu	Simonkatu	5	30	7	6411	534
Annankatu	Kansakoulukatu	Simonkatu	5	30	9	178	15
Annankatu	Kansakoulukatu	Simonkatu	5	30	11	322	27
Annankatu	Kansakoulukatu	Simonkatu	5	31	2	86	29
Annankatu	Kansakoulukatu	Simonkatu	5	31	5	13	4
Annankatu	Kansakoulukatu	Simonkatu	5	31	7	1126	375
Annankatu	Kansakoulukatu	Simonkatu	5	31	9	12	4
Annankatu	Kansakoulukatu	Simonkatu	5	31	11	40	13
Annankatu	Kansakoulukatu	Simonkatu	5	32	2	86	11
Annankatu	Kansakoulukatu	Simonkatu	5	32	5	4	0
Annankatu	Kansakoulukatu	Simonkatu	5	32	7	1126	141
Annankatu	Kansakoulukatu	Simonkatu	5	32	9	47	6
Annankatu	Kansakoulukatu	Simonkatu	5	32	11	36	4
Annankatu	Kansakoulukatu	Simonkatu	5	34	2	994	62

Annankatu	Kansakoulukatu	Simonkatu	5	34	5	39	2
Annankatu	Kansakoulukatu	Simonkatu	5	34	7	7538	471
Annankatu	Kansakoulukatu	Simonkatu	5	34	9	190	12
Annankatu	Kansakoulukatu	Simonkatu	5	34	11	362	23
Malminrinne (Kampintori)	Fredrikinkatu	Runeberginkatu	6	30	2	602	50
Malminrinne (Kampintori)	Fredrikinkatu	Runeberginkatu	6	30	5	17	1
Malminrinne (Kampintori)	Fredrikinkatu	Runeberginkatu	6	30	7	3312	276
Malminrinne (Kampintori)	Fredrikinkatu	Runeberginkatu	6	30	9	98	8
Malminrinne (Kampintori)	Fredrikinkatu	Runeberginkatu	6	30	11	66	6
Malminrinne (Kampintori)	Fredrikinkatu	Runeberginkatu	6	31	2	57	19
Malminrinne (Kampintori)	Fredrikinkatu	Runeberginkatu	6	31	5	9	3
Malminrinne (Kampintori)	Fredrikinkatu	Runeberginkatu	6	31	7	582	194
Malminrinne (Kampintori)	Fredrikinkatu	Runeberginkatu	6	31	9	7	2
Malminrinne (Kampintori)	Fredrikinkatu	Runeberginkatu	6	31	11	8	3
Malminrinne (Kampintori)	Fredrikinkatu	Runeberginkatu	6	32	2	57	7
Malminrinne (Kampintori)	Fredrikinkatu	Runeberginkatu	6	32	5	3	0
Malminrinne (Kampintori)	Fredrikinkatu	Runeberginkatu	6	32	7	582	73
Malminrinne (Kampintori)	Fredrikinkatu	Runeberginkatu	6	32	9	26	3
Malminrinne (Kampintori)	Fredrikinkatu	Runeberginkatu	6	32	11	7	1
Malminrinne (Kampintori)	Fredrikinkatu	Runeberginkatu	6	34	2	660	41
Malminrinne (Kampintori)	Fredrikinkatu	Runeberginkatu	6	34	5	26	2
Malminrinne (Kampintori)	Fredrikinkatu	Runeberginkatu	6	34	7	3893	243
Malminrinne (Kampintori)	Fredrikinkatu	Runeberginkatu	6	34	9	105	7
Malminrinne (Kampintori)	Fredrikinkatu	Runeberginkatu	6	34	11	75	5
Urho Kekkosen katu	Annankatu	Fredrikinkatu	7	30	2	825	69
Urho Kekkosen katu	Annankatu	Fredrikinkatu	7	30	5	32	3
Urho Kekkosen katu	Annankatu	Fredrikinkatu	7	30	7	4375	365
Urho Kekkosen katu	Annankatu	Fredrikinkatu	7	30	9	151	13
Urho Kekkosen katu	Annankatu	Fredrikinkatu	7	30	11	171	14
Urho Kekkosen katu	Annankatu	Fredrikinkatu	7	31	2	79	1
Urho Kekkosen katu	Annankatu	Fredrikinkatu	7	31	5	16	2
Urho Kekkosen katu	Annankatu	Fredrikinkatu	7	31	7	769	2
Urho Kekkosen katu	Annankatu	Fredrikinkatu	7	31	9	10	3
Urho Kekkosen katu	Annankatu	Fredrikinkatu	7	31	11	21	4
Urho Kekkosen katu	Annankatu	Fredrikinkatu	7	32	2	79	10
Urho Kekkosen katu	Annankatu	Fredrikinkatu	7	32	5	5	1
Urho Kekkosen katu	Annankatu	Fredrikinkatu	7	32	7	769	96
Urho Kekkosen katu	Annankatu	Fredrikinkatu	7	32	9	40	5
Urho Kekkosen katu	Annankatu	Fredrikinkatu	7	32	11	19	2
Urho Kekkosen katu	Annankatu	Fredrikinkatu	7	34	2	903	56
Urho Kekkosen katu	Annankatu	Fredrikinkatu	7	34	5	48	3
Urho Kekkosen katu	Annankatu	Fredrikinkatu	7	34	7	5143	321
Urho Kekkosen katu	Annankatu	Fredrikinkatu	7	34	9	161	10
Urho Kekkosen katu	Annankatu	Fredrikinkatu	7	34	11	192	12
Annankatu	Simonkatu	Urho Kekkosen katu	8	30	2	626	52
Annankatu	Simonkatu	Urho Kekkosen katu	8	30	5	18	2
Annankatu	Simonkatu	Urho Kekkosen katu	8	30	7	3969	331
Annankatu	Simonkatu	Urho Kekkosen katu	8	30	9	137	11
Annankatu	Simonkatu	Urho Kekkosen katu	8	30	11	126	10
Annankatu	Simonkatu	Urho Kekkosen katu	8	31	2	60	20

Annankatu	Simonkatu	Urho Kekkosen katu	8	31	5	9	3
Annankatu	Simonkatu	Urho Kekkosen katu	8	31	7	697	232
Annankatu	Simonkatu	Urho Kekkosen katu	8	31	9	9	3
Annankatu	Simonkatu	Urho Kekkosen katu	8	31	11	16	5
Annankatu	Simonkatu	Urho Kekkosen katu	8	32	2	60	7
Annankatu	Simonkatu	Urho Kekkosen katu	8	32	5	3	0
Annankatu	Simonkatu	Urho Kekkosen katu	8	32	7	697	87
Annankatu	Simonkatu	Urho Kekkosen katu	8	32	9	37	5
Annankatu	Simonkatu	Urho Kekkosen katu	8	32	11	14	2
Annankatu	Simonkatu	Urho Kekkosen katu	8	34	2	685	43
Annankatu	Simonkatu	Urho Kekkosen katu	8	34	5	27	2
Annankatu	Simonkatu	Urho Kekkosen katu	8	34	7	4666	292
Annankatu	Simonkatu	Urho Kekkosen katu	8	34	9	146	9
Annankatu	Simonkatu	Urho Kekkosen katu	8	34	11	141	9
Simonkatu	Annankatu	Mannerheimintie	9	30	2	964	80
Simonkatu	Annankatu	Mannerheimintie	9	30	5	38	3
Simonkatu	Annankatu	Mannerheimintie	9	30	7	7107	592
Simonkatu	Annankatu	Mannerheimintie	9	30	9	234	20
Simonkatu	Annankatu	Mannerheimintie	9	30	11	271	23
Simonkatu	Annankatu	Mannerheimintie	9	31	2	92	31
Simonkatu	Annankatu	Mannerheimintie	9	31	5	20	7
Simonkatu	Annankatu	Mannerheimintie	9	31	7	1249	416
