Flow Capacity of Bottlenecks in a Cycle Storage

By

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Summary

More than 40% of train travellers use a bicycle to get to the train station. To facilitate these travellers, big cycle storages are built at the stations. This master thesis intends to give more insight in the flow capacity of the bottlenecks of such facilities for future design of the cycle storages. In practice, bottlenecks in cycle storages are all locations at which cyclists walk next to their bicycle. Therefore this is the focus of this research. The research question of this thesis is: what is the capacity and the variation of the flow at capacity of a bicycle check-in, bicycle gate and bicycle stairs, and what is a suitable method to determine these values? The contribution of this thesis is twofold: 1) a method to measure a confidence interval for the capacity and the variation at capacity of a pedestrian bottleneck, and 2) capacity values for three common bottlenecks in cycle storages at stations. The bottlenecks that are considered are: cycle check-in using wall mounted Payter devices, cycle gate, and cycle stairs. The main results are shown at the images below, for a 95% confidence interval, on a per minute basis.

Check-in
Utrecht Jaarbeursplein
Capacity: 21.2 ±1.2 per minute.
Standard dev.: 3.5 per minute.

Gate
Zwolle Hanzelaan
Capacity: 6.83 ±0.35 per minute.
Standard dev.: 0.61 per minute.

Stairs (up)
Breda Centrumzijde
Capacity: 24.78 ±0.60 per minute.
Standard dev.: 1.02 per minute.

A clear and practical definition of capacity is essential to obtain usable results. Flow capacity is here defined as the queue discharge rate. The queue discharge rate is the average flow through the bottleneck while there is a queue directly upstream of the bottleneck. A fundamental assumption of this thesis is that the thus defined capacity can be considered to be independent of how long there has been a queue, or in other words: when there is a queue upstream of a bottleneck, flow can be described as a random variate with a constant mean and variation.

The method of this thesis can be summarized as follows: for each of the bottlenecks, measurements have been done which produced an event based log of the flow. During the measurements it was registered if there was a queue. The intervals during which there was a queue have been combined to create one large measurement at capacity. By computing the mean flow of this measurement, the flow capacity has been determined. By dividing the big measurements into intervals of the same size (span), a series of capacity measurements is created, of which the standard deviation was calculated. The standard deviation is a useful measure of the variation in itself, as an element with low standard deviation is preferred to an element with a high standard deviation. The standard deviation has also been used, in combination with the number of intervals (the sample size) to compute a confidence interval for the mean.

The conclusions of this thesis are the following:

1. The capacity of a bottleneck for people walking next to their bicycle in a cycle storage is the queue discharge rate. The queue discharge rate is measured independently of the measurement interval, and is the best measure of how much a bottleneck can handle.
2. The variation of the flow can be quantified by dividing the combined measurements into intervals, and calculating the standard deviation of these intervals. The flow shows autocorrelation, which should also be taken into account. For all locations that are considered in this research, dividing the flow showed that the flow was normally distributed.
3. The uncertainty of the capacity can be calculated using the standard deviation and the effective sample size. Because flow has been shown to be normally distributed, common ways to calculate uncertainty can be applied to flow at capacity in cycle storages.
4. A practical way of measuring bicycle flow is to manually create an event based log of the flow. Other measurement methods that have been considered proved less practical.
5. A 95% confidence interval of capacity values of the check-in in Utrecht, gate in Zwolle, and stairs in Breda are 21.2 ±1.2, 6.83 ±0.35, and 24.78 ±0.60 persons per minute respectively.
6. The standard deviations of the capacity flow of the check-in in Utrecht, gate in Zwolle, and stairs in Breda are 3.5, 0.61 and 1.02 persons per minute respectively.

Practitioners are recommended to use the method that is described in this research for future capacity measurements. Counting manually is a good, flexible and affordable option, although counting from video footage would enable checking data. When counting, tasks should be divided in such way that measurers generally do not need to click more than once per second. Measurements can generally be conducted best on a Tuesday evening, as that the busiest moment in a cycle storage. A single evening peak gives enough data if queues form. For locations at which queues do not occur in normal operations, queues can be created in an experiment.

A designer's task is to balance capacity and demand. The results of this study allow the designer to test a design with a simple queuing model. In general, a high capacity and low standard deviation are preferable. If a storage contains multiple elements that can be a bottleneck, there should be sufficient buffer space before the main bottleneck. It should be prevented that people have to wait on stairs for example.

Researchers are recommended to compare this method to other methods, and to apply the method to other pedestrian bottlenecks. As this method requires queues for capacity measurements, it would be useful to develop methods that do not need queues. Said methods could be calibrated and validated with the method of this thesis. For future research, a way to convert standard deviations of flow for different time steps which takes auto correlation into account seems the most logical next step.

Contents

List of figures

List of tables

1 Introduction

Bicycle storage is vital for the train travellers that access the station by bicycle, which is 40% of all train travellers in the Netherlands (NS, 2017). To store the bikes, 380.000 bicycle parking spots are available (Scheltema, 2013). Stimulating the combined use of public transport and cycling is one of the policies of the current government of the Netherlands. The coalition agreement stipulates that 100 million euros is available for co-financing bicycle infrastructure and bicycle parking, as well as that in the whole country the public transport must be well accessible by bike (VVD, CDA, D66, & CU, 2017). Bicycle use is being promoted as it can help alleviate the social (congestion) and environmental cost (pollution) of transport, and helps people to get enough exercise. Some other developments regarding bicycles are the growing number of electric bikes, bikes with crates in front, bicycle leasing and bike sharing.

Traditionally, transportation research has focussed on motorized modes, but active modes have been gaining interest recently. To properly assess bicycle infrastructure, scientific knowledge in this field is helpful. This thesis contributes by providing a method to measure capacity of bottlenecks in cycle storages (at which users generally walk next to their bicycle) and a measure of its uncertainty and the variation of the flow. The method that has been developed might prove useful to measure the capacity of bottlenecks for pedestrians without bicycles as well.

At train stations, ProRail and NS both have responsibilities regarding bicycle storages. In short, ProRail builds the facility, and NS does the exploitation. This research has been supported financially, practically and advisory by NS.

This introduction includes a problem statement, the objective and the research question. The second chapter contains information from outside sources on suitable definitions of flow capacity, and statistical measures that have been applied in this thesis. Data collection is described in chapter 3, data processing is described in chapter 4. Chapter 5 shows the results, including the variation in the flow, and a confidence interval for the capacity of each bottleneck that has been considered. The findings are summarized in the conclusion, which includes discussion and recommendations. Finally references are listed.

1.1 Problem statement

In some cycle storages, queues form regularly, because the peak flow demand is higher than the capacity of some bottlenecks. In general space around stations is scarce and budgets are limited, while everyone wants to minimize walking distance to the platform. Therefore cycle storage facilities cannot simply be built spaciously. Queues cause unsafe situations and irritations, and people may even have missed their train. Additionally, to avoid queueing, people tend to store their cycle in a different place that is less desirable from a planning perspective. All in all, queues do not fit in the policy of stimulating bicycle use. When interviewed by a company named STBY (van Dijk, 2014), travellers named stairs, sharp corners and tap in tap out areas as bottlenecks (at tap in tap out areas the users need to present an OV-chip card on arrival and departure, and sometimes pay for the storage time). Experts have indicated that currently the main bottlenecks are check-in devices, gates and stairs.

It is challenging for designers to ensure that the flow capacity of a new storage will be sufficient, as there is no report with strong conclusions on the capacity of well-known bottlenecks available. The objective of this thesis is to contribute to solving this problem, as is detailed in the following section.

1.2 Objective

The aim of this research is to develop a method to determine a confidence interval for the flow capacity of bottlenecks of bicycle storage facilities, as well as the variation of the flow at capacity, and to apply the method to a number of common cycle storage bottlenecks. The capacity should be defined so, that it is the average flow that can be expected given maximum demand. Literature research has not yielded a suitable method to measure capacity in such way. Therefore the main contribution of this thesis is a method to achieve this goal. Ideally, values of capacity and variation could be converted from one interval size to another, for example if the capacity and variation are measured on a per second basis, it should be possible to convert it to a per minute basis, or a per 15 minute basis.

A research gap has been identified: on walking with a bicycle no scientific literature has been found. While in literature capacity values can be found for road traffic and pedestrians without a bicycle, such values are not available for walking cyclists. Additionally, the literature appears to lack a robust method to measure such values. This research aims to contribute in filling this gap, by measuring flows of people walking next to their bike through bottlenecks in bicycle parks.

The focus in this research is on situations in cycle storages that are currently in use, at which queues occur. This focus is chosen because it is more likely that similar situations will cause queueing in future to be built storages, and because data gathered while people are queueing allows for stronger conclusions on the question of capacity and its variation.

In the considered situations, flow can be bi-directional and can be a mix of pedestrians, cyclists and people walking with a bicycle. In practice however, a single unidirectional flow of people walking with their bicycle showed to be dominant, and the other flows could be considered negligible. This is a striking difference with for example normal pedestrian stairs, for which a small flow against the main flow can have a considerable effect. For bicycle stairs however, cyclists are bound to the gutter, which makes the difference. Therefore no effects of bi-directional flow have been quantified. The contribution to the body of knowledge of this thesis is useful to designers of spaces in which walking cyclists can be expected, as well as others who want to determine the capacity values.

In short, the problem that is addressed here is queues in cycle storages, and the aim is to provide designers of cycle storage space with the capacity of common bottlenecks (check-in, gates and stairs) to enable them to design for the expected demand. To achieve this, a method to determine the desired capacity values has to be developed first. This brings us to the research question.

1.3 Research question

The research question of this thesis is:

What is the capacity and the variation of the flow at capacity of a bicycle check-in, bicycle gate and bicycle stairs, and what is a suitable method to determine these values?

The research question contains a methodological part and a practical part. The questions are covered in three sub questions each:

Methodological sub questions:

1. *What is a suitable definition of capacity?*
2. *How can the variation of the flow at capacity be quantified?*
3. *How can the uncertainty of the capacity be quantified?*

Practical sub questions:

4. *What is a practical way to measure bicycle flow?*
5. *What is a 95% confidence interval for the capacity at the case study locations?*
6. *What is the variation of the flow at capacity for each of the case studies?*

Although variation and uncertainty are closely related, it is not necessarily so that one knows the uncertainty of a mean if one knows its variation. Therefore the variation of the flow at capacity and the uncertainty of the capacity are treated separately.

This chapter has presented a problem, objective and research questions. The following chapter contains information from existing sources that help answering the research question and reaching the objective, starting off with literature on pedestrians.

2 Literature and background

In this chapter, scientific literature on similar subjects as the flow capacity of elements of a cycle storage entry are described, to base expectations and methods on. Some literature is mentioned on pedestrians with luggage, as a bicycle might be seen as a specific type of luggage. Additionally research on escalators is considered, as the escalator is clear example of a bottleneck for pedestrians. Literature on capacity determination methods (for road traffic) is described, and applicable statistics are listed.

2.1 Literature on pedestrians

This thesis concerns measuring flows of pedestrians with bicycles, because at bottlenecks in cycle storages cyclists typically walk. Therefore literature on pedestrians is relevant. The focus has been on flow capacity and methods to determine it. Research on a bridge in India showed that people with luggage walk slower (Maurya & Panda, 2015). Based on this finding one would expect walking speeds with a bicycle to be slower than normal walking speed. Their data collection method was counting manually from video footage. Research in Shanghai also found that people with luggage walk slower, and that the space occupation increased up to 650% (Abstract of: Ye, Chen, & Jian, 2012). Their method was video observation as well. A different method was used in Canadian airports to measure people with luggage carts. The measurements were done by discrete one-on-one observation with the help of a stopwatch.

Research on escalators is considered because an escalator is often a bottleneck for pedestrians. On the subject of escalators, conference proceedings have reported that capacity is dependent on the time unit of measure. Measuring capacity for 10 seconds would show significantly higher values than for longer time spans (Bodendorf, Osterkamp, Seyfried, & Holl, 2014). This is probably caused by the definition that is used: capacity is a peak value. The argumentation is that mean flow values are 'way too low'. The finding of a capacity that is interval dependent agrees with findings of a master thesis in 1996, which distinguished maximum capacity and mean capacity (Mayo, 1996 as cited in Davis & Dutta, 2002). An often cited publication of The institute for traffic planning of ETH Zurich reported that intervals of 60s , 30s and 15s showed a respectively 9%, 16% and 23% higher capacity measurement than a considered practical performance of 105 P/min (Westphal, 1972 as cited in Weidmann, 1993). Conference proceedings also reported a different escalator capacity in peak hours than non-peak hours (van den Heuvel, Ton, & Hermansen, 2016). A similar effect was reported in a working paper which found a 8-9% lower capacity for non-commuter traffic (Davis & Dutta, 2002). They also report a 7-8% lower capacity if escalators are paired, a dependence of capacity on the shape of the queue, and a higher capacity if people are standing still both on the left and the right side of an escalator.

Although a number of papers reports a different capacity for different intervals, there is no explanation of this phenomenon found. Here, it is speculated that root cause might be that capacity is not continuously reached in the measurements that the literature reports, and that instead of the capacity, the maximum flow is measured. This indicates that a solid definition of capacity is needed for this thesis.

2.2 A suitable definition of capacity

What is a suitable definition of flow capacity? This depends on what is measured, and the purpose of the measurement. No scientific literature has been found on people walking with bicycles. It is obvious to look into general pedestrian research, but car traffic research is a more mature research topic, which is described in the following paragraph.

2.2.1 Roadway capacity estimation methods

That a definition of capacity is nontrivial, is apparent form the tendency of literature to report different capacity values for different time intervals, see for example (Bodendorf et al., 2014). The definition of capacity is named in ‘An assessment of roadway capacity estimation methods’ (Minderhoud, Botma, & Bovy, 1997). In that text, the following question is raised: ‘What is the maximum number of vehicles this road can handle in a certain period’? If you replace the word vehicles by bicycles and road by cycle storage bottleneck, this question is the essence of this thesis. Minderhoud et al. mention problems in defining the meaning of the words *maximum* and *handle*, as well as the length of the observation period. They state that a consistent, reliable and useful method in measuring or estimating the roadway capacity for a variety of circumstances is not available at the time of writing, but existing methods can be useful under certain conditions and assumptions.

Referring to the Highway Capacity Manual of 1994, Minderhoud et al. recognize the stochastic nature of roadway flow due to differences in individual driver behaviour and changing road traffic and weather conditions. Their classification of methods and definitions is reprinted in Figure 2.1. Similar to this thesis, the authors focussed on what they call direct empirical data. If we consider the option counting data, which is used in this thesis, that could fall in the classifications ‘observed headways’ and ‘observed volumes’.

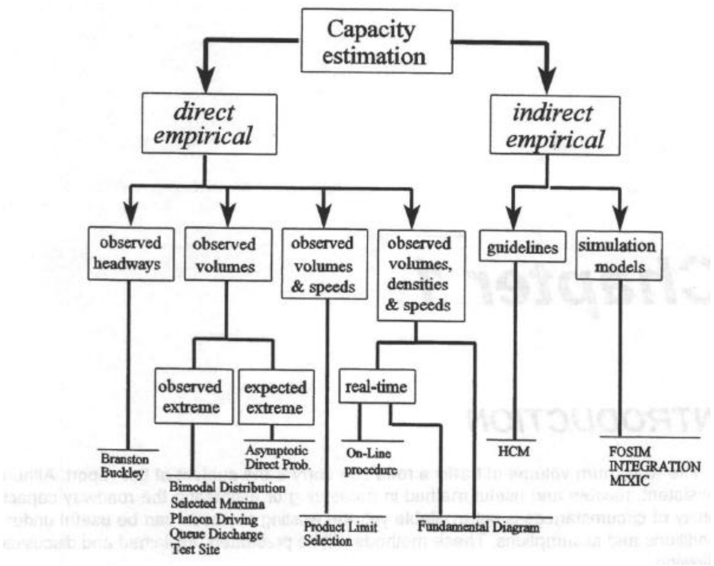


Figure 2.1 Classification of definitions and methods to determine roadway capacity from: (Minderhoud et al., 1997).