Simonkatu	Annankatu	Mannerheimintie	9	31	9	16	5
Simonkatu	Annankatu	Mannerheimintie	9	31	11	33	11
Simonkatu	Annankatu	Mannerheimintie	9	32	2	92	11
Simonkatu	Annankatu	Mannerheimintie	9	32	5	6	1
Simonkatu	Annankatu	Mannerheimintie	9	32	7	1249	156
Simonkatu	Annankatu	Mannerheimintie	9	32	9	62	8
Simonkatu	Annankatu	Mannerheimintie	9	32	11	30	4
Simonkatu	Annankatu	Mannerheimintie	9	34	2	1056	66
Simonkatu	Annankatu	Mannerheimintie	9	34	5	58	4
Simonkatu	Annankatu	Mannerheimintie	9	34	7	8355	522
Simonkatu	Annankatu	Mannerheimintie	9	34	9	250	16
Simonkatu	Annankatu	Mannerheimintie	9	34	11	304	19
Kaivokatu	Mannerheimintie	Elielinaukio	10	30	2	1430	119
Kaivokatu	Mannerheimintie	Elielinaukio	10	30	5	89	7
Kaivokatu	Mannerheimintie	Elielinaukio	10	30	7	8913	743
Kaivokatu	Mannerheimintie	Elielinaukio	10	30	9	309	26
Kaivokatu	Mannerheimintie	Elielinaukio	10	30	11	360	30
Kaivokatu	Mannerheimintie	Elielinaukio	10	31	2	136	45
Kaivokatu	Mannerheimintie	Elielinaukio	10	31	5	46	15
Kaivokatu	Mannerheimintie	Elielinaukio	10	31	7	1566	522
Kaivokatu	Mannerheimintie	Elielinaukio	10	31	9	21	7
Kaivokatu	Mannerheimintie	Elielinaukio	10	31	11	44	15
Kaivokatu	Mannerheimintie	Elielinaukio	10	32	2	136	17
Kaivokatu	Mannerheimintie	Elielinaukio	10	32	5	13	2
Kaivokatu	Mannerheimintie	Elielinaukio	10	32	7	1566	196
Kaivokatu	Mannerheimintie	Elielinaukio	10	32	9	82	10
Kaivokatu	Mannerheimintie	Elielinaukio	10	32	11	40	5
Kaivokatu	Mannerheimintie	Elielinaukio	10	34	2	1566	98

Kaivokatu	Mannerheimintie	Elielinaukio	10	34	5	135	8
Kaivokatu	Mannerheimintie	Elielinaukio	10	34	7	10479	655
Kaivokatu	Mannerheimintie	Elielinaukio	10	34	9	330	21
Kaivokatu	Mannerheimintie	Elielinaukio	10	34	11	404	25
Kaivokatu	Elielinaukio	Keskuskatu	11	30	2	2696	225
Kaivokatu	Elielinaukio	Keskuskatu	11	30	5	36	3
Kaivokatu	Elielinaukio	Keskuskatu	11	30	7	15473	1289
Kaivokatu	Elielinaukio	Keskuskatu	11	30	9	420	35
Kaivokatu	Elielinaukio	Keskuskatu	11	30	11	810	68
Kaivokatu	Elielinaukio	Keskuskatu	11	31	2	257	86
Kaivokatu	Elielinaukio	Keskuskatu	11	31	5	19	6
Kaivokatu	Elielinaukio	Keskuskatu	11	31	7	2718	906
Kaivokatu	Elielinaukio	Keskuskatu	11	31	9	28	9
Kaivokatu	Elielinaukio	Keskuskatu	11	31	11	100	33
Kaivokatu	Elielinaukio	Keskuskatu	11	32	2	257	32
Kaivokatu	Elielinaukio	Keskuskatu	11	32	5	5	1
Kaivokatu	Elielinaukio	Keskuskatu	11	32	7	2718	340
Kaivokatu	Elielinaukio	Keskuskatu	11	32	9	112	14
Kaivokatu	Elielinaukio	Keskuskatu	11	32	11	90	11
Kaivokatu	Elielinaukio	Keskuskatu	11	34	2	2953	185
Kaivokatu	Elielinaukio	Keskuskatu	11	34	5	55	3
Kaivokatu	Elielinaukio	Keskuskatu	11	34	7	18192	1137
Kaivokatu	Elielinaukio	Keskuskatu	11	34	9	448	28
Kaivokatu	Elielinaukio	Keskuskatu	11	34	11	910	57
Kaivokatu (Rautatientori)	Keskuskatu	Mikonkatu	12	30	2	2225	185
Kaivokatu (Rautatientori)	Keskuskatu	Mikonkatu	12	30	5	29	2
Kaivokatu (Rautatientori)	Keskuskatu	Mikonkatu	12	30	7	13198	1100
Kaivokatu (Rautatientori)	Keskuskatu	Mikonkatu	12	30	9	353	29
Kaivokatu (Rautatientori)	Keskuskatu	Mikonkatu	12	30	11	573	48
Kaivokatu (Rautatientori)	Keskuskatu	Mikonkatu	12	31	2	212	71
Kaivokatu (Rautatientori)	Keskuskatu	Mikonkatu	12	31	5	15	5
Kaivokatu (Rautatientori)	Keskuskatu	Mikonkatu	12	31	7	2319	773
Kaivokatu (Rautatientori)	Keskuskatu	Mikonkatu	12	31	9	24	8
Kaivokatu (Rautatientori)	Keskuskatu	Mikonkatu	12	31	11	71	24
Kaivokatu (Rautatientori)	Keskuskatu	Mikonkatu	12	32	2	212	26
Kaivokatu (Rautatientori)	Keskuskatu	Mikonkatu	12	32	5	4	1
Kaivokatu (Rautatientori)	Keskuskatu	Mikonkatu	12	32	7	2319	290
Kaivokatu (Rautatientori)	Keskuskatu	Mikonkatu	12	32	9	94	12
Kaivokatu (Rautatientori)	Keskuskatu	Mikonkatu	12	32	11	64	8
Kaivokatu (Rautatientori)	Keskuskatu	Mikonkatu	12	34	2	2437	152
Kaivokatu (Rautatientori)	Keskuskatu	Mikonkatu	12	34	5	45	3
Kaivokatu (Rautatientori)	Keskuskatu	Mikonkatu	12	34	7	15516	970
Kaivokatu (Rautatientori)	Keskuskatu	Mikonkatu	12	34	9	377	24
Kaivokatu (Rautatientori)	Keskuskatu	Mikonkatu	12	34	11	643	40
Kaisaniemenkatu	Mikonkatu	Vilhonkatu	13	30	2	871	73
Kaisaniemenkatu	Mikonkatu	Vilhonkatu	13	30	5	2	0
Kaisaniemenkatu	Mikonkatu	Vilhonkatu	13	30	7	4795	400
Kaisaniemenkatu	Mikonkatu	Vilhonkatu	13	30	9	185	15
Kaisaniemenkatu	Mikonkatu	Vilhonkatu	13	30	11	1287	107
Kaisaniemenkatu	Mikonkatu	Vilhonkatu	13	31	2	83	28

Kaisaniemenkatu	Mikonkatu	Vilhonkatu	13	31	5	1	0
Kaisaniemenkatu	Mikonkatu	Vilhonkatu	13	31	7	842	281
Kaisaniemenkatu	Mikonkatu	Vilhonkatu	13	31	9	12	4
Kaisaniemenkatu	Mikonkatu	Vilhonkatu	13	31	11	159	53
Kaisaniemenkatu	Mikonkatu	Vilhonkatu	13	32	2	83	10
Kaisaniemenkatu	Mikonkatu	Vilhonkatu	13	32	5	0	0
Kaisaniemenkatu	Mikonkatu	Vilhonkatu	13	32	7	842	105
Kaisaniemenkatu	Mikonkatu	Vilhonkatu	13	32	9	49	6
Kaisaniemenkatu	Mikonkatu	Vilhonkatu	13	32	11	143	18
Kaisaniemenkatu	Mikonkatu	Vilhonkatu	13	34	2	954	60
Kaisaniemenkatu	Mikonkatu	Vilhonkatu	13	34	5	3	0