Within the classification ‘observed headways’, Minderhoud et al. recognize methods of Branston and of Buckley. They remark that several investigations with these models resulted in a general conclusion that headway models overestimate the observed road capacity substantially. They conclude that headway approaches should not be the first choice for estimating a reliable capacity value.

Within ‘observed volumes’ with ‘observed extreme’ fall three methods that cannot be applied to normal daily traffic conditions, and fall merely in the category experiments: the ‘queue discharge flow method’ (using an artificial bottleneck), the ‘platoon driving method’ (using special instructed leader cars) and the ‘test site method’. Two methods can be used for daily traffic: the ‘bimodal distribution’ method and the ‘selected maxima’ method. The major doubt Minderhoud et al. have with the bimodal distribution method, is the assumption that the free flow intensity distribution can be represented with a Gaussian. In this thesis, that is especially doubtful because the demand is influenced by the timetable of the trains. The selected maxima method has as major disadvantage that the capacity

measurement depends on the number of measurements. Also calculating the average of selected maxima is considered arbitrary, taking a certain percentile is suggested as a more robust option.
Then there are, within the 'observed volumes' methods, the 'observed extreme' and the 'expected extreme' methods. These methods are not of direct interest in this thesis, as the main question in this thesis is: what average flow can be expected given maximum demand. Minderhoud et al. state similarly: 'Expected Maximum Methods have little practical value for freeway design'. The question of maximum flow might be of interest when a limitation is situated behind a moving walkway, but it is expected that the maximum flow is not of such importance that sound theoretical consideration is necessary.

2.2.2 Chosen definition

In paragraph 3-3-8, Minderhoud et al. remark that 'One can conclude that the mean flow rate over observation period T is a simpler, consistent estimate for the capacity which is independent of the averaging interval duration'. Although his method seems to be applied by for example (Bodendorf et al., 2014), in which different capacity values are reported for timespans ranging from 10 to 120 seconds, and they express doubt which interval is suitable as a general definition of capacity, which is in opposition to Minderhout et al. which mentions independence of the interval duration. In this research however, it has been observed that at locations where queues are present, the data shows distinctive intervals of approximately constant flow.
Therefore the following definition is used:

The capacity of a bottleneck is the queue discharge rate.

The queue discharge rate is the average flow through the bottleneck while there is a queue directly upstream of the bottleneck. The chosen definition is not agree with what is common in road traffic. In road traffic, the capacity is generally considered to be higher than the queue discharge. This difference, called the capacity drop, ranges from 3% up to 18% for road traffic (Yuan, Knoop, & Hoogendoorn, 2015). The general idea is that if demand slowly grows, the flow becomes higher until capacity is reached, after which the flow drops to the queue discharge rate. In the situations that are considered in this research however, demand quite suddenly becomes higher than the capacity, which makes a possible capacity drop irrelevant. Additionally there have not been indications from the data that the considered bottlenecks had a capacity drop. This definition can therefore only be used when there are queues. How queues are defined and detected is described in paragraph 3.2.1.

2.2.3 Fundamental assumption

A fundamental assumption in this research is:

When there is a queue upstream of a bottleneck, flow can be described as a random variate with a constant mean and variation.

This flow is called capacity in this research. This assumption disagrees with some literature, in which capacity is reported differently for different measurement duration. It appears to hold however, for the data gathered in this research. This also means that it is assumed that capacity does not change with outside factors such as time of day and weather, and that it does not change with the composition of the travellers, although it can be observed that businesspeople, parents, and scholars arrive at

different times. Additionally, it is assumed that behaviour of people does not change while they queue, although it can be expected that people are more in a hurry, have their card ready and understand the process better when a long queue is present.
The assumption is that if one starts measures the flow for a certain time while the system is at capacity state, the measurement could be described as a random draw from the distribution of capacity values that belongs to the measurement time. If one does a second measurement directly after, the measurements will have some correlation, which may or may not be significant, based on the interval size that has been used for the measurement. This can be understood by thinking about two extreme interval sizes, say a millisecond and an hour. If you measure flow for a millisecond, and a millisecond thereafter the flow will be the same as the same person is still passing the measurement point. If one measures for an hour, and subsequent another hour, no significant correlation would be expected in regular operations.
The fundamental assumption states that if the system is at capacity, in this research, the flow is has a constant mean and variation. The following chapter summarizes how statistics like the mean and variation are calculated, and how other statistical methods that are used in this research work.

2.3 Quantification of variation and other statistics

This sub chapter contains information on statistics that are used in this research. This includes handling outliers, how to calculate a mean, the standard deviation, statistics of a mean, confidence intervals and autocorrelation. If no reference is mentioned, a formula is taken from (Dekking, Kraaikamp, Lopuhaä, & Meester, 2005).

2.3.1 Outliers

The sample mean as well as the sample standard deviation are very sensitive to outliers (Dekking et al., 2005). In this research, outliers have been removed if, after plotting data as a time series, it appeared from the graph that an interval was probably not correctly identified as flow at capacity. Further outlier searching has been done with the help of histograms.

2.3.2 Mean

An arithmetic mean is used to average flow values that have been calculated for intervals of equal duration:

$$q_n = \frac{q_1 + q_2 + \cdots + q_n}{n} \tag{1}$$

In the calculations for the bicycle gate the primary measurement has been the service time, which can be averaged using an arithmetic mean. But if one would use the inverse of the service time to calculate the flow for each user, the average flow should be calculated with a harmonic mean:

$$q_n = \frac{n}{\frac{1}{q1} + \frac{1}{q2} + \cdots + \frac{1}{q_n}} \tag{2}$$

This plays a role in paragraph 5.2.1, where mean service times, measured in seconds per person, are being converted into mean capacities, measured in persons per second.

2.3.3 Sample standard deviation

The sample standard deviation can be defined as follows:

$$s_n = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x}_n)^2} \tag{3}$$

The variance is s_n^2.
The theory on standard deviations is fundamentally developed around independent samples from a normal distribution. The standard deviation of a time series is more complex, as correlation can be involved. This is the case in this thesis, but also for example for some economic phenomena e.g. (Whaley, 1982), as well as weather measurements e.g. (Zięba & Ramza, 2011).

The meaning of a standard deviation is well defined for infinite sample size. Then, the empirical rule or 68–95–99.7 rule states which percentage of samples falls within an interval of σ, 2σ or 3σ from the mean. For smaller sample sizes, MATLAB script 1 (see Appendix B) has been used to make an estimation of the equivalent of this rule, of which the outcome are shown in Table 2.1.

Table 2.1 Empirical rule for small sample size. s stands for sample standard deviation, σ for true standard deviation.

	Percentage of new samples that falls within an interval of…		
Sample size (N)	**± s**	**± 2s**	**± 3s**
5	59 %	85 %	95 %
10	63 %	91 %	98 %
infinite (s=σ)	68 %	95 %	99.7 %

The values in the table show that even for a small sample size, the empirical rule can give a usable approximation for some practical purposes.

2.3.4 Expectation and variance or standard deviation of an average

If $\bar{X}_n$ is the average of n independent random variables with the same expectation μ and variance σ^2, then, according to (Dekking et al., 2005):

$$E[\bar{X}_n] = \mu \quad and \quad Var(\bar{X}_n) = \frac{\sigma^2}{n} \tag{4}$$

This equation is of great importance for this research. The equation describes how the standard deviation of the mean of a number of draws from a normal distribution is distributed. This is relevant when the time unit of flow variation needs to be changed. For example from flow measured every second to flow measured for a minute. If the flow through a bottleneck is a random draw from a normal distribution for each time unit, this equation describes how the variation depends on the time unit. For example, if the variation of the flow is measured per second, and flow could each second be considered as a random draw from a normal distribution, the variation per minute would be a factor $\sqrt{60}$ lower.

2.3.5 Confidence interval

In this research, the average of flow is taken over various time intervals. Assuming a normal distribution, a 100(1-α) % confidence interval for a mean is given by

$$\left(\bar{x} - t_{n-1,\frac{\alpha}{2}}\frac{s_n}{\sqrt{n}}, \bar{x} + t_{n-1,\frac{\alpha}{2}}\frac{s_n}{\sqrt{n}}\right) \tag{5}$$

$$or \qquad \bar{x} \pm t_{n-1,\frac{\alpha}{2}} \frac{s_n}{\sqrt{n}}$$

Values of t can be found in tables. For a large sample and 95% confidence, $t_{n-1,\frac{\alpha}{2}}$ = 1.96.

The confidence interval is not as strict as it may seem. It has been calculated with the assumption of a normal distribution, and an accurate measurement. Although graphs in the result section do suggest that a normal distribution is an acceptable approximation, logically the distribution cannot be normal, as for example there cannot be a negative flow. An alternative approach could have been to bootstrap a confidence interval, which would be less dependent on the underlying distribution.

2.3.6 Autocorrelation

In this research it is shown that the flow through each bottleneck is, to some extent, auto correlated. Autocorrelation of a time series with time-independent mean and standard deviation can be expressed as follows:

$$R(\tau) = \frac{E[(X_t - \mu)(X_{t+\tau} - \mu)]}{\sigma^2} \tag{6}$$

In which R is the auto correlation function, E the expected value operator, X the time series of which the autocorrelation is calculated (flow of pedestrians with bicycles in this case), μ the average flow (capacity in this case), τ the lag between for which the auto correlation is calculated, σ is the standard deviation. R is an even function, $\mathrm{R}(\tau) = \mathrm{R}(-\tau)$.

2.4 Summary

In this chapter, some information from literature is presented which helps answering the research question. Literature shows that pedestrians with luggage walk slower than pedestrians without luggage, and take more space. Some literature report a different capacity for different time units. These authors have used the maximum flow during any interval as a definition as capacity, which is a definition that does not reach the aim of this research. A common method to measure pedestrian flows is based on video footage. Observing live has also been done.

Many definitions of capacity have been used in other research. For this research capacity is defined as what is known as the queue discharge rate: the average flow through the bottleneck while there is a queue upstream of the bottleneck. In road traffic there is a considerable difference between the capacity and the queue discharge rate, but in this case which concerns pedestrians with a bicycle this difference is not relevant because of high demand fluctuations and moreover probably negligible. The definition of choice assumes that when there is a queue upstream of a bottleneck, flow can be described as a random variate with a constant mean and variation.

This chapter has presented formulas for the most important statistical methods that have been applied in this research, which includes the mean, standard deviation, how the standard deviation changes when an average of multiple samples is taken, how to calculate a confidence interval and autocorrelation.

The next chapter concerns how data has been collected to calculate the capacity and its characteristics on the bottlenecks that are considered, as well as general information for each bottleneck.

3 Data collection

How case studies, bottlenecks, have been selected, descriptions of the selected bottlenecks and the measurement method are described in this chapter. Data has been collected from processes as they are in day-to-day practice. This has eliminated the need for recruitment of participants for experiments, and has eliminated validity concerns. The bottlenecks that are selected are a check-in in Utrecht, gates in Zwolle and stairs in Breda. This chapter also concerns how flow of walking cyclists can be registered in an efficient way, and what other methods have been considered. But first it is described how bottlenecks have been selected.

3.1 Bottleneck selection

Measurements are limited to existing situations, because validity and recruitment of participants are not an issue. The alternative, controlled experiments, has the advantage that a higher variation in experiment setups is possible, that experiments can be repeated, and that participants can be tracked better with help of markers. A third possibility that has been considered, simulation, opens possibility for many more experiments and exact repetition. For calibration and validation of a simulation model, real world measurements are needed first though. And the same holds for real world experiments. Thus, this research can be considered the first step, on which enables validation of further steps.

The shape of demand peaks over time at cycle storages of stations depends on, among others, the shape of the general demand of travellers at the station, the timetable, and on environmental factors such as traffic lights near the parking. The overall shape of the whole peak is in general higher and narrower in the morning than in the evening. However, peaks per train are smaller and higher for people that just left a train than for people who are about to board a train. Therefore peaks at a cycle storage usually is higher in the morning, which is why queueing happens more frequent in the morning. This probably even holds for ‘attraction’ stations, which are a destination rather than an origin for the majority of people. This is caused by the fact that the bicycle is much more a way to get to the station than it is a way to get away from the station in the morning.

For a good measurement, it needs to be busier than the facility can handle well. Because of proper design, these moments are scarce. The busiest day is generally Tuesday. Monday and Thursday can also be busy. For some locations, a regular Tuesday is the only moment to measure, as that are the only moments at which queues can be expected. Holidays limit the number of suitable measurement days. This means that a couple of measurements can take weeks.

The bottlenecks that have been selected have been found with the help of NS-station professionals who know about which cycle storages queuing has been reported to be the problem. This list has thereafter been checked with each storage manager. Finally, measurements have been done at each location, after which some locations turned out to not face queues after all. Finally some suitable bottlenecks have not been included in this report due to time constraints. That includes stairs in Haarlem and a moving walkway in Amsterdam Zuid. The bottlenecks that have been selected are described in the following section. The next section describes the bottlenecks that have been selected.

3.2 A practical way to measure bicycle flow in cycle storages

This subsection describes the measurement tool that has been used. Alternative data sources that have been considered are described in the next section. The most important data that has been collected for this research has been collected while being physically present, and has been registered using an app just like the other locations. The app and the measurement errors that come with it are described in this chapter. The main sources of error come from human error: either too many things happening at the same time, or clicking on the wrong button. The human measurement error is sometimes considerable, but not deemed to be too high. Some of the human errors are apparent from the data and can be corrected afterwards.

Counting data is always aggregated to a certain level. In the context of bicycle throughput measurements, aggregation intervals of one, five and fifteen minute are common. Aggregation can be useful, but can lead to loss of information. Therefore it is generally better to measure with a time step that is as low as possible, leaving aggregation to the analysis. For the manual counts in this thesis an app is used, called Counter, that is developed by 'Keep It Simple' and is available on Google Play. A screenshot of the app with a number of counters is shown in Figure 3.1. This app stores each count with a date and time in seconds. A device registering milliseconds might have been convenient but was not necessary and was not found.

Figure 3.1 Screenshot of the app that is used for counting, called 'Counter' developed by 'Keep It Simple'. The app allows creation of a series of counters, which can be increased and decreased by tapping. The time of each tap is registered with second precision. The app can show graphs of the counts, but also allows to export the data as a csv file, for external analysis.

When using this app, it can be challenging to hit the right counter button, because it is preferable to tap blindly while observing the measurement location. Although it happens that a count is registered at the wrong counter because of inaccurate finger placement, it does not happen often that a tap of the finger is not registered at all. This is prevented by the fact that the app gives haptic feedback in the form of a short vibration when an event is registered. If there is a queue or not can be stored in an additional counter. The dedicated counter can be set to 1 when a queue emerges, and back to zero when the queue dissolves. This can lead to measurement inaccuracies because one needs to look at the screen at a moment that it is very busy.

3.2.1 Queue detection

Queue detection was a task for the measurer, while measuring the flow. When a queue started to form, the queue detector counter was set to one, when the queue dissolved it was set back to zero. The exact instant at which something like that happens is hard to register consistently. As a definition of queueing was used: someone had to clearly wait until this person could walk to a Payter, or had to slow down before he or she could step on the stairs.

At the gates, the same flow was measured twice: once at the moment that a person was ready to use the gate or joined the queue, and once when the gate opened. This allowed a more precise queue detection. The main advantage was that this yields more data, as shorter intervals of queueing could be identified already. As a definition of an interval at capacity for the gate has been used: an interval in which a person is ready to be serviced, but the person before him or her has not been serviced yet. This is illustrated in Figure 3.2, in which one interval at capacity is visible. Alternatively, every user's service time could have be used to calculate capacity (resulting in more data points), but that would have two drawbacks: firstly the registration of arrival might have a bias which would influence the measurement of capacity (to remove this bias, the person causing the queue is, by using a closed interval, not incorporated in calculations), and secondly people might behave differently when they are not holding other people up.