Kaisaniemenkatu	Mikonkatu	Vilhonkatu	13	34	7	5638	352
Kaisaniemenkatu	Mikonkatu	Vilhonkatu	13	34	9	197	12
Kaisaniemenkatu	Mikonkatu	Vilhonkatu	13	34	11	1446	90
Vilhonkatu + Mikonkatu (Rautatientori)	Kaisaniemenkatu	Kaisaniemenkatu	14	30	2	724	60
Vilhonkatu + Mikonkatu (Rautatientori)	Kaisaniemenkatu	Kaisaniemenkatu	14	30	5	6	1
Vilhonkatu + Mikonkatu (Rautatientori)	Kaisaniemenkatu	Kaisaniemenkatu	14	30	7	4313	359
Vilhonkatu + Mikonkatu (Rautatientori)	Kaisaniemenkatu	Kaisaniemenkatu	14	30	9	153	13
Vilhonkatu + Mikonkatu (Rautatientori)	Kaisaniemenkatu	Kaisaniemenkatu	14	30	11	1069	89
Vilhonkatu + Mikonkatu (Rautatientori)	Kaisaniemenkatu	Kaisaniemenkatu	14	31	2	69	23
Vilhonkatu + Mikonkatu (Rautatientori)	Kaisaniemenkatu	Kaisaniemenkatu	14	31	5	3	1
Vilhonkatu + Mikonkatu (Rautatientori)	Kaisaniemenkatu	Kaisaniemenkatu	14	31	7	758	253
Vilhonkatu + Mikonkatu (Rautatientori)	Kaisaniemenkatu	Kaisaniemenkatu	14	31	9	10	3
Vilhonkatu + Mikonkatu (Rautatientori)	Kaisaniemenkatu	Kaisaniemenkatu	14	31	11	132	44
Vilhonkatu + Mikonkatu (Rautatientori)	Kaisaniemenkatu	Kaisaniemenkatu	14	32	2	69	9
Vilhonkatu + Mikonkatu (Rautatientori)	Kaisaniemenkatu	Kaisaniemenkatu	14	32	5	1	0
Vilhonkatu + Mikonkatu (Rautatientori)	Kaisaniemenkatu	Kaisaniemenkatu	14	32	7	758	95
Vilhonkatu + Mikonkatu (Rautatientori)	Kaisaniemenkatu	Kaisaniemenkatu	14	32	9	41	5
Vilhonkatu + Mikonkatu (Rautatientori)	Kaisaniemenkatu	Kaisaniemenkatu	14	32	11	119	15
Vilhonkatu + Mikonkatu (Rautatientori)	Kaisaniemenkatu	Kaisaniemenkatu	14	34	2	793	50
Vilhonkatu + Mikonkatu (Rautatientori)	Kaisaniemenkatu	Kaisaniemenkatu	14	34	5	9	1
Vilhonkatu + Mikonkatu (Rautatientori)	Kaisaniemenkatu	Kaisaniemenkatu	14	34	7	5070	317
Vilhonkatu + Mikonkatu (Rautatientori)	Kaisaniemenkatu	Kaisaniemenkatu	14	34	9	163	10
Vilhonkatu + Mikonkatu (Rautatientori)	Kaisaniemenkatu	Kaisaniemenkatu	14	34	11	1201	75
Kaisaniemenkatu	Vilhonkatu	Fabianinkatu	15	30	2	1527	127
Kaisaniemenkatu	Vilhonkatu	Fabianinkatu	15	30	5	29	2
Kaisaniemenkatu	Vilhonkatu	Fabianinkatu	15	30	7	9103	759
Kaisaniemenkatu	Vilhonkatu	Fabianinkatu	15	30	9	320	27
Kaisaniemenkatu	Vilhonkatu	Fabianinkatu	15	30	11	2255	188
Kaisaniemenkatu	Vilhonkatu	Fabianinkatu	15	31	2	145	48
Kaisaniemenkatu	Vilhonkatu	Fabianinkatu	15	31	5	15	5
Kaisaniemenkatu	Vilhonkatu	Fabianinkatu	15	31	7	1599	533
Kaisaniemenkatu	Vilhonkatu	Fabianinkatu	15	31	9	21	7
Kaisaniemenkatu	Vilhonkatu	Fabianinkatu	15	31	11	278	93
Kaisaniemenkatu	Vilhonkatu	Fabianinkatu	15	32	2	145	18
Kaisaniemenkatu	Vilhonkatu	Fabianinkatu	15	32	5	4	1
Kaisaniemenkatu	Vilhonkatu	Fabianinkatu	15	32	7	1599	200
Kaisaniemenkatu	Vilhonkatu	Fabianinkatu	15	32	9	85	11
Kaisaniemenkatu	Vilhonkatu	Fabianinkatu	15	32	11	251	31
Kaisaniemenkatu	Vilhonkatu	Fabianinkatu	15	34	2	1673	105

Kaisaniemenkatu	Vilhonkatu	Fabianinkatu	15	34	5	45	3
Kaisaniemenkatu	Vilhonkatu	Fabianinkatu	15	34	7	10703	669
Kaisaniemenkatu	Vilhonkatu	Fabianinkatu	15	34	9	342	21
Kaisaniemenkatu	Vilhonkatu	Fabianinkatu	15	34	11	2533	158
Kaisaniemenkatu	Fabianinkatu	Unioninkatu	16	30	2	2150	179
Kaisaniemenkatu	Fabianinkatu	Unioninkatu	16	30	5	61	5
Kaisaniemenkatu	Fabianinkatu	Unioninkatu	16	30	7	11663	972
Kaisaniemenkatu	Fabianinkatu	Unioninkatu	16	30	9	365	30
Kaisaniemenkatu	Fabianinkatu	Unioninkatu	16	30	11	2684	224
Kaisaniemenkatu	Fabianinkatu	Unioninkatu	16	31	2	205	68
Kaisaniemenkatu	Fabianinkatu	Unioninkatu	16	31	5	31	10
Kaisaniemenkatu	Fabianinkatu	Unioninkatu	16	31	7	2049	683
Kaisaniemenkatu	Fabianinkatu	Unioninkatu	16	31	9	24	8
Kaisaniemenkatu	Fabianinkatu	Unioninkatu	16	31	11	331	110
Kaisaniemenkatu	Fabianinkatu	Unioninkatu	16	32	2	205	26
Kaisaniemenkatu	Fabianinkatu	Unioninkatu	16	32	5	9	1
Kaisaniemenkatu	Fabianinkatu	Unioninkatu	16	32	7	2049	256
Kaisaniemenkatu	Fabianinkatu	Unioninkatu	16	32	9	97	12
Kaisaniemenkatu	Fabianinkatu	Unioninkatu	16	32	11	298	37
Kaisaniemenkatu	Fabianinkatu	Unioninkatu	16	34	2	2354	147
Kaisaniemenkatu	Fabianinkatu	Unioninkatu	16	34	5	92	6
Kaisaniemenkatu	Fabianinkatu	Unioninkatu	16	34	7	13712	857
Kaisaniemenkatu	Fabianinkatu	Unioninkatu	16	34	9	389	24
Kaisaniemenkatu	Fabianinkatu	Unioninkatu	16	34	11	3016	188
Unioninkatu	Kaisaniemenkatu	Siltavuorenranta	17	30	2	3234	270
Unioninkatu	Kaisaniemenkatu	Siltavuorenranta	17	30	5	20	2
Unioninkatu	Kaisaniemenkatu	Siltavuorenranta	17	30	7	17402	1450
Unioninkatu	Kaisaniemenkatu	Siltavuorenranta	17	30	9	844	70
Unioninkatu	Kaisaniemenkatu	Siltavuorenranta	17	30	11	3160	263
Unioninkatu	Kaisaniemenkatu	Siltavuorenranta	17	31	2	270	90
Unioninkatu	Kaisaniemenkatu	Siltavuorenranta	17	31	5	12	4
Unioninkatu	Kaisaniemenkatu	Siltavuorenranta	17	31	7	3626	1209
Unioninkatu	Kaisaniemenkatu	Siltavuorenranta	17	31	9	19	6
Unioninkatu	Kaisaniemenkatu	Siltavuorenranta	17	31	11	712	237
Unioninkatu	Kaisaniemenkatu	Siltavuorenranta	17	32	2	347	43
Unioninkatu	Kaisaniemenkatu	Siltavuorenranta	17	32	5	8	1
Unioninkatu	Kaisaniemenkatu	Siltavuorenranta	17	32	7	3142	393
Unioninkatu	Kaisaniemenkatu	Siltavuorenranta	17	32	9	107	13
Unioninkatu	Kaisaniemenkatu	Siltavuorenranta	17	32	11	579	72
Unioninkatu	Kaisaniemenkatu	Siltavuorenranta	17	34	2	3504	219
Unioninkatu	Kaisaniemenkatu	Siltavuorenranta	17	34	5	32	2
Unioninkatu	Kaisaniemenkatu	Siltavuorenranta	17	34	7	21028	1314
Unioninkatu	Kaisaniemenkatu	Siltavuorenranta	17	34	9	863	54
Unioninkatu	Kaisaniemenkatu	Siltavuorenranta	17	34	11	3872	242
Siltasaarenkatu	Siltavuorenranta	Hakaniemenranta	18	30	2	2470	206
Siltasaarenkatu	Siltavuorenranta	Hakaniemenranta	18	30	5	56	5
Siltasaarenkatu	Siltavuorenranta	Hakaniemenranta	18	30	7	15128	1261
Siltasaarenkatu	Siltavuorenranta	Hakaniemenranta	18	30	9	690	57
Siltasaarenkatu	Siltavuorenranta	Hakaniemenranta	18	30	11	2869	239
Siltasaarenkatu	Siltavuorenranta	Hakaniemenranta	18	31	2	206	69

Siltasaarenkatu	Siltavuorenranta	Hakaniemenranta	18	31	5	32	11
Siltasaarenkatu	Siltavuorenranta	Hakaniemenranta	18	31	7	3152	1051
Siltasaarenkatu	Siltavuorenranta	Hakaniemenranta	18	31	9	16	5
Siltasaarenkatu	Siltavuorenranta	Hakaniemenranta	18	31	11	647	216
Siltasaarenkatu	Siltavuorenranta	Hakaniemenranta	18	32	2	265	33
Siltasaarenkatu	Siltavuorenranta	Hakaniemenranta	18	32	5	24	3
Siltasaarenkatu	Siltavuorenranta	Hakaniemenranta	18	32	7	2731	341
Siltasaarenkatu	Siltavuorenranta	Hakaniemenranta	18	32	9	87	11
Siltasaarenkatu	Siltavuorenranta	Hakaniemenranta	18	32	11	525	66
Siltasaarenkatu	Siltavuorenranta	Hakaniemenranta	18	34	2	2676	167
Siltasaarenkatu	Siltavuorenranta	Hakaniemenranta	18	34	5	88	6
Siltasaarenkatu	Siltavuorenranta	Hakaniemenranta	18	34	7	18280	1142
Siltasaarenkatu	Siltavuorenranta	Hakaniemenranta	18	34	9	706	44
Siltasaarenkatu	Siltavuorenranta	Hakaniemenranta	18	34	11	3516	220
Siltasaarenkatu	Hakaniemenranta	Hämeentie	19	30	2	1770	147
Siltasaarenkatu	Hakaniemenranta	Hämeentie	19	30	5	34	3
Siltasaarenkatu	Hakaniemenranta	Hämeentie	19	30	7	10929	911
Siltasaarenkatu	Hakaniemenranta	Hämeentie	19	30	9	385	32
Siltasaarenkatu	Hakaniemenranta	Hämeentie	19	30	11	2726	227
Siltasaarenkatu	Hakaniemenranta	Hämeentie	19	31	2	147	49
Siltasaarenkatu	Hakaniemenranta	Hämeentie	19	31	5	20	7
Siltasaarenkatu	Hakaniemenranta	Hämeentie	19	31	7	2277	759
Siltasaarenkatu	Hakaniemenranta	Hämeentie	19	31	9	9	3
Siltasaarenkatu	Hakaniemenranta	Hämeentie	19	31	11	614	205
Siltasaarenkatu	Hakaniemenranta	Hämeentie	19	32	2	190	24
Siltasaarenkatu	Hakaniemenranta	Hämeentie	19	32	5	14	2
Siltasaarenkatu	Hakaniemenranta	Hämeentie	19	32	7	1973	247
Siltasaarenkatu	Hakaniemenranta	Hämeentie	19	32	9	49	6
Siltasaarenkatu	Hakaniemenranta	Hämeentie	19	32	11	499	62
Siltasaarenkatu	Hakaniemenranta	Hämeentie	19	34	2	1917	120
Siltasaarenkatu	Hakaniemenranta	Hämeentie	19	34	5	54	3
Siltasaarenkatu	Hakaniemenranta	Hämeentie	19	34	7	13206	825
Siltasaarenkatu	Hakaniemenranta	Hämeentie	19	34	9	393	25
Siltasaarenkatu	Hakaniemenranta	Hämeentie	19	34	11	3341	209
Hämeentie	Siltasaarenkatu	Toinen linja	20	30	2	1016	85
Hämeentie	Siltasaarenkatu	Toinen linja	20	30	5	21	2
Hämeentie	Siltasaarenkatu	Toinen linja	20	30	7	6179	515
Hämeentie	Siltasaarenkatu	Toinen linja	20	30	9	255	21
Hämeentie	Siltasaarenkatu	Toinen linja	20	30	11	2401	200
Hämeentie	Siltasaarenkatu	Toinen linja	20	31	2	85	28
Hämeentie	Siltasaarenkatu	Toinen linja	20	31	5	12	4
Hämeentie	Siltasaarenkatu	Toinen linja	20	31	7	1287	429
Hämeentie	Siltasaarenkatu	Toinen linja	20	31	9	6	2
Hämeentie	Siltasaarenkatu	Toinen linja	20	31	11	541	180
Hämeentie	Siltasaarenkatu	Toinen linja	20	32	2	109	14
Hämeentie	Siltasaarenkatu	Toinen linja	20	32	5	9	1
Hämeentie	Siltasaarenkatu	Toinen linja	20	32	7	1116	139
Hämeentie	Siltasaarenkatu	Toinen linja	20	32	9	32	4
Hämeentie	Siltasaarenkatu	Toinen linja	20	32	11	440	55
Hämeentie	Siltasaarenkatu	Toinen linja	20	34	2	1100	69

Hämeentie	Siltasaarenkatu	Toinen linja	20	34	5	33	2
Hämeentie	Siltasaarenkatu	Toinen linja	20	34	7	7466	467
Hämeentie	Siltasaarenkatu	Toinen linja	20	34	9	261	16
Hämeentie	Siltasaarenkatu	Toinen linja	20	34	11	2942	184
Hämeentie	Toinen linja	Kolmas linja	21	30	2	1342	112
Hämeentie	Toinen linja	Kolmas linja	21	30	5	19	2
Hämeentie	Toinen linja	Kolmas linja	21	30	7	7137	595
Hämeentie	Toinen linja	Kolmas linja	21	30	9	398	33
Hämeentie	Toinen linja	Kolmas linja	21	30	11	2581	215
Hämeentie	Toinen linja	Kolmas linja	21	31	2	112	37
Hämeentie	Toinen linja	Kolmas linja	21	31	5	11	4
Hämeentie	Toinen linja	Kolmas linja	21	31	7	1487	496
Hämeentie	Toinen linja	Kolmas linja	21	31	9	9	3
Hämeentie	Toinen linja	Kolmas linja	21	31	11	582	194
Hämeentie	Toinen linja	Kolmas linja	21	32	2	144	18
Hämeentie	Toinen linja	Kolmas linja	21	32	5	8	1
Hämeentie	Toinen linja	Kolmas linja	21	32	7	1289	161