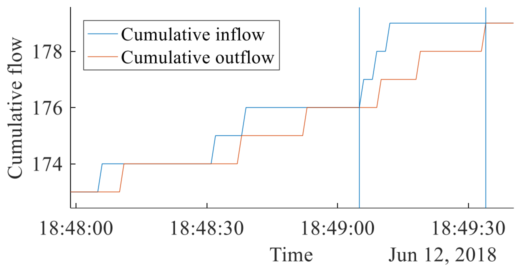


Figure 3.2 Only the interval on the right is at capacity according to the definition that has been used, as is indicated by the vertical lines. The marked interval contains three people, but yields only two service time measurements.

3.3 Description of measurement locations

Because of the choice to measure existing situations, an overview of potential measurement locations has been created, based on reported queues by local staff, caused by flow restrictions. The occurrence of queues has been verified by daily staff, after which a measurement is done. An overview of the infrastructure type and flow type that has been selected and measured is shown in Table 3.1. One location, in Haarlem, has not been analysed due to time constraints, although the measurements have been done. That location is described in Appendix A.

Table 3.1 Selected measurement locations.

Train station	Cycle park location	Bottleneck	Time
Utrecht Centraal	Jaarbeursplein	Check in	07:00-09:00
Breda	Centrumzijde	Stairs, Upward	17:00-19:00
Zwolle	Hanzelaan	Gate out	17:00-19:00

In some cycle storages, registration of arrival day and time is needed, to check if payment is needed to leave the storage. In general, the first 24 hours no payment is needed. Registration of arrival happens with labels on the bike or by registration of the OV chip card. One of the registration options is done with a wall mounted Payter. Check out then happens at a member of the staff, who holds a handheld device. People who stored their bike longer than 24h pay by PIN. In some other locations both check-in and check-out is controlled by a gate. A location with check-in through wall mounted Payter devices is described in the next section.

3.3.1 Check-in (Utrecht)

At the entrance of the cycle storage at Utrecht Jaarbeurszijde, three Payter devices (see Figure 3.4) are wall mounted to allow users without an abonnement to register their arrival time at the cycle storage. Using the app (Figure 3.3 and paragraph 3.2), the flow has been registered per Payter. There was one queue for the three Payters. It was registered when there was a queue and when staff interfered, as the staff could speed up the process with handheld scanners. The staff was instructed to only interfere in case of excessive queuing. The measurement took place on a regular morning rush hour; 21-6-18 from 7:00 to 9:00.

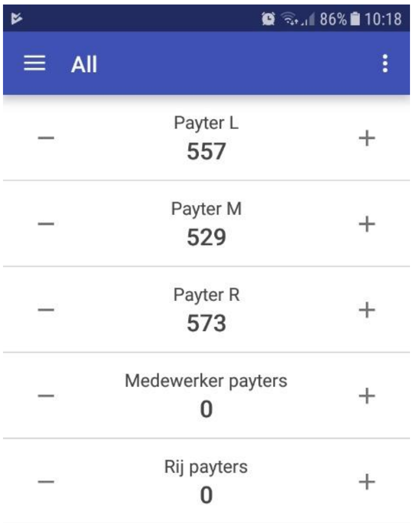


Figure 3.3 Screenshot of counter app as it was configured for the check-in (Payter) capacity measurement on 21-6-18. The letters L, M and R indicate the Payter for the viewer left, middle and right respectively. Flow was from right to left.

Figure 3.4 Wall mounted Payter devices for check-in.

The Payters were obviously part of a bigger system, but interference appeared to be negligible. There were additional flows of people who did not need to use the Payters: people who had an abonnement, people leaving the storage and people who came to get or return an OV-fiets. According to the visual judgement of the measurer these flows did not have a significant influence on the measured flow, as there was enough space for the additional flow. Another way of controlling entrance and even exit is a gate, which is described in the following section.

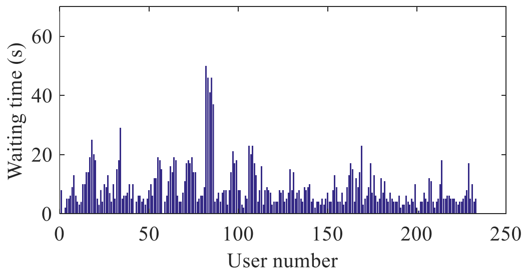
3.3.2 Gate (Zwolle)

A relatively small cycle storage at the Hanzelaan in Zwolle has automated gates for entrance and exit control. A request came up to measure waiting time at these gates. To answer this question, flow for each gate has been measured using the app at the gate and just before the gate, which included the queue if there was one. The combination of these two flows contains information on a number of interesting parameters over time: the queue length, the waiting time, the throughput, and the time people spend inside the storage facility.

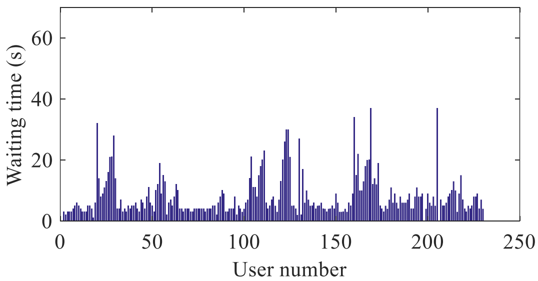
Figure 3.5 Bicycle gates. There is a gate for each flow direction.

The measurement was done on June 12th, between 7-9h and 17-19h. For both intervals, cumulative inflow and outflow was measured both for the gate dedicated to entering the storage, and the gate dedicated for exiting the storage. With the flow it was also registered if it concerned a person with an OV-bike, regular bike or without a bike.

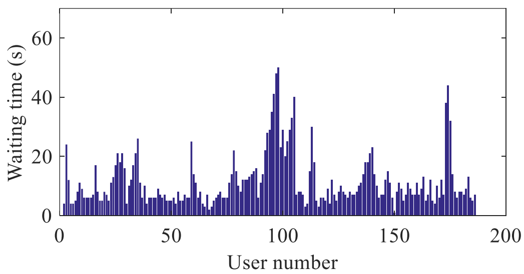
Figure 3.6 illustrates how many people use the storage during the peak hours, and long these people take to get through the gates. Each sub figure represents the time it took people to get through the gate, including the waiting time. The longest waiting time is observed for the flow out of the storage in the evening, depicted in subfigure d. Looking at subfigure d), it is apparent that some people have to wait about a minute to get out of the storage in the evening. This is typical; in all other storages has been observed that peak demand was highest for the flow out in the evening.



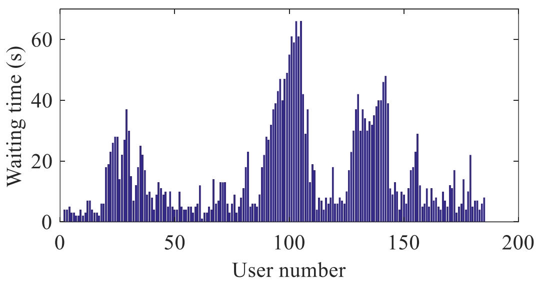
(a)



(b)



(c)



(d)

Figure 3.6 Waiting time per user of the Zwolle Hanzelaan cycle storage for the following flows: a) 7:00-9:00 in, b) 7:00-9:00 out, c) 17:00-19:00 in, d) 17:00-19:00 out on June 12th.

3.3.3 Stairs (Breda)

At this location, the cycle storage is underground. To exit the storage, users have to pass a door where they are checked out manually. The checkout is not the bottleneck, the stairs are. After the door they make a 90 degree turn to the right, and pass another, narrower door. This leads to the stairs, which have two ramps, of which one is used per flow direction. A drawing of the situation is shown in Figure 3.7, pictures are shown in Figure 3.8 and Figure 3.9. The doors appear to regulate the stream, and seem to discourage the use of the ramp of the opposite flow direction.

Counting was done at the lower side of the stairs, from a position from which the flow was not influenced, with the view of Figure 3.8. The moment the front wheel of each user touched the ramp was registered with a sample time of a second. The flow appeared to be constant, by eye.

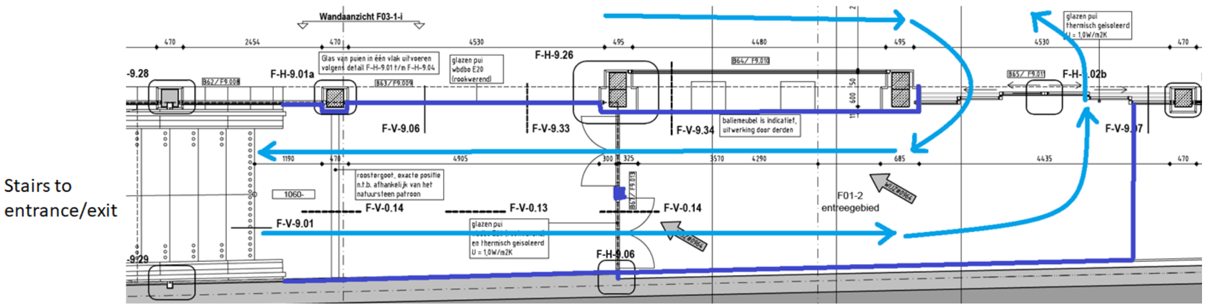


Figure 3.7 Design drawing of entrance and exit area of cycle storage Breda Centrumzijde. Black lines are from original drawing. Dark blue lines indicate where users can walk. Light blue lines indicate the path of users. Working number: 110320. Drawing number: BCS-WE-2.09-32

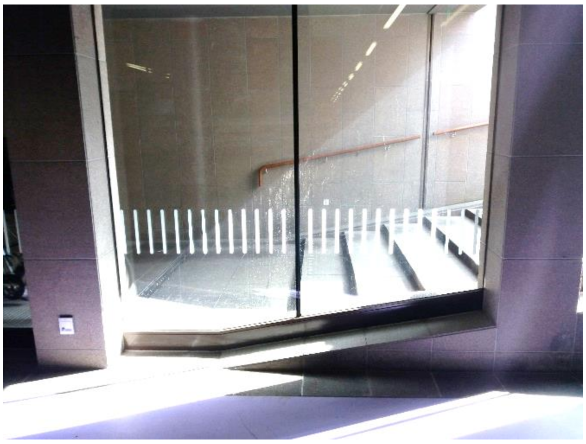


Figure 3.8 The cycle stairs that have been measured. Viewpoint from the counting person.

Figure 3.9 View from the upper side of the stairs

Bicycle stairs are stairs with one or more bicycle ramps. This chapter describes measurements that have been done on cycle stairs with a single ramp per direction (see Figure 3.9).

Local staff said beforehand that there were queues only in the evening, so that was the time that measurement took place. In the evening the main flow is out of the storage. Therefore, as the storage was below street level, the only flow that has been measured at capacity is the upward flow.

To calculate the effective sample size later, we need to know how many bicycles fit on the stairs. The measurements of the stairs are as follows. The steps have been measured by the staff to be 19.7 cm deep, and 8.4 cm high. The stairs consist of 38 steps. This means that the length of the stairs is about $38 * \sqrt{19.7^2 + 8.4^2} \cong 814cm$. The length of a regular bike is not easily found online. One source on this is (Leefmilieu Brussel, 2013), which considers a typical bicycle to be 1.85 m in length. Including headway, 2 meters is a reasonable estimate for this calculation. The number of bicycles that fits on the stairs at a time is therefore about 4.

3.4 Alternative data sources and measurement methods

Other data sources have been considered. This includes at least four sources: trajectory data from stereo cameras, log data from check-in systems, camera footage and previously made measurements per minute. Use of stereo cameras was not feasible within the time that was available for measurements. Also, the use would come with many uncertainties including how well they would register bicycles, if there would be enough headspace, if the internet connection would be sufficient, if installation would be permitted, and how long installation would take.

The second source, log data from check-in, turned out to not contain enough information. Apart from that there was no queue detection, it was also not registered at which device the check-in took place, and how many (handheld) devices were active at which moment. A typical example of the data that is available from the log data is visualized in Figure 3.10. In the figure it is visible that there are no peaks at which the throughput is more or less constant for more than a minute. Comparison of three months of data did not indicate capacity being reached, see Figure 3.11. If there was some capacity value, it was expected for the shape of the box plots to change near this value, but no such change is visible. This is all caused by the fact that hand scanners were used to improve the check-in capacity, for which no distinction was made in the data base. To implement such distinction a change of the IT system would have been needed by an external party.

A third source, camera footage, comes into two variations: security camera footage and handheld camera footage. Use of security camera images was not allowed for privacy reasons, as privacy sensitive information can only be used for the purpose that it was originally gathered. Secondly it was an option to record manually during the measurement. In this case, it was chosen to not do that, as people do not like to be videotaped, and there would not be an option for people to opt-out, as they needed to catch a train. The fourth option, relying on measurements that had been conducted manually in the past by an external party, was unusable because the queue detection was unreliable.

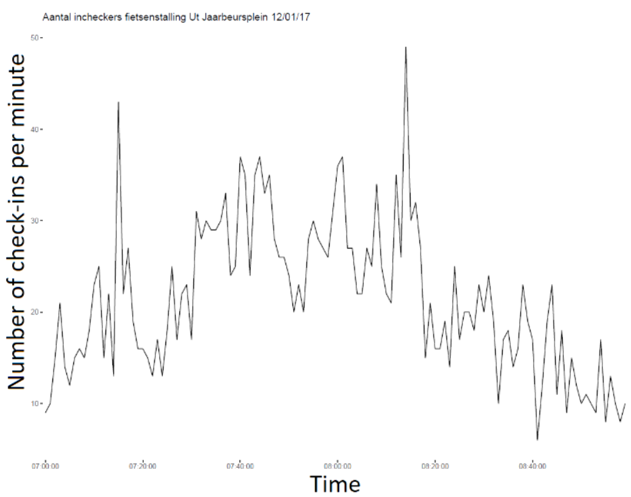


Figure 3.10 A typical example of a busy day of check-ins at the cycle storage Jaarbeursplein (January 12th 2017).

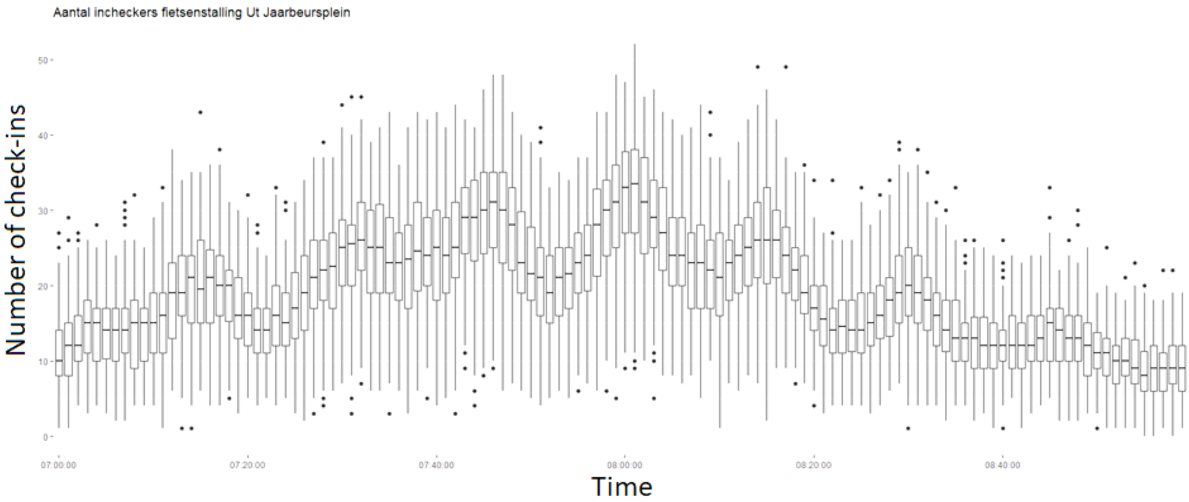


Figure 3.11 Boxplots for the number of check-ins per minute for three months of data. No statements except a lower boundary of the capacity can be determined based on this graph. This is the reason that new data has been gathered manually in this research.

4 Data processing

Data collection, which is described in the previous chapter, has yielded a log of when cyclists passed the reference point, and within what time intervals there was a queue. This chapter describes the method that has been used in this thesis to calculate the flow capacity and the variation of the flow at capacity. Quantification of variation is important because it can help to calculate a confidence interval around an average value that is calculated. Also it can help with determining how long flow needs to be measured, to find a stable average.
After collecting data with the app and exporting it, the data has been processed in the following steps:

1. Selecting intervals at capacity

4.1.1 Converting to continuous flow

The concept of flow is borrowed from fluid mechanics, and is firstly defined for infinitely many particles. When flow is integer and low, big variations of flow are measured even for what is perceived as steady flow. A standard method to reduce this effect is averaging over large time intervals, but this reduces the possible resolution (Steffen & Seyfried, 2010). The solution for the two-dimensional version of this problem of Steffen and Seyfried is drawing Voronoi cells around people and measure how much of a cell of a person has crossed a line. In this research a one-dimensional equivalent is used, by 'spreading out' each person between the instant the person passed a point and the instant that the next person passes the point. This is illustrated in Table 4.1, and visualized in Figure 4.1. In the figure, the graph in the middle displays the data in the way it was stored during the measurement. The graph on the left shows the real information in the example measurement, and the graph on the right shows an intuitive representation of the data. The variation of the graph on the right represents the variation of the flow better than the graph in the middle. This way of converting to continuous flow cannot work if in some seconds two people are measured. Therefore, in the case of the check-in, the data has been converted to continuous flow per Payter (check-in device).

Table 4.1 Three different ways to display the same flow data.

Service time (seconds per person)	n.a.	2		3			1	n.a.
Flow per second(persons per second)	0	1	0	1	0	0	1	0
Continuous flow (persons per second)	0	1/2	1/2	1/3	1/3	1/3	1	0

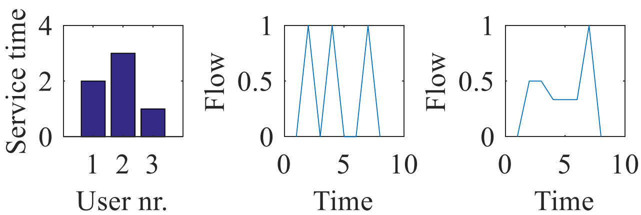


Figure 4.1 Three ways to display the same flow data from Table 4.1. The graph in the middle shows the way the data has been gathered in this research. The bar graph on the left shows the information that can be taken from that data, and the graph on the right shows an intuitive way to display the information.

One can also take service times as a starting point (left graph in Figure 4.1). This is common in queueing theory. Converting an average service time to a capacity value can be done by simply taking the inverse, which is statistically straightforward. Other converting other statistics, like the standard deviation is less straightforward.

2. Combining intervals

3. Converting to continuous flow
4. Removing measurement errors
5. Averaging over time interval
6. Display Cumulative distribution of the flow
7. Determination of effective sample size
8. Calculating the mean and standard deviation, and a 95% confidence interval

4.2 Chosen data processing method

The data processing method that has been used to generate the results that are reported in the next chapter consists of 8 steps, which are each described in the sections that follow. An alternative method is described in paragraph 4.3. The first step is to select the times at which the system was at capacity:

4.2.1 Selecting intervals at capacity

A fundamental assumption in this research is that flow is constant when there is a queue, except for stochastic variation around the mean. At the locations that were measured, there weren't queues all the time. The intervals at which there were queues, have been combined (in the next step), as if the time at which there was free flow was skipped. This way, one large interval at capacity is created. Queue detection was already part of the data collection. However, after visualising the data, some intervals have been removed although they were marked as 'at capacity', as it appeared that the queue detection was wrong there. This step results in a collection of intervals at which the system was at capacity. The data is stored as an event log, which contains the time of passing for each person that passed, with second precision. At the next step, the way that the flow is stored is changed.

4.2.2 Converting to continuous flow

The concept of flow is borrowed from fluid mechanics, and is firstly defined for infinitely many particles. When flow is integer and low, big variations of flow are measured even for what is perceived as steady flow. A standard method to reduce this effect is averaging over large time intervals, but this reduces the possible resolution (Steffen & Seyfried, 2010). The solution for the two-dimensional version of this problem of Steffen and Seyfried is drawing Voronoi cells around people and measure how much of a cell of a person has crossed a line. In this research a one-dimensional equivalent is used, by 'spreading out' each person between the instant the person passed a point and the instant that the next person passes the point. This is illustrated in Table 4.1, and visualized in Figure 4.1. In the figure, the graph in the middle displays the data in the way it was stored during the measurement. The graph on the left shows the real information in the example measurement, and the graph on the right shows an intuitive representation of the data. The variation of the graph on the right represents the variation of the flow better than the graph in the middle. This way of converting to continuous flow cannot work if in some seconds two people are measured. Therefore, in the case of the check-in, the data has been converted to continuous flow per Payter (check-in device).

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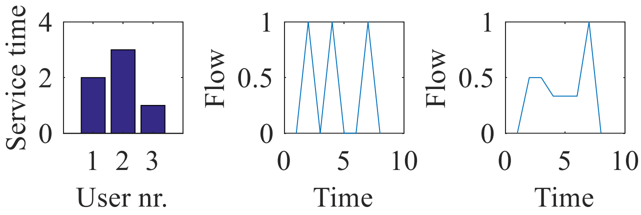

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One can also take service times as a starting point (left graph in Figure 4.1). This is common in queueing theory. Converting an average service time to a capacity value can be done by simply taking the inverse, which is statistically straightforward. Other converting other statistics, like the standard deviation is less straightforward.

4.2.3 Combining intervals

In the previous step, intervals at which capacity is reached are identified. Each of these intervals is an opportunity to measure capacity, but a major challenge has been to combine the information that is gained for each interval. A weighted average based on the duration of the interval has been considered, but that would cause problems due to autocorrelation of the flow.

Intervals at capacity are likely starting and ending with a count. When combining intervals directly, this would result in a peak of flow at the instants at which the intervals are connected. To prevent this, the flow is first converted into service times (in the former step), which reduces N by one, and enables combining intervals 'fairly'. After these steps, a combined measurement at capacity is created, which has to be checked for errors in the next step.

4.2.4 Removing measurement errors

Experience shows that it is challenging to measure multiple high flows on a smartphone screen. A practical guideline has turned out that one should not need to click more often than once per second. Sometimes people are missed, and sometimes flows are registered at a different counter than intended. The queue detection registered in this way is not easy to use. The app gives a small vibration when it registers a click. This haptic feedback largely prevents clicks from not being registered. However, it is still possible to click on the wrong counter. When counts were accidentally registered in the queue detection counter, this was clear from the data and has been corrected afterwards.

It has turned out that the manual queue detection has not been flawless. In the cases in which the queue detection has clearly been wrong, the intervals at capacity have been based on the data.

The purpose of visual queue detection was to enable differentiation between maximum flow and capacity. With the uncertainty that comes with this way of queue detection, the value of the queue detection becomes low, and therefore capacity must be detected based on the flow data. Reduction of counting error would be possible by reducing the workload by counting with multiple people. Quantification of the measurement error would be possible by letting multiple people count the same and comparing the results. This has not been done in this research.

The measurement of the stairs in Breda contained some clear miss clicks, which were visible in the data in such way that they could be repaired. This process is described in 5.3.3. The next step is described in paragraph 4.2.5.

4.2.5 Averaging over time interval

Measurements have been done per second, which is suitable for capturing the process accurately, but not necessarily an appropriate unit for reporting the variation of the flow. To quantify variation, the total measurement has been divided into intervals of equal duration. It makes sense to choose the interval size in such way, that the total number of intervals is equal or a little bit lower than the effective sample size, applying equation (8) (for sample size determination, see 4.2.7). The intervals that have thus been created, are treated as successive measurements of flow at capacity.
The starting points at which the division into intervals is started, has an influence on the outcome of the calculation of variation. Therefore it makes sense to do the division into intervals for all possible starting points. This has been achieved by applying a moving average over the data. The moving average does have no influence on the mean, and the expected influence on the standard deviation, as has been verified using MATLAB script 2 (see Appendix B). For the moving average at the endpoint of the data, the data from the start has been used, for the begin point the opposite has been done, as if the data was cyclic. In the script that is mentioned, with the random number generator set to 'default', the variable confidenceR= 0.9508 (which represents the confidence in an interval based on normally distributed data) and confidenceT=0.9421 (which represents the confidence interval for the same data treated with a moving average filter), which is both close to the expected value of 0.95.
This section has explained how a moving average filter is a suitable way to increase the measurement interval from 1 second to for example 10 seconds or a minute. The next section concerns a way to visualize the information on the capacity and the variation of the flow at capacity, by means of a cumulative distribution function.

4.2.6 Display Cumulative distribution of the flow

To visualize how the flow varies around the mean, the data that has been obtained by applying a moving average has been visualized as a cumulative distribution. The cumulative distribution function can be a tool to judge if there were measurement errors, and if it is reasonable to assume a normal distribution, see for example Figure 5.5. The interval size has been chosen to reflect the effective sample size using equation (8). A cumulative distribution function shows what part of the data is lower or equal as the value on the x-axis. As an alternative to a cumulative distribution function, histograms have been considered as a way to visualize the spread in the data. However, choices in bin size and binning starting point have an influence on the shape of the histogram. Therefore, in this the histogram has been plotted twice on top of each other: once for a bin size that seems most suitable, and once for a much smaller bin size which gives more insight in the underlying data. In the end the cumulative distribution function was concluded to be more informative.

4.2.7 Determination of effective sample size

Sample size is a measure of the quantity of information that is available on a quantity. If the values of successive measurements are correlated, the effective sample size is lower. Determination of the sample size for flow data is not trivial. Changing the time step of the data does change the number of data points, but does not necessarily change the amount of information in the data. Imagine measuring every millisecond instead of every second; the effective sample size does not increase 1000-fold.

It appears to make sense that the effective sample size (N_{eff}) cannot be higher than the number of people that passed during the measurement (N). If multiple people can use the device at the same time, we call that number c, a single unit of information can only be obtained with at least that amount of people. Also, the sample size is bounded the number of intervals of span (S) that fits within the total measuring time (T). In formula form:

$$N_{eff} = \min\left(\frac{T}{S}, \frac{N}{c}\right) \tag{7}$$

Based off this formula, a value for S can be chosen to be as big as possible without affecting the effective sample size by equating the terms from which the minimum is taken, shown in equation (8).

$$\frac{T}{S} = \frac{N}{c} \; or \; S = \frac{Tc}{N} \tag{8}$$

In this research, three situations are considered: check-in, gate, and stairs. In all situations, the number of people that has passed during the measurement is the starting point for the sample size. Further analysis has shown that the flows can be auto correlated even beyond the optimal interval size. This means that the effective sample size could still be an overestimation especially for the stairs.

4.2.8 Calculating the mean and standard deviation, and a 95% confidence interval

The mean (capacity) and standard deviation are calculated from the data which is obtained at step 5. Step 7 has enabled a judgement weather the data is normally distributed or not. For each of the bottlenecks that is considered in this research this is the case. Thus, the assumption that the data is normally distributed is justified. With an additional assumption that the measurement is unbiased, using the standard deviation together with the effective sample size, a 95% confidence interval for the mean is calculated.

A quite different approach to dividing the measurement time into intervals is explained in the next section. As opposed to step 5, this approach does not divide the whole measurement into intervals of equal time, but the interval duration is dependent on the data.

4.3 Alternative quantification of flow variation Stairs

Here, and alternative method to quantify the variation of the flow is presented, which has not been chosen because it relied too much on phenomena that could not fully be explained and was not deemed applicable on other bottlenecks than stairs. This approach first adds some interpretation to the graphs. This approach utilizes slanted cumulative curves. This kind of curve shows the cumulative flow over time minus a constant cumulative flow. If the capacity is chosen as the constant, intervals at capacity become horizontal lines.

Looking into the cumulative curve of flow on the stairs in Breda in Figure 5.11, it appears that flow is constant for short intervals. This is illustrated in Figure 4.2, in which the graph is piecewise linearized by manually drawing lines. With the same idea the peaks between the intervals have been manually selected in Figure 4.3. These graphs do not exactly match, and it is debatable which interpretation is better. This illustrates that this method has some arbitrariness to it. The duration and flow of each interval is calculated from the peak data, and listed in Table 4.2.

4.3.1 Quantification of flow variation (subjective)

As a proof of concept, the first interval at capacity has been manually linearized,

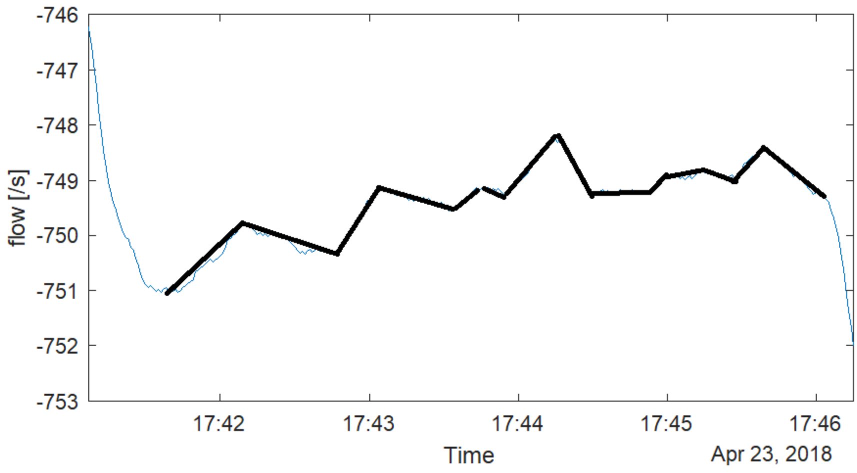

Figure 4.2 Manually drawn straight lines on smoothed (span11) slanted cumulative flow data on stairs at Breda. Direction Up. Slanted at 0.416 persons per second. This figure supports the hypothesis that flow is constant over certain intervals, and changes quite abruptly between said intervals.

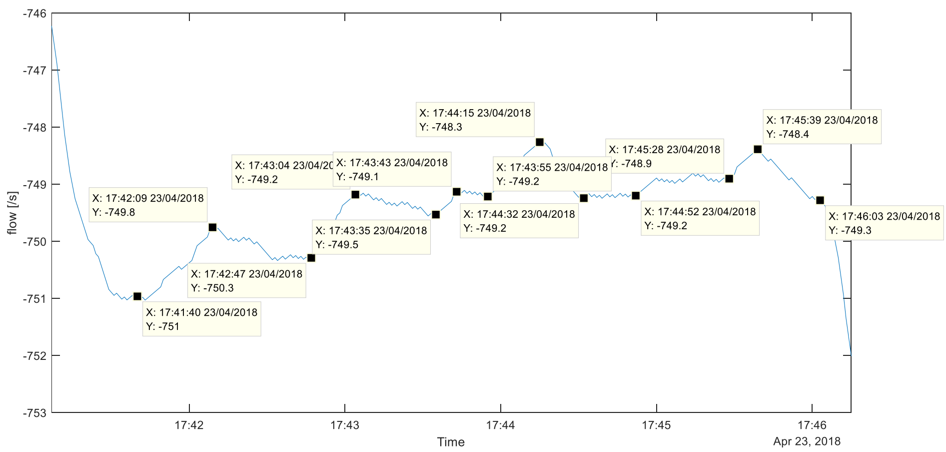

Figure 4.3 Manually selected maxima, smooth (span11) slanted cumulative flow on stairs at Breda. Direction upward. Slanted at 0.416 persons per second.

For the intervals between the manually selected points the duration and flow have been calculated, and are shown in Table 4.2.

Table 4.2 The values of the segments indicated by the data tips.

Duration (s)	29	38	17	31	8	12	20	17	20	36	11	24
Flow (/min)	27	24	29	24	28	25	28	21	25	25	28	23

Exploratory statistics on these values have been calculated. It must be noted that each interval is treated equally, instead of using some weighting considering the duration of the interval. Secondly the points have been selected by hand, without a clear recipe for what is a peak or not. This means that this analysis could be redone in a more objective fashion. The average flow was calculated as 25.344 persons per minute, the sample standard deviation was calculated to be 2.3 persons per minute.