Hämeentie	Toinen linja	Kolmas linja	21	32	9	50	6
Hämeentie	Toinen linja	Kolmas linja	21	32	11	473	59
Hämeentie	Toinen linja	Kolmas linja	21	34	2	1454	91
Hämeentie	Toinen linja	Kolmas linja	21	34	5	30	2
Hämeentie	Toinen linja	Kolmas linja	21	34	7	8623	539
Hämeentie	Toinen linja	Kolmas linja	21	34	9	407	25
Hämeentie	Toinen linja	Kolmas linja	21	34	11	3162	198
Hämeentie	Kolmas linja	Haapaniemenkatu	22	30	2	1294	108
Hämeentie	Kolmas linja	Haapaniemenkatu	22	30	5	25	2
Hämeentie	Kolmas linja	Haapaniemenkatu	22	30	7	8023	669
Hämeentie	Kolmas linja	Haapaniemenkatu	22	30	9	322	27
Hämeentie	Kolmas linja	Haapaniemenkatu	22	30	11	2443	204
Hämeentie	Kolmas linja	Haapaniemenkatu	22	31	2	108	36
Hämeentie	Kolmas linja	Haapaniemenkatu	22	31	5	14	5
Hämeentie	Kolmas linja	Haapaniemenkatu	22	31	7	1671	557
Hämeentie	Kolmas linja	Haapaniemenkatu	22	31	9	7	2
Hämeentie	Kolmas linja	Haapaniemenkatu	22	31	11	551	184
Hämeentie	Kolmas linja	Haapaniemenkatu	22	32	2	139	17
Hämeentie	Kolmas linja	Haapaniemenkatu	22	32	5	10	1
Hämeentie	Kolmas linja	Haapaniemenkatu	22	32	7	1449	181
Hämeentie	Kolmas linja	Haapaniemenkatu	22	32	9	41	5
Hämeentie	Kolmas linja	Haapaniemenkatu	22	32	11	447	56
Hämeentie	Kolmas linja	Haapaniemenkatu	22	34	2	1401	88
Hämeentie	Kolmas linja	Haapaniemenkatu	22	34	5	39	2
Hämeentie	Kolmas linja	Haapaniemenkatu	22	34	7	9694	606
Hämeentie	Kolmas linja	Haapaniemenkatu	22	34	9	329	21
Hämeentie	Kolmas linja	Haapaniemenkatu	22	34	11	2994	187
Hämeentie	Haapaniemenkatu	Helsinginkatu	23	30	2	1399	117
Hämeentie	Haapaniemenkatu	Helsinginkatu	23	30	5	20	2
Hämeentie	Haapaniemenkatu	Helsinginkatu	23	30	7	9195	766
Hämeentie	Haapaniemenkatu	Helsinginkatu	23	30	9	417	35
Hämeentie	Haapaniemenkatu	Helsinginkatu	23	30	11	2447	204
Hämeentie	Haapaniemenkatu	Helsinginkatu	23	31	2	117	39

Hämeentie	Haapaniemenkatu	Helsinginkatu	23	31	5	11	4
Hämeentie	Haapaniemenkatu	Helsinginkatu	23	31	7	1916	639
Hämeentie	Haapaniemenkatu	Helsinginkatu	23	31	9	10	3
Hämeentie	Haapaniemenkatu	Helsinginkatu	23	31	11	551	184
Hämeentie	Haapaniemenkatu	Helsinginkatu	23	32	2	150	19
Hämeentie	Haapaniemenkatu	Helsinginkatu	23	32	5	8	1
Hämeentie	Haapaniemenkatu	Helsinginkatu	23	32	7	1660	208
Hämeentie	Haapaniemenkatu	Helsinginkatu	23	32	9	53	7
Hämeentie	Haapaniemenkatu	Helsinginkatu	23	32	11	448	56
Hämeentie	Haapaniemenkatu	Helsinginkatu	23	34	2	1515	95
Hämeentie	Haapaniemenkatu	Helsinginkatu	23	34	5	31	2
Hämeentie	Haapaniemenkatu	Helsinginkatu	23	34	7	11111	694
Hämeentie	Haapaniemenkatu	Helsinginkatu	23	34	9	426	27
Hämeentie	Haapaniemenkatu	Helsinginkatu	23	34	11	2998	187
Hämeentie	Helsinginkatu	Mäkelänkatu	24	30	2	2922	243
Hämeentie	Helsinginkatu	Mäkelänkatu	24	30	5	39	3
Hämeentie	Helsinginkatu	Mäkelänkatu	24	30	7	12829	1069
Hämeentie	Helsinginkatu	Mäkelänkatu	24	30	9	744	62
Hämeentie	Helsinginkatu	Mäkelänkatu	24	30	11	2883	240
Hämeentie	Helsinginkatu	Mäkelänkatu	24	31	2	243	81
Hämeentie	Helsinginkatu	Mäkelänkatu	24	31	5	23	8
Hämeentie	Helsinginkatu	Mäkelänkatu	24	31	7	2673	891
Hämeentie	Helsinginkatu	Mäkelänkatu	24	31	9	17	6
Hämeentie	Helsinginkatu	Mäkelänkatu	24	31	11	650	217
Hämeentie	Helsinginkatu	Mäkelänkatu	24	32	2	313	39
Hämeentie	Helsinginkatu	Mäkelänkatu	24	32	5	16	2
Hämeentie	Helsinginkatu	Mäkelänkatu	24	32	7	2316	290
Hämeentie	Helsinginkatu	Mäkelänkatu	24	32	9	94	12
Hämeentie	Helsinginkatu	Mäkelänkatu	24	32	11	528	66
Hämeentie	Helsinginkatu	Mäkelänkatu	24	34	2	3165	198
Hämeentie	Helsinginkatu	Mäkelänkatu	24	34	5	62	4
Hämeentie	Helsinginkatu	Mäkelänkatu	24	34	7	15502	969
Hämeentie	Helsinginkatu	Mäkelänkatu	24	34	9	761	48
Hämeentie	Helsinginkatu	Mäkelänkatu	24	34	11	3533	221
Hämeentie	Mäkelänkatu	Vellamonkatu	25	30	2	1264	105
Hämeentie	Mäkelänkatu	Vellamonkatu	25	30	5	31	3
Hämeentie	Mäkelänkatu	Vellamonkatu	25	30	7	6671	556
Hämeentie	Mäkelänkatu	Vellamonkatu	25	30	9	347	29
Hämeentie	Mäkelänkatu	Vellamonkatu	25	30	11	1305	109
Hämeentie	Mäkelänkatu	Vellamonkatu	25	31	2	170	57
Hämeentie	Mäkelänkatu	Vellamonkatu	25	31	5	5	2
Hämeentie	Mäkelänkatu	Vellamonkatu	25	31	7	1229	410
Hämeentie	Mäkelänkatu	Vellamonkatu	25	31	9	32	11
Hämeentie	Mäkelänkatu	Vellamonkatu	25	31	11	280	93
Hämeentie	Mäkelänkatu	Vellamonkatu	25	32	2	108	13
Hämeentie	Mäkelänkatu	Vellamonkatu	25	32	5	0	0
Hämeentie	Mäkelänkatu	Vellamonkatu	25	32	7	878	110
Hämeentie	Mäkelänkatu	Vellamonkatu	25	32	9	24	3
Hämeentie	Mäkelänkatu	Vellamonkatu	25	32	11	280	35
Hämeentie	Mäkelänkatu	Vellamonkatu	25	34	2	1433	90

Hämeentie	Mäkelänkatu	Vellamonkatu	25	34	5	36	2
Hämeentie	Mäkelänkatu	Vellamonkatu	25	34	7	7900	494
Hämeentie	Mäkelänkatu	Vellamonkatu	25	34	9	380	24
Hämeentie	Mäkelänkatu	Vellamonkatu	25	34	11	1584	99
Hämeentie	Vellamonkatu	Sturenkatu	26	30	2	1282	107
Hämeentie	Vellamonkatu	Sturenkatu	26	30	5	31	3
Hämeentie	Vellamonkatu	Sturenkatu	26	30	7	6769	564
Hämeentie	Vellamonkatu	Sturenkatu	26	30	9	352	29
Hämeentie	Vellamonkatu	Sturenkatu	26	30	11	1324	110
Hämeentie	Vellamonkatu	Sturenkatu	26	31	2	172	57
Hämeentie	Vellamonkatu	Sturenkatu	26	31	5	5	2
Hämeentie	Vellamonkatu	Sturenkatu	26	31	7	1247	416
Hämeentie	Vellamonkatu	Sturenkatu	26	31	9	33	11
Hämeentie	Vellamonkatu	Sturenkatu	26	31	11	284	95
Hämeentie	Vellamonkatu	Sturenkatu	26	32	2	109	14
Hämeentie	Vellamonkatu	Sturenkatu	26	32	5	0	0
Hämeentie	Vellamonkatu	Sturenkatu	26	32	7	891	111
Hämeentie	Vellamonkatu	Sturenkatu	26	32	9	25	3
Hämeentie	Vellamonkatu	Sturenkatu	26	32	11	284	35
Hämeentie	Vellamonkatu	Sturenkatu	26	34	2	1454	91
Hämeentie	Vellamonkatu	Sturenkatu	26	34	5	36	2
Hämeentie	Vellamonkatu	Sturenkatu	26	34	7	8016	501
Hämeentie	Vellamonkatu	Sturenkatu	26	34	9	384	24
Hämeentie	Vellamonkatu	Sturenkatu	26	34	11	1607	100
Hämeentie	Sturenkatu	Haukilahdenkatu	27	30	2	2335	195
Hämeentie	Sturenkatu	Haukilahdenkatu	27	30	5	74	6
Hämeentie	Sturenkatu	Haukilahdenkatu	27	30	7	16121	1343
Hämeentie	Sturenkatu	Haukilahdenkatu	27	30	9	810	68
Hämeentie	Sturenkatu	Haukilahdenkatu	27	30	11	1420	118
Hämeentie	Sturenkatu	Haukilahdenkatu	27	31	2	313	104
Hämeentie	Sturenkatu	Haukilahdenkatu	27	31	5	12	4
Hämeentie	Sturenkatu	Haukilahdenkatu	27	31	7	2970	990
Hämeentie	Sturenkatu	Haukilahdenkatu	27	31	9	75	25
Hämeentie	Sturenkatu	Haukilahdenkatu	27	31	11	304	101
Hämeentie	Sturenkatu	Haukilahdenkatu	27	32	2	199	25
Hämeentie	Sturenkatu	Haukilahdenkatu	27	32	5	0	0
Hämeentie	Sturenkatu	Haukilahdenkatu	27	32	7	2121	265
Hämeentie	Sturenkatu	Haukilahdenkatu	27	32	9	57	7
Hämeentie	Sturenkatu	Haukilahdenkatu	27	32	11	304	38
Hämeentie	Sturenkatu	Haukilahdenkatu	27	34	2	2648	165
Hämeentie	Sturenkatu	Haukilahdenkatu	27	34	5	86	5
Hämeentie	Sturenkatu	Haukilahdenkatu	27	34	7	19091	1193
Hämeentie	Sturenkatu	Haukilahdenkatu	27	34	9	885	55
Hämeentie	Sturenkatu	Haukilahdenkatu	27	34	11	1724	108
Hämeentie	Haukilahdenkatu	Hermannin rantatie	28	30	2	2739	228
Hämeentie	Haukilahdenkatu	Hermannin rantatie	28	30	5	120	10
Hämeentie	Haukilahdenkatu	Hermannin rantatie	28	30	7	16158	1346
Hämeentie	Haukilahdenkatu	Hermannin rantatie	28	30	9	800	67
Hämeentie	Haukilahdenkatu	Hermannin rantatie	28	30	11	1778	148
Hämeentie	Haukilahdenkatu	Hermannin rantatie	28	31	2	367	122

Hämeentie	Haukilahdenkatu	Hermannin rantatie	28	31	5	20	7
Hämeentie	Haukilahdenkatu	Hermannin rantatie	28	31	7	2976	992
Hämeentie	Haukilahdenkatu	Hermannin rantatie	28	31	9	74	25
Hämeentie	Haukilahdenkatu	Hermannin rantatie	28	31	11	381	127
Hämeentie	Haukilahdenkatu	Hermannin rantatie	28	32	2	234	29
Hämeentie	Haukilahdenkatu	Hermannin rantatie	28	32	5	0	0
Hämeentie	Haukilahdenkatu	Hermannin rantatie	28	32	7	2126	266
Hämeentie	Haukilahdenkatu	Hermannin rantatie	28	32	9	56	7
Hämeentie	Haukilahdenkatu	Hermannin rantatie	28	32	11	381	48
Hämeentie	Haukilahdenkatu	Hermannin rantatie	28	34	2	3106	194
Hämeentie	Haukilahdenkatu	Hermannin rantatie	28	34	5	140	9
Hämeentie	Haukilahdenkatu	Hermannin rantatie	28	34	7	19134	1196
Hämeentie	Haukilahdenkatu	Hermannin rantatie	28	34	9	874	55
Hämeentie	Haukilahdenkatu	Hermannin rantatie	28	34	11	2159	135
Hämeentie	Hermannin rantatie	Kustaa Vaasan tie	29	30	2	4028	336
Hämeentie	Hermannin rantatie	Kustaa Vaasan tie	29	30	5	94	8
Hämeentie	Hermannin rantatie	Kustaa Vaasan tie	29	30	7	26046	2170
Hämeentie	Hermannin rantatie	Kustaa Vaasan tie	29	30	9	3099	258
Hämeentie	Hermannin rantatie	Kustaa Vaasan tie	29	30	11	1684	140
Hämeentie	Hermannin rantatie	Kustaa Vaasan tie	29	31	2	540	180
Hämeentie	Hermannin rantatie	Kustaa Vaasan tie	29	31	5	15	5
Hämeentie	Hermannin rantatie	Kustaa Vaasan tie	29	31	7	4798	1599
Hämeentie	Hermannin rantatie	Kustaa Vaasan tie	29	31	9	288	96
Hämeentie	Hermannin rantatie	Kustaa Vaasan tie	29	31	11	361	120
Hämeentie	Hermannin rantatie	Kustaa Vaasan tie	29	32	2	344	43
Hämeentie	Hermannin rantatie	Kustaa Vaasan tie	29	32	5	0	0
Hämeentie	Hermannin rantatie	Kustaa Vaasan tie	29	32	7	3427	428
Hämeentie	Hermannin rantatie	Kustaa Vaasan tie	29	32	9	216	27
Hämeentie	Hermannin rantatie	Kustaa Vaasan tie	29	32	11	361	45
Hämeentie	Hermannin rantatie	Kustaa Vaasan tie	29	34	2	4568	286
Hämeentie	Hermannin rantatie	Kustaa Vaasan tie	29	34	5	109	7
Hämeentie	Hermannin rantatie	Kustaa Vaasan tie	29	34	7	30844	1928
Hämeentie	Hermannin rantatie	Kustaa Vaasan tie	29	34	9	3387	212
Hämeentie	Hermannin rantatie	Kustaa Vaasan tie	29	34	11	2044	128
Kustaa Vaasan tie	Hämeentie	Väinö Auerin katu	30	30	2	3756	313
Kustaa Vaasan tie	Hämeentie	Väinö Auerin katu	30	30	5	150	12
Kustaa Vaasan tie	Hämeentie	Väinö Auerin katu	30	30	7	24274	2023
Kustaa Vaasan tie	Hämeentie	Väinö Auerin katu	30	30	9	2602	217
Kustaa Vaasan tie	Hämeentie	Väinö Auerin katu	30	30	11	1710	143
Kustaa Vaasan tie	Hämeentie	Väinö Auerin katu	30	31	2	504	168