4.3.2 Quantification of flow variation (automated)

To properly quantify the variation, it has to be done in an objective, repeatable way. A script has been used to find a piecewise linear fit of the first interval at capacity. Figure 4.4 shows an example with 29 nodes. It is quite clear that 29 nodes is too many, and that two nodes would be too few. A suitable repeatable method to determine the number of nodes is yet to be found.

Another issue with this method is that 'outliers' are too important for these fits. A good fit would follow the parts where the line is narrow precisely, and the parts where the line is wide could be fit more loosely. The current definition of the error is not consistent with this. One option to consider is to divide the error of fit (for now the RMS of the error) by the error that is caused by the aggregation. The fact that different flow values lead to different aggregation errors is illustrated in Figure 4.5.

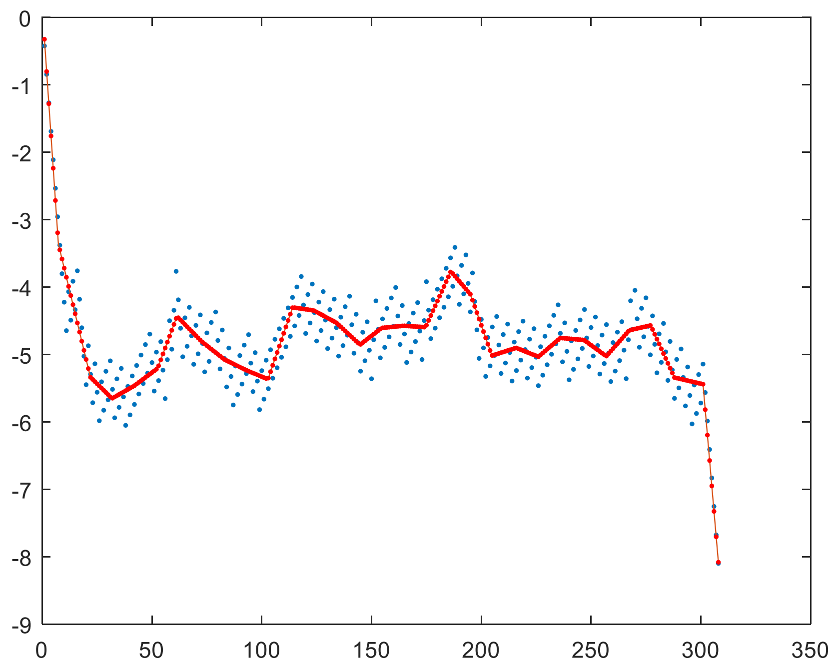

Figure 4.4 Proof of concept: Fit with 29 nodes, which is clearly too many.

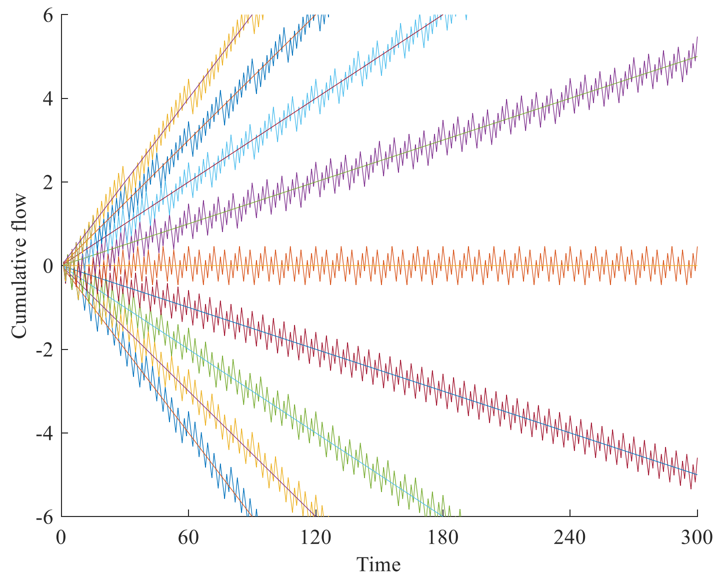

Figure 4.5 This plot consists of slanted cumulative curves slanted at 25 slope from 21 to 29. This illustrates that when piecewise linear fitting, some flow numbers are fitted with lower error than others.

4.3.3 Synthetic data to illustrate the effect of aggregation, and smoothing.

In each measurement with the counter app, the flow is registered with second precision. Therefore, at that interval level, flows are registered as integer, and only in higher time aggregation intervals the flow starts to make sense. To illustrate the effect of this aggregation level, synthetic flow data has been aggregated this way. Figure 4.6 shows a slanted cumulative curve of a constant flow, which is distorted by the aggregation at unit level. Figure 4.7 has had the same treatment, but based on flow that is has two values that are similar, shown as a triangular wave. The distortion makes the amplitude of the wave higher. The parameters have been chosen to resemble the real data shown in Figure 4.8. To reduce the distortion, moving average smoothing has been tried. Figure 4.10 and Figure 4.11 show the effect of smoothing with span 3 and span 11 respectively. Smoothing obviously reduces the distortion, and span 11 is the lowest span that really appears to have almost no distortion. The amplitude of the wave that results from smoothing with span 11 is lower than the original triangular wave though.

Smoothing with span 11 is aesthetically pleasing. However, it is not covered by a theoretical argumentation (yet). Smoothing with flow 3 appears to make more sense theoretically, in combination with the flow rates that are typical in this case.

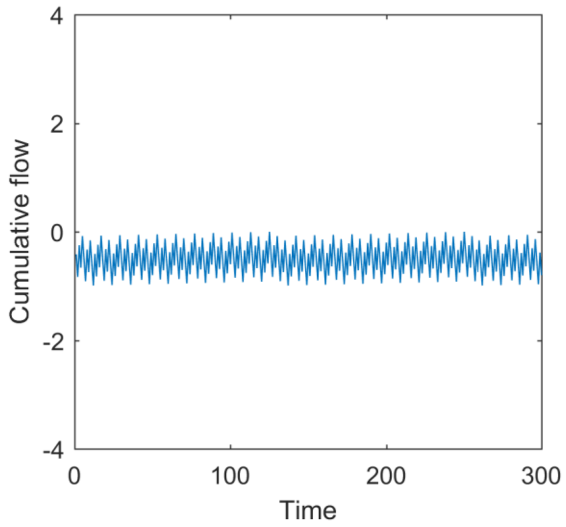

Figure 4.6 Slanted cumulative curve of synthetic data of a constant flow. It should have been a straight horizontal line, but it is distorted by aggregation at a unit level. The script to create this graph is shown on the right.

Script:

```
nrMinutes=5;
time      =1:nrMinutes*60;
realFlow =0.416;
slanting =0.416;


realFlowCum=time*realFlow;
intFlowCum =floor(realFlowCum);

slantingFlowCum=slanting*time;

slantedCumCurve=intFlowCum-…
slantingFlowCum;

figure(1)
plot(time,slantedCumCurve)
```

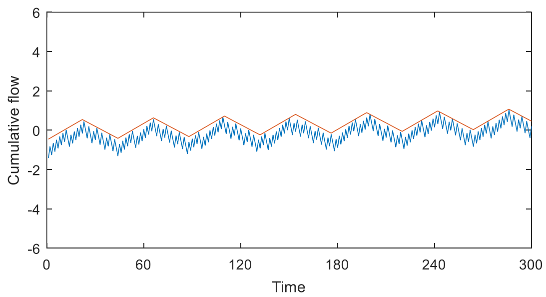

Figure 4.7 Similar to Figure 4.3, but now with a triangular wave. The parameters of the figure, as well as the scaling have been chosen to look similar as the real data, shown in Figure 4.8. Comparison between the blue and red line shows that the variation of the flow can appear to be greater than it actually is.

Script

Some lines are changed or added to the script that belongs to Figure 4.6.

Added a triangular shape to the flow

```
realFlowCum=time*realFlow+…
0.5*sawtooth(1/7*time,0.5);
```

And plotted original line

```
realSlantedCumCurve=…
     realFlowCum-...
     slantingFlowCum;

hold on
plot(time,realSlantedCumCurve)
hold on
```

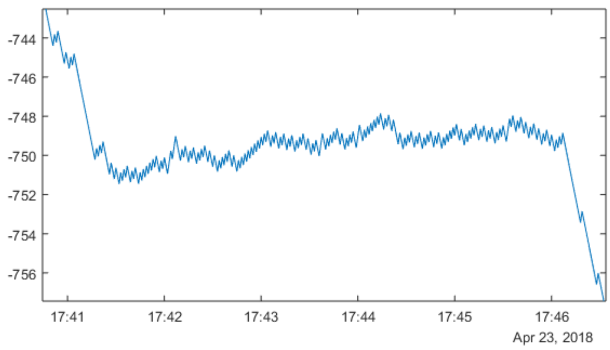

Figure 4.8 Real data, shown here to compare with Figure 4.7.

Script

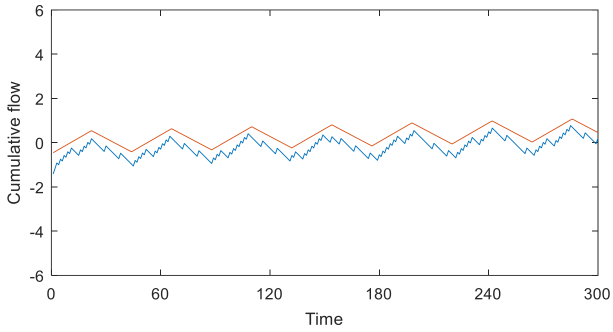

Figure 4.9 Smoothing (span 3) appears to help

```
plot(time,smooth(intSlantedCumCurve,3))
```

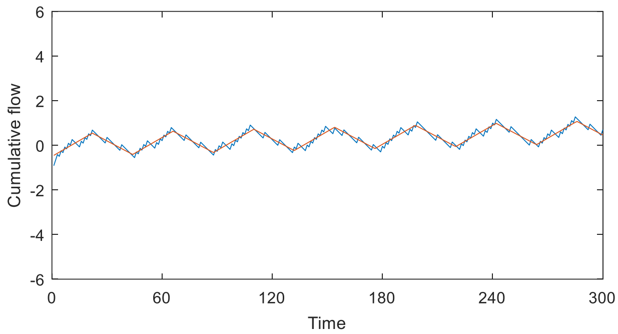

Figure 4.10 Smoothed at span 3, and subtracted means so the means of the lines would be the same.

Better visible when the mean is subtracted from both lines. But extremes are still exaggerated .

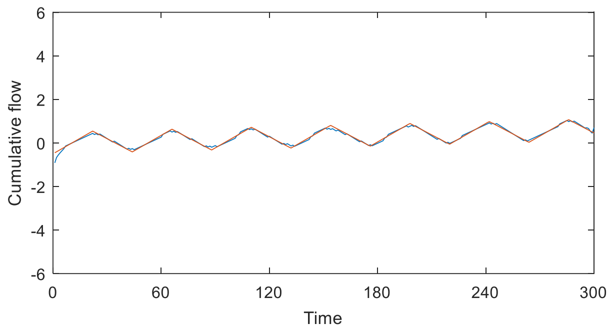

Figure 4.11 Smoothed with span 11, like Figure 4.2. This shows that extremes are a bit smoothed away.

The smoothing span is a bit arbitrary still, but this span is reasonable. Although the corners of the triangle wave are smoothed out, the amplitude is only a little smaller. The real flow probably does not consist of intervals that are as clearly distinguishable as a triangular wave has.

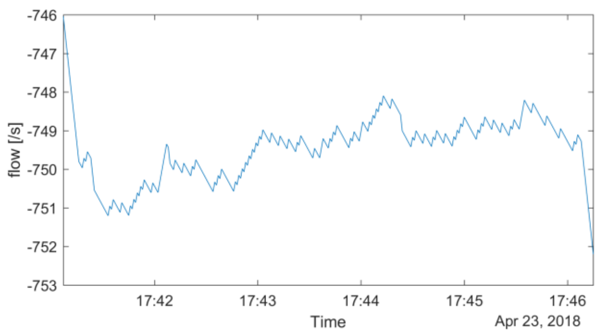

Figure 4.12 Smooth (span3) Slanted Cumulative Flow on stairs at Breda. Direction Up. Slanted at 0.416 persons per second.png

Smoothing with span 3 does look better than the original (Figure 4.8) without apparent loss of information. A distortion is still visible though.

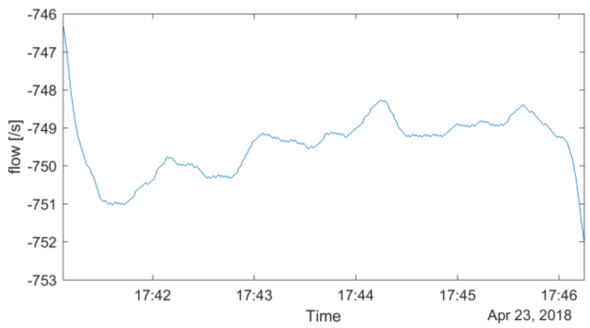

Figure 4.13 Smooth (span11) Slanted Cumulative Flow on stairs at Breda. Direction Up. Slanted at 0.416 persons per second.png

Span 11 is the lowest span at which no distortion is visible. It does appear though that some real 'sharp corners' are lost when using this span.

4.3.4 Why would the flow be constant over intervals of about 20 seconds?

Figure 4.2 shows that flow was constant for intervals of about 20 seconds. This is different than would be expected according to the fundamental assumption (paragraph 2.2.3) as it would be expected that flow, while a queue is present, is more or less constant, and slowly randomly changing around the average. Contrary to this expectation, flow appears to be constant for intervals ranging from 8 to 38 seconds, typically 20 seconds (see Table 4.2). A rationale of the interval length based on time on the stairs would predict an interval length of about 10 seconds (see calculation in bullet points further in this subsection). This possible explanation of this behaviour is based on the following assumptions:

1. Flow over time is primarily determined by the preferred speed of the users of the stairs, and then in the first place by the slowest person on the stairs.
2. The speed of an individual is only based on his or her preferred speed, and the speed of the person before him or her. Headway does not play a role, as the braking distance is negligible due to the slow speed.
3. Apart from a reaction time, speed changes are practically instantaneous.
4. Preferred speed is influenced by the environment.
5. Stumbling and the bike not staying in the ramp rarely has an influence.

According to assumption 1, if someone who is slower starts to use the stairs, the flow (which is measured at the low side of the stairs) directly becomes lower. This explains the sudden decreases in flow. When this slower person gets of the stairs, the effect is measurable at the lower end of the stairs with a delay. The delay is the sum of the reaction times of the people on the stairs (assumption 3). Therefore, although the speed change of all users can only be measured after a delay when measuring at the downside of the stairs, the speed change will not be gradual. With this line of thinking, the flow being constant for intervals makes sense. The length of the intervals is then dependant on the spread of preferred speed. The estimated time on stairs per person has been calculated to be about 10 seconds, based on the following calculation:

- The steps have been measured to be 19.7 cm deep, and 8.4 cm high. The stairs consist of 38 steps. This has been measured on-site by the staff. This means that the length of the stairs is about $38 * \sqrt{19.7^2 + 8.4^2} = 814cm$.
- The length of a regular bike is not easily found online. One source on this is (Leefmilieu Brussel, 2013), which considers a typical bicycle to be 1.85 m in length.

- At a flow of 25 bicycles per minute, with a bicycle length including headway of 2 meters, the speed of the bicycles is 2*(25/60) [$m*s^{-1}$]=0.83 m/s. (Compared to a commonly known average horizontal walking speed without bike of about 1.4 m/s)
- Therefore the time on stairs per person is about 8.14/0.83=9.8 s. This is about half of the typical time that emerges from the data.

In conclusion, a line of thinking has been presented in this section that appears to explain that the flow is constant for intervals, after which the flow instantly changes before staying constant for a while. This way of thinking however predicts intervals of about 10 seconds, while intervals in a range of 8 to 38 seconds have been observed. Therefore, more is at play than the reasoning above.

5 Results

Flow has been measured as is described in chapter 0, and the data has been processed as described in chapter 4. This chapter shows the results of the analysis. A subchapter has been dedicated to each measurement location; the check-in in Utrecht, the gate in Zwolle, and the stairs in Breda. For each location, a graph of the flow (per second) at capacity is shown, to give an idea how flow varies at capacity. Next to that, a cumulative distribution function (CDF) of the flow is given, which shows how often the flow was below a certain value. For this plot the flow has been averaged over a period (S) which corresponds to the effective sample size (N_{eff}) as is explained in paragraph 4.2.7. On top of the empirical CDF that is based on the data, a CDF for a normal distribution is plotted, with the same mean and standard deviation (σ) as the data. This combination of a theoretical graph with the graph from the data enables a judgement if the data is normally distributed.

The graphs are followed by a series of tables, which of which the first lists the capacity value that is found, with the (effective) sample size (N representing the number of people that passed during the measurement, N_{eff} the effective sample size), effective measurement time T (the time at which the bottleneck has been measured at capacity), and the span (S), which is the ratio of the effective measurement time and the effective sample size, and is also the base for de CDF. The second table for each location lists the capacity with a confidence interval, standard deviation and effective sample size for different averaging spans. This has been done because in this research, a satisfying way to convert a standard deviation that is calculated for one span to another span has not been found yet. A third table shows the capacity on a per minute basis, which contains the same values as the second table for 60 seconds, but multiplied by 60 seconds, which results in capacity per minute to aid mental arithmetic.

5.1 Check-in (Utrecht)

5.1.1 Capacity and standard deviation

For capacity determination, the counting data of the three Payters has been combined, and only the data for intervals at which a queue was observed was selected. The selected data of flow at capacity has been visualised per second in Figure 5.1.

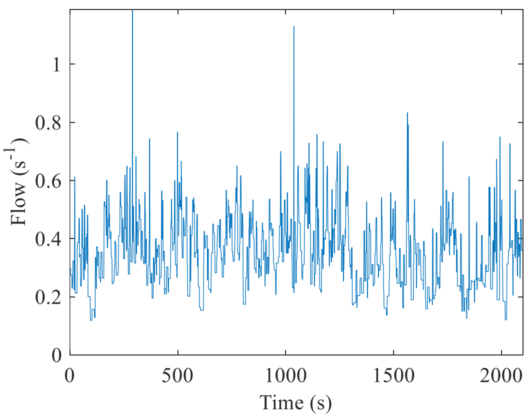

Figure 5.1 Flow (per second) at capacity at the check-in in Utrecht. Flow is processed as described in paragraph 4.2.2.

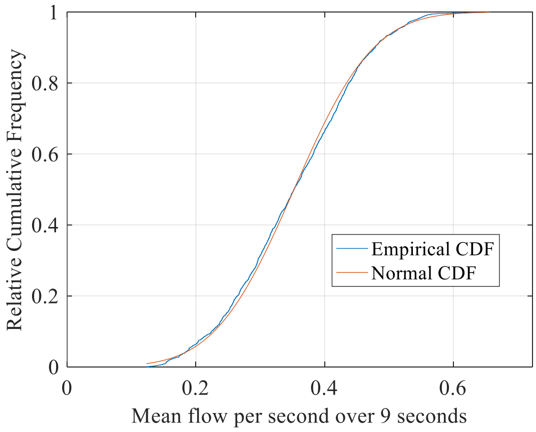

Figure 5.2 Cumulative distribution function of flow over intervals of 9 seconds in Utrecht, compared to a normal distribution.

To give an illustration of the spread of flow values within a fixed interval, for an aggregation span of 9 seconds a cumulative distribution plot of calculated capacity values for all possible starting points is depicted in Figure 5.2. These calculations have both been done for the intervals at which people were queueing (capacity).

The tables below list values as described at the beginning of this chapter. Table 5.1 lists general statistics, Table 5.2 lists the capacity with its confidence interval and standard deviation together with the effective sample size for a measurement interval of a single second, the 'optimal' interval size and 60 seconds interval size. Table 5.3 shows the same value as the last row of the table before, but expressed in minutes.

Table 5.1 Some statistics on the capacity measurement at Utrecht.

Capacity (s^{-1})	N	N_{eff}	T (s)	S (s)
0.352	739	246	2099	9

As is shown in the table above, 739 people passed during the measurement at times that there was a queue. As explained in 5.1.4, the effective sample size is three times lower. The total time measured is 2099 seconds, which if divided by the effective sample size gives an 'optimal' span of 9 seconds.

Table 5.2 A 95% confidence interval for the capacity of the check-in at Utrecht, for a number of averaging spans, based on measurements with a 9 second span.

Span (s)	Capacity (s^{-1})	σ (s^{-1})	N_{eff}
1	0.352 ±0.016	0.125	246
9	0.352 ±0.012	0.097	246
60	0.352 ±0.020	0.058	35

Table 5.2 gives the capacity per 1, 9 and 60 seconds. The capacity does not depend on the span, but the confidence interval does, as does the effective sample size. The effective sample size, calculated with equation (8), cannot be higher than the value determined in 5.1.4, but it can be lower as in this case for span 60 T/S≅35.

Table 5.3 Capacity expressed per minute (last row of

As is shown in the table above, 739 people passed during the measurement at times that there was a queue. As explained in 5.1.4, the effective sample size is three times lower. The total time measured is 2099 seconds, which if divided by the effective sample size gives an 'optimal' span of 9 seconds.

Table 5.2 multiplied by 60 seconds).

Span (min)	Capacity (min^{-1})	σ (min^{-1})	N_{eff}
1	21.2 ±1.2	3.5	35

5.1.2 Capacity improvement by response time reduction

Could the capacity be improved by reducing the response time of the device? The flow capacity of the Payter check-in system is partly determined by the response time of the IT system of it. This response time is specific to the situation, and therefore this response time has been measured, and a theoretical upper boundary of capacity improvement has been calculated. The response time measurement has been done on 15 October 2018, by hand using a stopwatch on a phone. The time that passed between the card touching the device and the positive response of the device (in the form of a beep and a green light) has been measured 10 times. The measurement data is shown in Table 5.4.

Table 5.4 Response time measurements of check-in devices at the Utrecht Jaarbeurszijde cycle storage. The response time includes the reaction time of the measurer. The sample size is low, which means that the mean and standard error provide only an indication of the real response time.

Measurement number	1	2	3	4	5	6	7	8	9	10	**Mean**	**Standard error**
Response time (s)	1.71	1.40	1.26	1.07	1.66	1.45	1.53	1.33	1.85	1.33	**1.46**	**0.07**

The mean response time is about 1.5 seconds. Lowering the response times might be one of the most certain ways to increase capacity, as in principle each person has to wait for that time. However, people have been observed to anticipate approval, and therefore the approval time is not completely lost time. The maximum theoretical capacity improvement that would be possible by removing the response time can be calculated as follows. Taking the mean service time as the inverse of the capacity; dividing the capacity by 3 because the capacity is reported for the combination of 3 devices; the service time is 1/(0.352/3)=8.523. This service time can theoretically be reduced by the current response time of 1.5 seconds to 7.0 seconds, which corresponds to a capacity of 1/7=0.14s^{-1} for a single device or 3*0.14=0.43s^{-1} for three devices. The percentage improvement could theoretically be about (0.43-0.352)/0.352*100%=22%, but again, it has been observed that users anticipate approval. The capacity improvement of reducing the response time could be between 0% and 22%.

5.1.3 Outliers

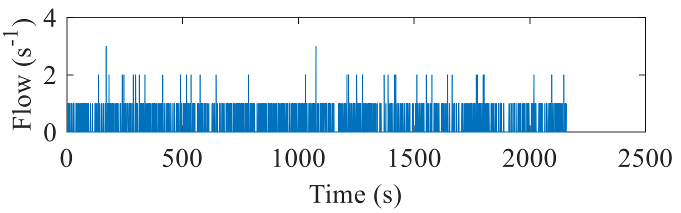

Figure 5.3 Outliers in Utrecht. The figure shows flow at capacity. Upon visual inspection, two clear gaps are visible. These gaps have been removed as outliers in further analysis.

Upon visual inspection of the flow data at capacity, two clear gaps are visible of about 20 seconds (see Figure 5.3), which have been removed. The reason is that it is very unlikely that three people at the same time would struggle with checking in for 20 seconds while normally about 7 people would pass during that time. It is much more likely that the manual queue detection was not reset when the queue dissolved. No further outliers have been removed, because although low flow at capacity for a certain interval may be counterintuitive, a histogram did not suggest that there are further outliers that need to be removed. Low flow can firstly be explained by the measurement precision, which is lower than the average service time, and secondly by the fact that some people take quite a while to find the right card, while blocking others.

5.1.4 Effective sample size

As is argued in paragraph 4.2.4, the sample size is not simply the number of data points. The upper boundary of the sample size is the number of people that passed during the measurement. In this case however, we measure a flow over three parallel devices. Therefore, a single person is not a full sample of how the system functions because interactions are not accounted for. Therefore, the number of people has been divided by three, which brings the effective sample size to 750/3=250 people. With a total measuring time of 2119 seconds, the minimum averaging interval size is 2119/250=8.476 seconds, rounded up to 9 seconds.

5.2 Gate (Zwolle)

5.2.1 Capacity and standard deviation

Intervals at capacity have been selected from the data of the flow out of the storage in the afternoon. Within the selected intervals, 95 users were found who arrived before the person ahead him had passed through. Their personal serving time has been calculated, with second precision. The data has been processed as is described in section 4.2. The flow per second is shown Figure 5.4. To show the distribution of the flow a cumulative distribution plot of the data is shown in Figure 5.5, with theoretical line for a normal distribution.

The waiting time is not relevant for the research question, but is still interesting for practitioners. Therefore the waiting time for both gates and both in the morning and the evening is shown in Figure 5.6.

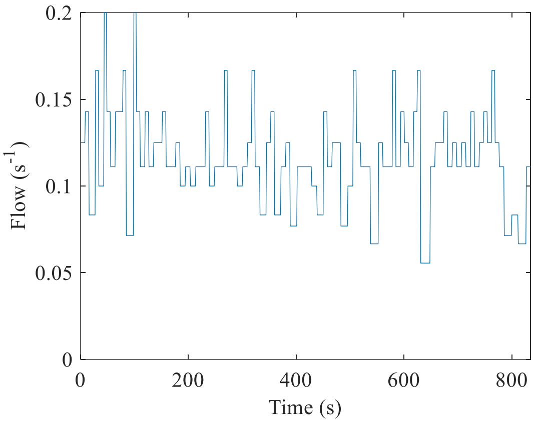

Figure 5.4 Flow (per second) at capacity at the gate in Zwolle. Flow is processed as described in paragraph 4.2.2.

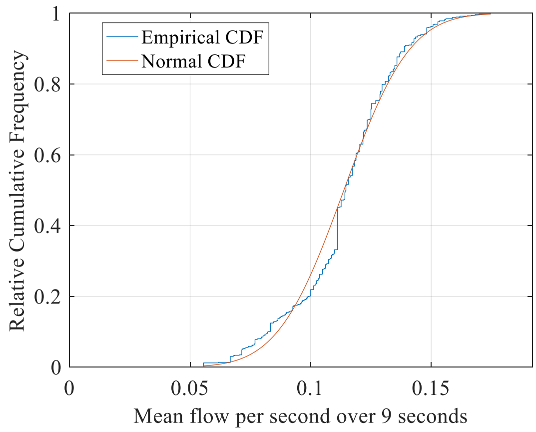

Figure 5.5 Cumulative distribution function of flow over intervals of 9 seconds in Zwolle, compared to a normal distribution.

The tables below list values as described at the beginning of this chapter. Table 5.5 lists general statistics, Table 5.6 lists the capacity with its confidence interval and standard deviation together with the effective sample size for a measurement interval of a single second, the 'optimal' interval size and 60 seconds interval size. Table 5.7 shows the same value as the last row of the table before, but expressed in minutes.

Table 5.5 Some statistics on the flow at capacity, averaged over 9 second intervals.

Capacity (s^{-1})	N	N_{eff}	T (s)	S (s)
0.1138	95	95	835	9

Table 5.6 Capacity and standard deviation for some measurement intervals.

Span (s)	Capacity (s^{-1})	σ (s^{-1})	N_{eff}
1	0.1138 ±0.0054	0.0268	95
9	0.1138 ±0.0043	0.0215	95
60	0.1138 ±0.0058	0.0101	14

Table 5.7 Capacity per minute, 95% confidence interval.

Span (min)	Capacity (min^{-1})	σ (min^{-1})	N_{eff}
1	6.83 ±0.35	0.61	14

5.2.2 Capacity improvement by response time reduction

Just like the Payter check-in system in Utrecht, the gates in Zwolle have a delay between the moment that a valid entry card is presented and the moment that the gate gets approval of the system to open. Here we call that delay the response time. The capacity of the gate could probably be improved by reducing the response time. This is more probable in this case than in the case of the Payter check-in in Utrecht, because with a closed gate the users cannot anticipate approval. Currently, the installer of the gates reports the response time as 2 seconds, and in the future the underlying IT system will be changed after which a response time of 0.5 seconds is expected.

The current mean service time is 8.8 seconds (see paragraph 5.2.4), and the new mean service time could be 8.8-2+0.5=7.3 seconds, which corresponds to a capacity of 1/7.3=0.14 persons per second, or 8.2 persons per minute. The current capacity is 6.8 persons per minute, which means that the planned response time reduction might improve the capacity with (8.2-6.8)/6.8*100%=21%.

5.2.3 Effective sample size

For the case of the bicycle gate, little correlation between measurements at capacity is expected. One could argue that if the queue is long, people in the queue have more time to get their card ready, and to see before them how the process works. However, in the measurements at capacity, there is always at least one person before the person of which the service time is measured. Therefore, any possible correlation is neglected, and the effective sample size is considered to be the true sample size; the number of people that has passed through the gate while measuring (N=95). As the total effective measuring time was 835 seconds, 14 intervals of 60 seconds fit in ($N_{eff,60}$=14).

5.2.4 Service time

The histogram of service times (Figure 5.6) shows a clear peak at 9 seconds. A considerable amount of people passed through a bit quicker, but no one managed to be quicker than 5 seconds. The distribution appears to have a long tail on the right, probably from people who had some kind of trouble. The distribution does not appear to be normal distribution, as opposed to Figure 5.5, which is from the same data but from a flow perspective instead of a service time perspective. The assumption of a normal distribution is made only for the flow perspective.

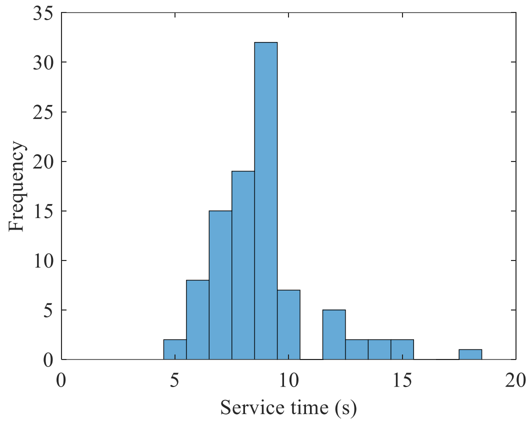

Figure 5.6 Histogram of service time at capacity. It shows that, when the system was at capacity, most users had a service time of 9 seconds.

The mean service time was 8.8 s. Therefore the capacity is 1/8.8*60 = 6.8 persons per minute. In total, 95 peoples service time at capacity was measured (N=95).

Table 5.8 Some statistics on the service time of users when the system was at capacity.

	Service time (s)
Mean	8.790
Standard deviation	2.226
95% confidence interval	± 0.045

5.3 Stairs, single ramp (Breda)

The capacity has been determined from the cycle storage at station Breda, the Centrum side. The capacity flow is shown in Figure 5.7, a cumulative distribution plot of flow samples is shown in Figure 5.8. Table 5.9, Table 5.10 and Table 5.11 show statistics on the measurement and the flow.