Kustaa Vaasan tie	Hämeentie	Väinö Auerin katu	30	31	5	24	8
Kustaa Vaasan tie	Hämeentie	Väinö Auerin katu	30	31	7	4472	1491
Kustaa Vaasan tie	Hämeentie	Väinö Auerin katu	30	31	9	242	81
Kustaa Vaasan tie	Hämeentie	Väinö Auerin katu	30	31	11	366	122
Kustaa Vaasan tie	Hämeentie	Väinö Auerin katu	30	32	2	321	40
Kustaa Vaasan tie	Hämeentie	Väinö Auerin katu	30	32	5	0	0
Kustaa Vaasan tie	Hämeentie	Väinö Auerin katu	30	32	7	3194	399
Kustaa Vaasan tie	Hämeentie	Väinö Auerin katu	30	32	9	182	23
Kustaa Vaasan tie	Hämeentie	Väinö Auerin katu	30	32	11	366	46
Kustaa Vaasan tie	Hämeentie	Väinö Auerin katu	30	34	2	4260	266

Kustaa Vaasan tie	Hämeentie	Väinö Auerin katu	30	34	5	174	11
Kustaa Vaasan tie	Hämeentie	Väinö Auerin katu	30	34	7	28746	1797
Kustaa Vaasan tie	Hämeentie	Väinö Auerin katu	30	34	9	2844	178
Kustaa Vaasan tie	Hämeentie	Väinö Auerin katu	30	34	11	2077	130
Väinö Auerin katu + Intiankatu	Kustaa Vaasan tie	Koskelantie	31	30	2	1005	84
Väinö Auerin katu + Intiankatu	Kustaa Vaasan tie	Koskelantie	31	30	5	30	3
Väinö Auerin katu + Intiankatu	Kustaa Vaasan tie	Koskelantie	31	30	7	3031	253
Väinö Auerin katu + Intiankatu	Kustaa Vaasan tie	Koskelantie	31	30	9	574	48
Väinö Auerin katu + Intiankatu	Kustaa Vaasan tie	Koskelantie	31	30	11	231	19
Väinö Auerin katu + Intiankatu	Kustaa Vaasan tie	Koskelantie	31	31	2	135	45
Väinö Auerin katu + Intiankatu	Kustaa Vaasan tie	Koskelantie	31	31	5	5	2
Väinö Auerin katu + Intiankatu	Kustaa Vaasan tie	Koskelantie	31	31	7	558	186
Väinö Auerin katu + Intiankatu	Kustaa Vaasan tie	Koskelantie	31	31	9	53	18
Väinö Auerin katu + Intiankatu	Kustaa Vaasan tie	Koskelantie	31	31	11	50	17
Väinö Auerin katu + Intiankatu	Kustaa Vaasan tie	Koskelantie	31	32	2	86	11
Väinö Auerin katu + Intiankatu	Kustaa Vaasan tie	Koskelantie	31	32	5	0	0
Väinö Auerin katu + Intiankatu	Kustaa Vaasan tie	Koskelantie	31	32	7	399	50
Väinö Auerin katu + Intiankatu	Kustaa Vaasan tie	Koskelantie	31	32	9	40	5
Väinö Auerin katu + Intiankatu	Kustaa Vaasan tie	Koskelantie	31	32	11	50	6
Väinö Auerin katu + Intiankatu	Kustaa Vaasan tie	Koskelantie	31	34	2	1140	71
Väinö Auerin katu + Intiankatu	Kustaa Vaasan tie	Koskelantie	31	34	5	35	2
Väinö Auerin katu + Intiankatu	Kustaa Vaasan tie	Koskelantie	31	34	7	3589	224
Väinö Auerin katu + Intiankatu	Kustaa Vaasan tie	Koskelantie	31	34	9	628	39
Väinö Auerin katu + Intiankatu	Kustaa Vaasan tie	Koskelantie	31	34	11	281	18
Koskelantie	Intiankatu	Kunnalliskodintie	32	30	2	2018	168
Koskelantie	Intiankatu	Kunnalliskodintie	32	30	5	75	6
Koskelantie	Intiankatu	Kunnalliskodintie	32	30	7	10024	835
Koskelantie	Intiankatu	Kunnalliskodintie	32	30	9	1410	118
Koskelantie	Intiankatu	Kunnalliskodintie	32	30	11	305	25
Koskelantie	Intiankatu	Kunnalliskodintie	32	31	2	271	90
Koskelantie	Intiankatu	Kunnalliskodintie	32	31	5	12	4
Koskelantie	Intiankatu	Kunnalliskodintie	32	31	7	1847	616
Koskelantie	Intiankatu	Kunnalliskodintie	32	31	9	131	44
Koskelantie	Intiankatu	Kunnalliskodintie	32	31	11	65	22
Koskelantie	Intiankatu	Kunnalliskodintie	32	32	2	172	22
Koskelantie	Intiankatu	Kunnalliskodintie	32	32	5	0	0
Koskelantie	Intiankatu	Kunnalliskodintie	32	32	7	1319	165
Koskelantie	Intiankatu	Kunnalliskodintie	32	32	9	98	12
Koskelantie	Intiankatu	Kunnalliskodintie	32	32	11	65	8
Koskelantie	Intiankatu	Kunnalliskodintie	32	34	2	2289	143
Koskelantie	Intiankatu	Kunnalliskodintie	32	34	5	87	5
Koskelantie	Intiankatu	Kunnalliskodintie	32	34	7	11871	742
Koskelantie	Intiankatu	Kunnalliskodintie	32	34	9	1542	96
Koskelantie	Intiankatu	Kunnalliskodintie	32	34	11	370	23
Kunnalliskodintie	Koskelantie	Antti Korpin tie	33	30	2	694	58
Kunnalliskodintie	Koskelantie	Antti Korpin tie	33	30	5	48	4
Kunnalliskodintie	Koskelantie	Antti Korpin tie	33	30	7	4033	336
Kunnalliskodintie	Koskelantie	Antti Korpin tie	33	30	9	246	20
Kunnalliskodintie	Koskelantie	Antti Korpin tie	33	30	11	39	3
Kunnalliskodintie	Koskelantie	Antti Korpin tie	33	31	2	93	31

Kunnalliskodintie	Koskelantie	Antti Korpin tie	33	31	5	8	3
Kunnalliskodintie	Koskelantie	Antti Korpin tie	33	31	7	743	248
Kunnalliskodintie	Koskelantie	Antti Korpin tie	33	31	9	23	8
Kunnalliskodintie	Koskelantie	Antti Korpin tie	33	31	11	8	3
Kunnalliskodintie	Koskelantie	Antti Korpin tie	33	32	2	59	7
Kunnalliskodintie	Koskelantie	Antti Korpin tie	33	32	5	0	0
Kunnalliskodintie	Koskelantie	Antti Korpin tie	33	32	7	531	66
Kunnalliskodintie	Koskelantie	Antti Korpin tie	33	32	9	17	2
Kunnalliskodintie	Koskelantie	Antti Korpin tie	33	32	11	8	1
Kunnalliskodintie	Koskelantie	Antti Korpin tie	33	34	2	787	49
Kunnalliskodintie	Koskelantie	Antti Korpin tie	33	34	5	56	4
Kunnalliskodintie	Koskelantie	Antti Korpin tie	33	34	7	4776	299
Kunnalliskodintie	Koskelantie	Antti Korpin tie	33	34	9	269	17
Kunnalliskodintie	Koskelantie	Antti Korpin tie	33	34	11	48	3
Antti Korpin tie	Kunnalliskodintie	Juhana-Herttuan tie	34	30	2	246	21