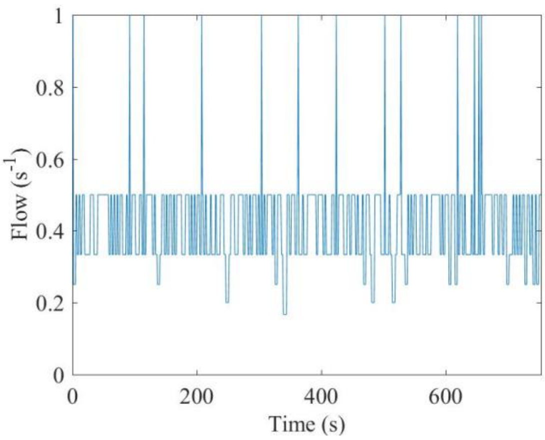

Figure 5.7 Flow (per second) at capacity at single stairs in Breda. Flow is processed as described in paragraph 4.2.2.

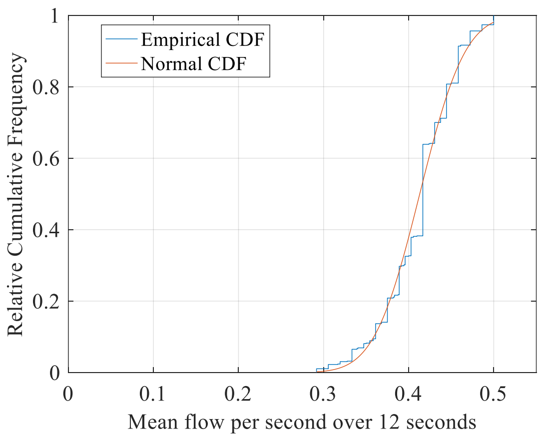

Figure 5.8 Cumulative distribution function of flow over intervals (S) of 12 seconds in Breda, compared to a normal distribution.

Table 5.9 Some statistics on the flow at capacity at single stairs, averaged over 12 second intervals.

Mean	N	N_{eff}	T (s)	S (s)
0.4130	310	77	753	12

5.3.1 Capacity and standard deviation

Table 5.10 Capacity and standard deviation for some measurement intervals.

Span (s)	Capacity (s^{-1})	σ (s^{-1})	N_{eff}
1	0.413 ±0.028	0.123	77
12	0.4130 ±0.0094	0.0421	77
60	0.413 ±0.010	0.017	12

Table 5.11 Capacity per minute, 95% confidence interval

Span (min)	Capacity (min^{-1})	σ (min^{-1})	N_{eff}
1	24.78 ±0.60	1.02	12

It is interesting to calculate the walking speed on the stairs. At capacity, 24.74 bicycles per minute, and assuming a headway (including bicycle length) of 2 meters, the speed of the users is 0.83 m/s. This is slower than what is considered a normal walking speed for pedestrians, 1.4 m/s.

5.3.2 Effective sample size

As argued in paragraph 4.2.7, the sample size is not simply the number of data points. In this case, the flow can be expected to correlate even between different persons. One can only climb the stairs as fast as ones predecessor. In paragraph 3.3.3 it is stated that about 4 people fit on the stairs, therefore it is chosen to divide the effective number of people measured (N=310, see Table 5.10) by 4 to obtain the effective sample size: 77. With an effective measurement time of T=753 seconds, the appropriate averaging span is 12 seconds.

5.3.3 Data correction

The flow measurement of the stairs in Breda was the first location that ended up in this report. At this location some preventable and correctable measurement errors have been made, of which the correction is described in this section. For the other measurement locations this error have not been made, or not been noticed, which is why the correction is only described for this location.

5.3.3.1 Visualization of the flow data and error correction single ramp up.

The flow data from this measurement is visualized in Figure 5.9. For this representation, the flow has been smoothed with a span of 19 seconds. The same data is represented in Figure 5.10, in the form of a slanted cumulative curve. The peaks in Figure 5.9 correspond with the horizontal parts in the slanted cumulative curve.

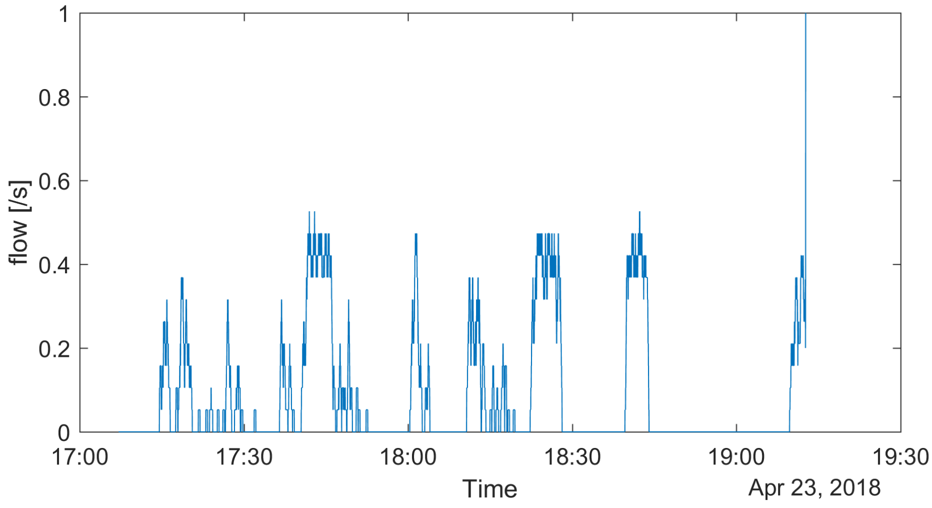

Figure 5.9 Flow aggregated at 1 second interval. Smoothing span 19. At times that there were not so many users, some users were not counted. At the busy times, all users were counted. Therefore, the data is only reliable at the peaks.

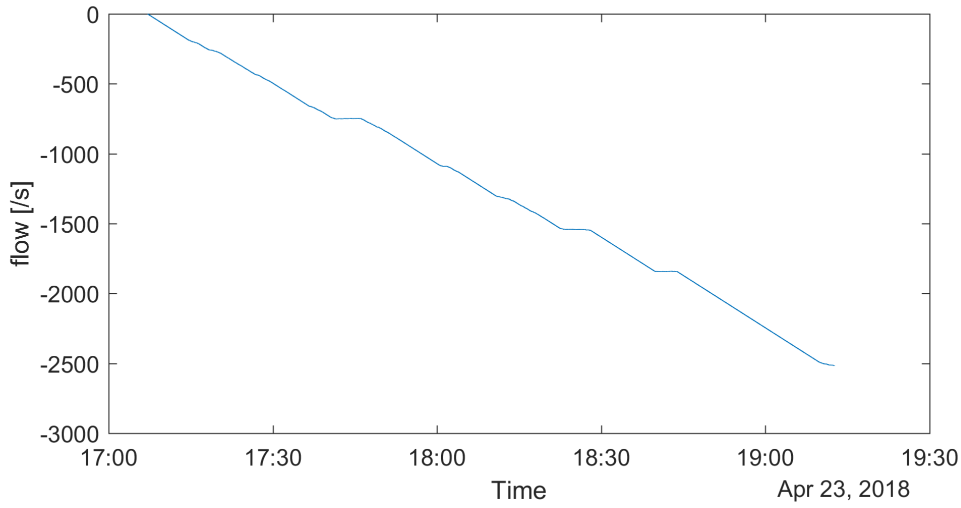

Figure 5.10 Slanted Cumulative Flow on stairs at Breda. Direction Up. Slanted at 0.416 persons per second.

The horizontal parts of Figure 5.10 have been zoomed into. These graphs are shown in Figure 5.11, Figure 5.12 and Figure 5.14. These graphs show that the flow has some variation.

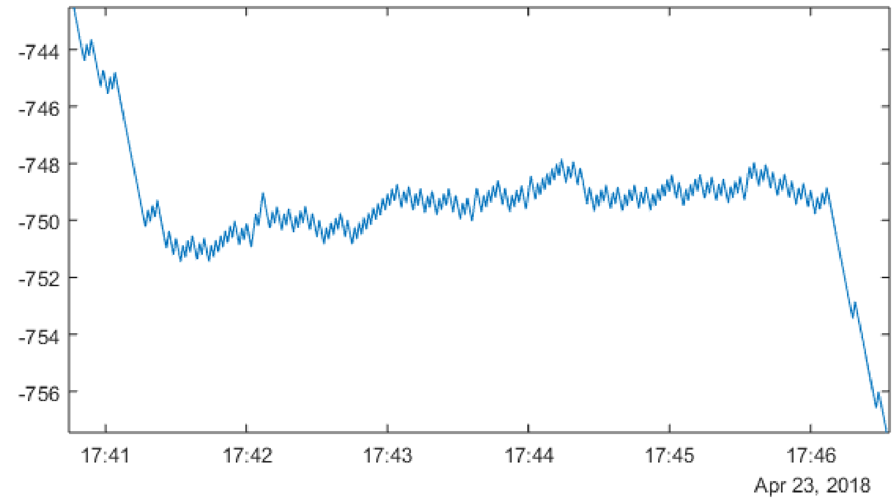

Figure 5.11 First interval of high flow. Slanted Cumulative Flow on stairs at Breda. Upward. Slanted at 0.416 persons per second.

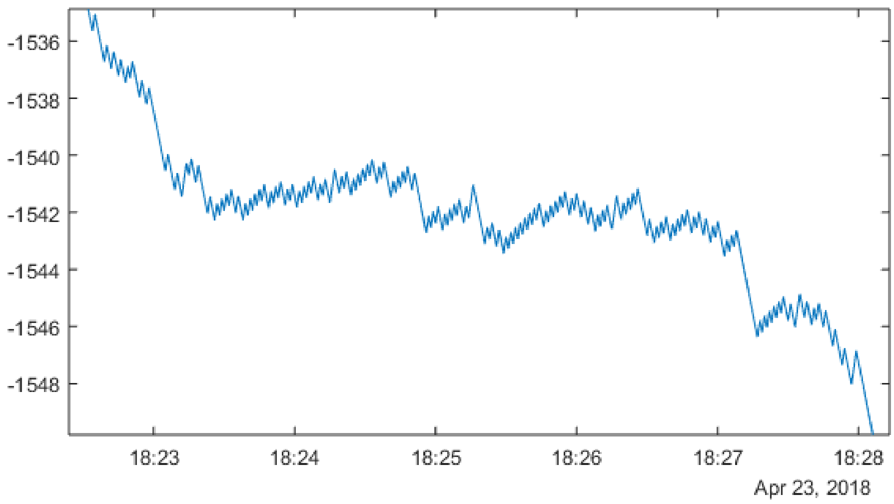

Figure 5.12 Uncorrected second interval of high flow. Slanted Cumulative Flow on stairs at Breda. Flow direction upward. Slanted at 0.416 persons per second. There have been 4 demonstrable miss clicks in this data gathering process. There are also 4 weird jumps in the data, which appear to be caused by the miss clicks, see Figure 5.13.

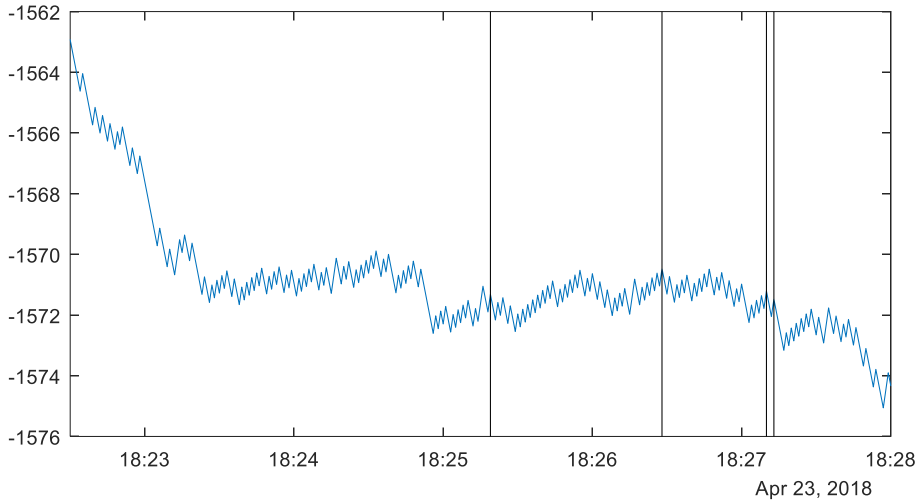

Figure 5.13 Corrected version of second interval with horizontal lines indicating where the cumulative curve was corrected. The corrections were based on clear miss clicks on the queue detection counter. Two 'jumps' in the line remain, for which no evidence exists if the flow was actually stopped for a few seconds, or if a couple of people were missed.

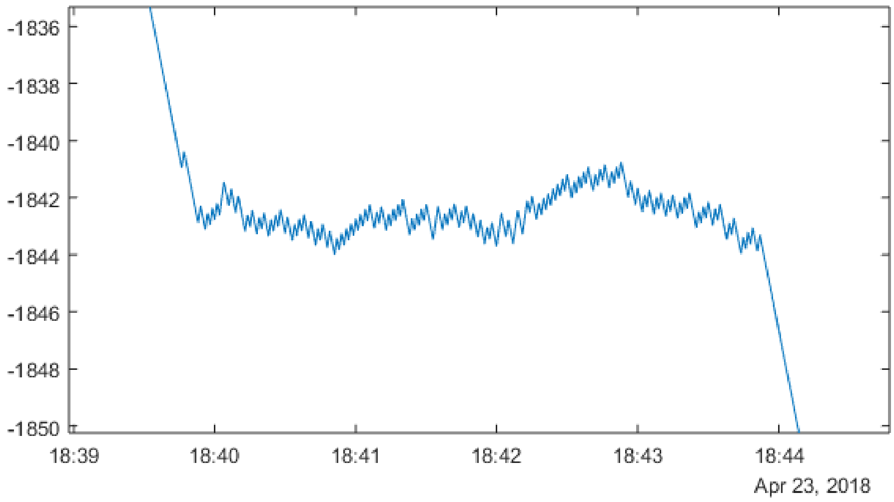

Figure 5.14 Third interval of high flow. Slanted Cumulative Flow on stairs at Breda. Upward. Slanted at 0.416 persons per second.

5.3.3.2 Was the measured peak hour a typical peak for this location?

This question was relevant if it would be needed to decide if and when to gather more data. To answer the question, checkouts for NS in the whole station on the measurement day have been compared to the same day of the week, Monday, from the five weeks before. The checkouts are visualized per 15 minutes in Figure 5.15, the totals are shown in Table 5.12.