Antti Korpin tie	Kunnalliskodintie	Juhana-Herttuan tie	34	30	5	9	1
Antti Korpin tie	Kunnalliskodintie	Juhana-Herttuan tie	34	30	7	1520	127
Antti Korpin tie	Kunnalliskodintie	Juhana-Herttuan tie	34	30	9	86	7
Antti Korpin tie	Kunnalliskodintie	Juhana-Herttuan tie	34	30	11	74	6
Antti Korpin tie	Kunnalliskodintie	Juhana-Herttuan tie	34	31	2	33	11
Antti Korpin tie	Kunnalliskodintie	Juhana-Herttuan tie	34	31	5	1	0
Antti Korpin tie	Kunnalliskodintie	Juhana-Herttuan tie	34	31	7	280	93
Antti Korpin tie	Kunnalliskodintie	Juhana-Herttuan tie	34	31	9	8	3
Antti Korpin tie	Kunnalliskodintie	Juhana-Herttuan tie	34	31	11	16	5
Antti Korpin tie	Kunnalliskodintie	Juhana-Herttuan tie	34	32	2	21	3
Antti Korpin tie	Kunnalliskodintie	Juhana-Herttuan tie	34	32	5	0	0
Antti Korpin tie	Kunnalliskodintie	Juhana-Herttuan tie	34	32	7	200	25
Antti Korpin tie	Kunnalliskodintie	Juhana-Herttuan tie	34	32	9	6	1
Antti Korpin tie	Kunnalliskodintie	Juhana-Herttuan tie	34	32	11	16	2
Antti Korpin tie	Kunnalliskodintie	Juhana-Herttuan tie	34	34	2	279	17
Antti Korpin tie	Kunnalliskodintie	Juhana-Herttuan tie	34	34	5	10	1
Antti Korpin tie	Kunnalliskodintie	Juhana-Herttuan tie	34	34	7	1800	113
Antti Korpin tie	Kunnalliskodintie	Juhana-Herttuan tie	34	34	9	94	6
Antti Korpin tie	Kunnalliskodintie	Juhana-Herttuan tie	34	34	11	89	6
Juhana-Herttuan tie	Antti Korpin tie	Voudintie	35	30	2	123	10
Juhana-Herttuan tie	Antti Korpin tie	Voudintie	35	30	5	9	1
Juhana-Herttuan tie	Antti Korpin tie	Voudintie	35	30	7	608	51
Juhana-Herttuan tie	Antti Korpin tie	Voudintie	35	30	9	34	3
Juhana-Herttuan tie	Antti Korpin tie	Voudintie	35	30	11	34	3
Juhana-Herttuan tie	Antti Korpin tie	Voudintie	35	31	2	17	6
Juhana-Herttuan tie	Antti Korpin tie	Voudintie	35	31	5	1	0
Juhana-Herttuan tie	Antti Korpin tie	Voudintie	35	31	7	112	37
Juhana-Herttuan tie	Antti Korpin tie	Voudintie	35	31	9	3	1
Juhana-Herttuan tie	Antti Korpin tie	Voudintie	35	31	11	7	2
Juhana-Herttuan tie	Antti Korpin tie	Voudintie	35	32	2	11	1
Juhana-Herttuan tie	Antti Korpin tie	Voudintie	35	32	5	0	0
Juhana-Herttuan tie	Antti Korpin tie	Voudintie	35	32	7	80	10
Juhana-Herttuan tie	Antti Korpin tie	Voudintie	35	32	9	2	0
Juhana-Herttuan tie	Antti Korpin tie	Voudintie	35	32	11	7	1
Juhana-Herttuan tie	Antti Korpin tie	Voudintie	35	34	2	140	9

Juhana-Herttuan tie	Antti Korpin tie	Voudintie	35	34	5	10	1
Juhana-Herttuan tie	Antti Korpin tie	Voudintie	35	34	7	720	45
Juhana-Herttuan tie	Antti Korpin tie	Voudintie	35	34	9	38	2
Juhana-Herttuan tie	Antti Korpin tie	Voudintie	35	34	11	42	3
Antti Korpin tie	Voudintie	Juhana-Herttuan tie	36	30	2	82	7
Antti Korpin tie	Voudintie	Juhana-Herttuan tie	36	30	5	9	1
Antti Korpin tie	Voudintie	Juhana-Herttuan tie	36	30	7	456	38
Antti Korpin tie	Voudintie	Juhana-Herttuan tie	36	30	9	26	2
Antti Korpin tie	Voudintie	Juhana-Herttuan tie	36	30	11	39	3
Antti Korpin tie	Voudintie	Juhana-Herttuan tie	36	31	2	11	4
Antti Korpin tie	Voudintie	Juhana-Herttuan tie	36	31	5	1	0
Antti Korpin tie	Voudintie	Juhana-Herttuan tie	36	31	7	84	28
Antti Korpin tie	Voudintie	Juhana-Herttuan tie	36	31	9	2	1
Antti Korpin tie	Voudintie	Juhana-Herttuan tie	36	31	11	8	3
Antti Korpin tie	Voudintie	Juhana-Herttuan tie	36	32	2	7	1
Antti Korpin tie	Voudintie	Juhana-Herttuan tie	36	32	5	0	0
Antti Korpin tie	Voudintie	Juhana-Herttuan tie	36	32	7	60	8
Antti Korpin tie	Voudintie	Juhana-Herttuan tie	36	32	9	2	0
Antti Korpin tie	Voudintie	Juhana-Herttuan tie	36	32	11	8	1
Antti Korpin tie	Voudintie	Juhana-Herttuan tie	36	34	2	93	6
Antti Korpin tie	Voudintie	Juhana-Herttuan tie	36	34	5	10	1
Antti Korpin tie	Voudintie	Juhana-Herttuan tie	36	34	7	540	34
Antti Korpin tie	Voudintie	Juhana-Herttuan tie	36	34	9	28	2
Antti Korpin tie	Voudintie	Juhana-Herttuan tie	36	34	11	48	3
Voudintie	Juhana-Herttuan tie	umpikuja	37	30	2	25	2
Voudintie	Juhana-Herttuan tie	umpikuja	37	30	5	4	0
Voudintie	Juhana-Herttuan tie	umpikuja	37	30	7	152	13
Voudintie	Juhana-Herttuan tie	umpikuja	37	30	9	9	1
Voudintie	Juhana-Herttuan tie	umpikuja	37	30	11	74	6
Voudintie	Juhana-Herttuan tie	umpikuja	37	31	2	3	1
Voudintie	Juhana-Herttuan tie	umpikuja	37	31	5	1	0
Voudintie	Juhana-Herttuan tie	umpikuja	37	31	7	28	9
Voudintie	Juhana-Herttuan tie	umpikuja	37	31	9	1	0
Voudintie	Juhana-Herttuan tie	umpikuja	37	31	11	16	5
Voudintie	Juhana-Herttuan tie	umpikuja	37	32	2	2	0
Voudintie	Juhana-Herttuan tie	umpikuja	37	32	5	0	0
Voudintie	Juhana-Herttuan tie	umpikuja	37	32	7	20	3
Voudintie	Juhana-Herttuan tie	umpikuja	37	32	9	1	0
Voudintie	Juhana-Herttuan tie	umpikuja	37	32	11	16	2
Voudintie	Juhana-Herttuan tie	umpikuja	37	34	2	28	2
Voudintie	Juhana-Herttuan tie	umpikuja	37	34	5	5	0
Voudintie	Juhana-Herttuan tie	umpikuja	37	34	7	180	11
Voudintie	Juhana-Herttuan tie	umpikuja	37	34	9	9	1
Voudintie	Juhana-Herttuan tie	umpikuja	37	34	11	89	6