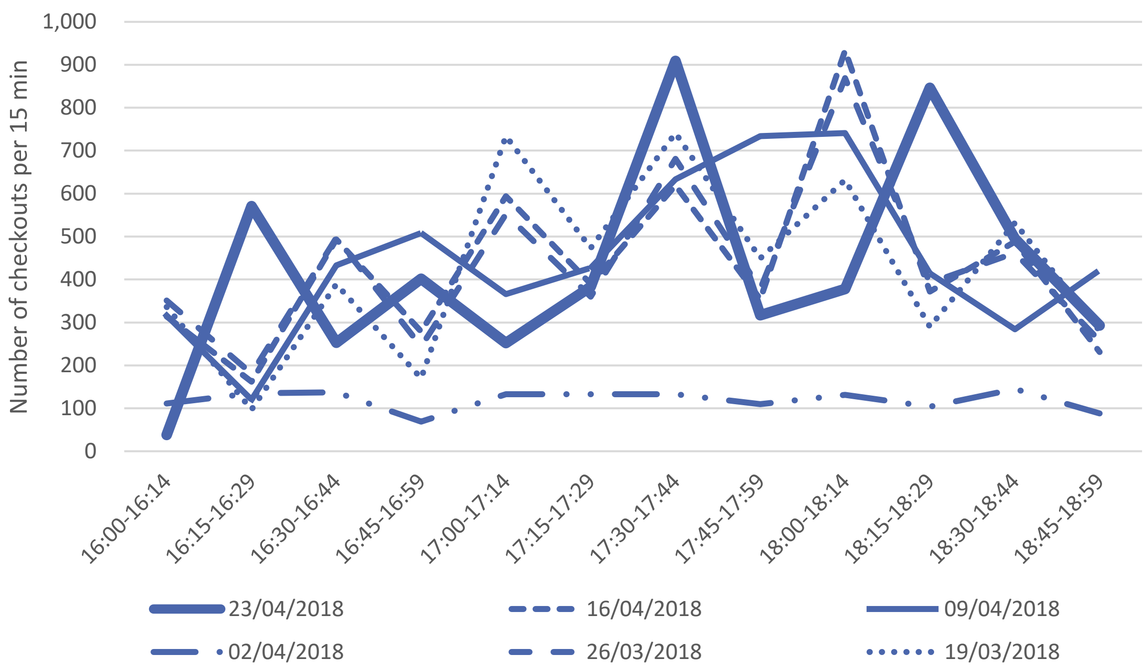

Figure 5.15 NS checkouts on a number of Mondays. The measurement day (solid line) was a fairly typical Monday, as is here illustrated using NS traveller checkouts on the measurement day, It can be seen that due to delayed trains (free coffee was available for this reason), peaks were a little later than on other Mondays, but not higher. Also, April 2nd was a public holiday, second Easter. The total per day is listed in Table 5.12.

From the graph of Figure 5.15 it can be concluded that it was a fairly typical Monday considering the maximum number of checkouts per 15 minutes. Due to delays, peaks were shifted, but not higher than usual. The total number of checkouts for each day is listed in Table 5.12. This number also shows that the measurement day was not an unusual day. On the graph and in the table April 2nd is an outlier, this day was a public holiday.

Table 5.12 Total number of NS checkouts at Breda between 16h and 19 h, for a selection of Mondays. This information is showed per 15 minutes in Figure 5.15. It shows that the measurement day was a fairly typical regarding total number of checkouts.

Date	23/04/2018	16/04/2018	09/04/2018	02/04/2018	26/03/2018	19/03/2018
Checkouts 16:00-19:00	5,137	5,229	5,398	1,429	5,224	5,123

5.4 Dependence of standard deviation on measurement interval

This subchapter describes some challenges with converting standard deviations to different measurement intervals. Although the measurements have been done per second, with averaging it is possible to calculate the results per two seconds, or per minute etc. Which interval size or span is useful for calculating depends on the situation. It is intuitive that with a longer time interval, the standard deviation becomes lower.

The cumulative distribution functions that are shown (Figure 5.2, Figure 5.5 and Figure 5.8) support the assumption of a normal distribution. For a normal distribution one would expect that formula 4 would explain how a standard deviation can be converted for different interval sizes.

However, the figures on the right below illustrate that the conversion does not work so well. The blue lines show the standard deviation for the interval size that is shown on the x-axis. The red and yellow

line show what kind of function of the interval size the standard deviation of a truly normally distributed and memoryless 'flow' would have, for an infinite sample size and a sample size like the data respectively.
The figures on the left show the autocorrelation function for each of the data sources. The graphs suggest that the conversion of standard deviations to different intervals should take the autocorrelation into account. Future analysis might result this relationship, for example using methods described in 'Standard Deviation of the Mean of Auto correlated Observations Estimated with the Use of the Autocorrelation Function Estimated From the Data' (Zięba & Ramza, 2011).

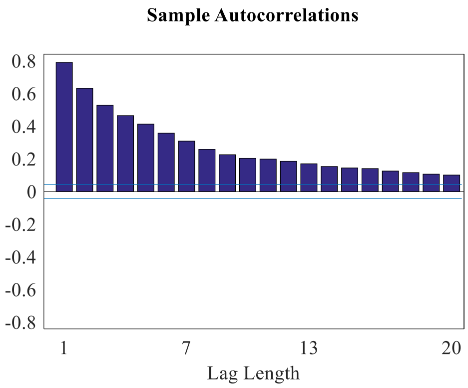

Figure 5.16 Autocorrelation based on measurements per second, check-in Utrecht.

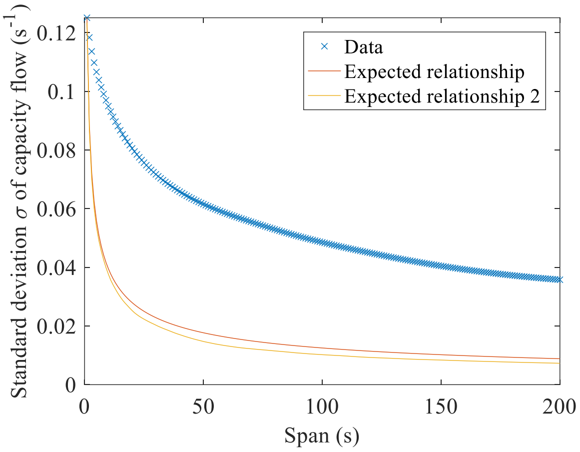

Figure 5.17 Relationship between averaging span and standard deviation, check-in Utrecht

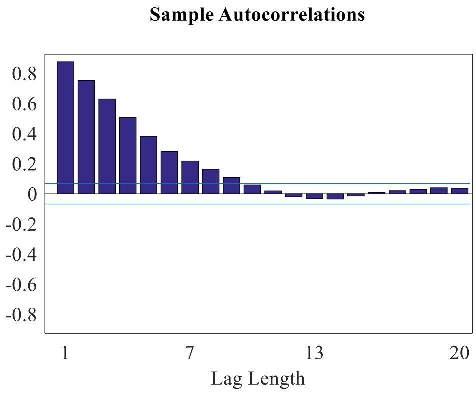

Figure 5.18 Autocorrelation based on measurements per second, gate Zwolle.

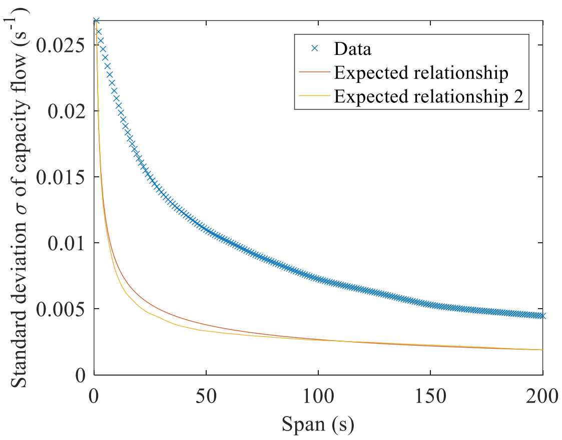

Figure 5.19 Relationship between averaging span and standard deviation, gate Zwolle.

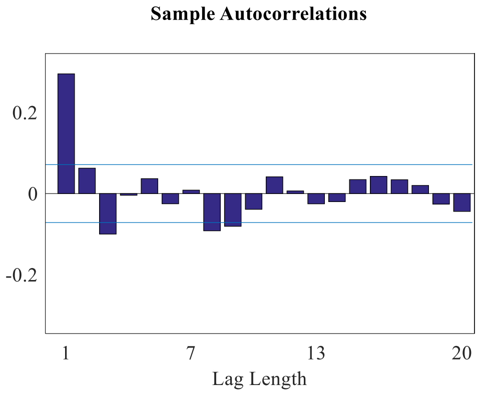

Figure 5.20 Autocorrelation based on measurements per second stairs, Breda.

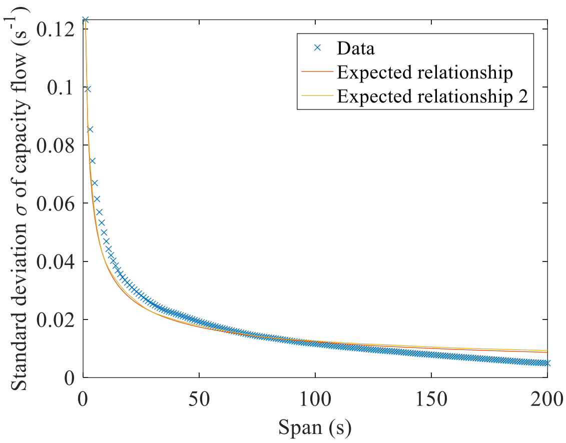

Figure 5.21 Relationship between averaging span and standard deviation, stairs Breda.

That autocorrelation really is the culprit, causing the standard deviation to not change according to equation (4), here can be understood by imagining a process that has a constant flow for two seconds, and then changes to a different flow, that is a random draw from a normal distribution, for two seconds. If one would study the process per two seconds, one would find an approximation of the normal distribution that is drawn from. If one would study the process per second, one would still find the same distribution. To make the argument stronger, the autocorrelation has been removed from the real data, by shuffling the data. This results in graphs that follow equation (4) much better, see Figure 5.22.

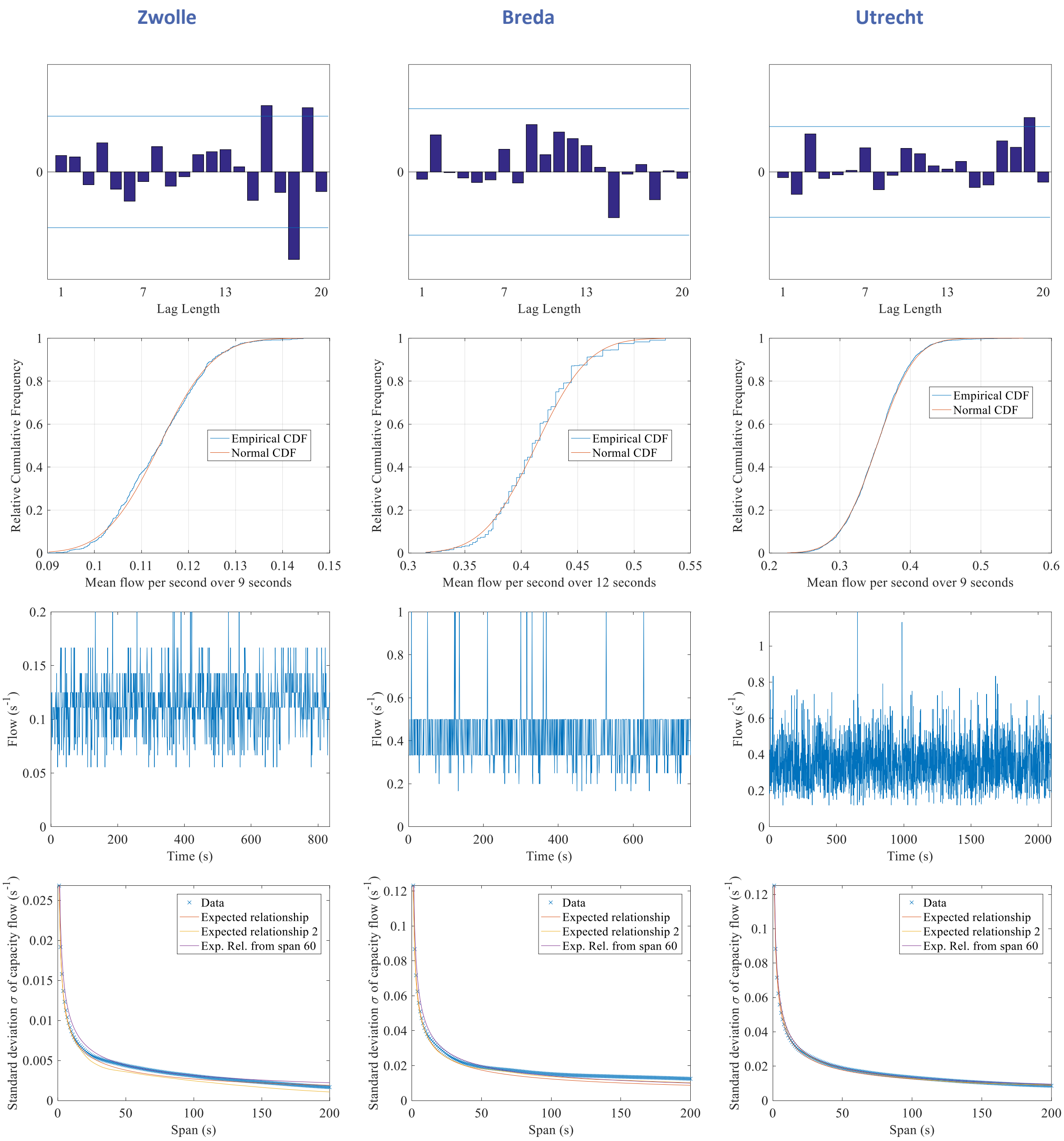

Figure 5.22 Data analysis with shuffled data, to show the effect of removing autocorrelation. The top row shows that autocorrelation is minimized. The second row shows that the CDF is unchanged. The third row shows that the flow changes more quickly, the fourth and last row shows that the standard deviation changes as equation (4) predicts.

6 Conclusions and recommendations

The research question of this thesis was: what is the capacity and the variation of the flow at capacity of a bicycle check-in, bicycle gate and bicycle stairs, and what is a suitable method to determine these values? As a definition of capacity has been used the queue discharge rate, as the queue discharge rate gives a satisfying answer to the question 'how much can this bottleneck handle if demand is suddenly high?' To quantify the variation, the measurement at capacity has been divided into intervals of equal span, of which the span has been chosen as the ratio of the effective measurement time divided by the effective sample size, which in turn was chosen as the effective number of people measured divided by the number of people that could use the bottleneck at the same time. The thus obtained data points have been shown to follow a normal distribution, allowing the calculation of a standard deviation and a confidence interval for the capacity. This research is relevant for designers of cycle storages, and scientists and practitioners who want to measure capacity flow of pedestrians.

6.1 Findings

A practical way of measuring bicycle flow has proven to be counting while being physically present to create an event based log. From the data it is calculated that the capacity values at the case study locations were as shown in Table 6.1. The capacity value of the gate was considerably lower at about 7 per minute, compared to the stairs at about 25 per minute and the check-in (which consisted of 3 devices) at about 21 per minute.

Table 6.1 Overview of capacity values, based on averaging over a minute.

Bottleneck	**Location**	**Capacity (min^{-1})**	**σ (min^{-1})**	**N_{eff}**
Check-in, three devices	Utrecht	21.2 ±1.2	3.5	35
Gate, single direction	Zwolle	6.83 ±0.35	0.61	14
Stairs, single ramp up	Breda	24.78 ±0.60	1.02	12

Table 6.2 contains two relative statistics; the coefficient of variation c_v, which is defined as the ratio of the standard deviation σ to the mean (capacity in this case), and the size of the confidence interval relative to the capacity, both expressed as a percentage.

Table 6.2 relative variation and uncertainty

Bottleneck	**Location**	**Relative size confidence interval *100%**	**coefficient of variation c_v *100%**
Check-in, three devices	Utrecht	5.7%	17%
Gate, single direction	Zwolle	5.1%	8.9%
Stairs, single ramp up	Breda	2.4%	4.1%

The confidence intervals are all 6% of the capacity or lower, and in absolute sense about 1 person per minute or lower. The coefficients of variation vary by about factors of two; the check-in had the highest c_v at 17%, the gate had about half of that (8.9%), and again the stairs had about half of that (4.1%). This shows that there are considerable relative differences in the variation of the flow. The cumulative distribution functions all seem close to the normal cumulative distribution function. All flows show some autocorrelation, but on quite a different time scale. On the stairs the auto correlation is lowest and may even be negligible, while for the gate the auto correlation first crosses zero at lag 13, and at the check-in this zero-crossing is further than lag 20. The graphs of standard deviation as a function of averaging span show that a standard deviation that is calculated for one span, cannot always be simply converted to a different span using equation (4). This means that infrastructure elements can only be compared well in terms of standard deviation of the flow for the timespan that the standard deviation has been calculated for from the data.

6.2 Conclusions and discussion

In this thesis, the following question was addressed: What is a confidence interval for, and a suitable way to quantify the variation of, the expected flow at capacity of some case studies (bicycle check-in, bicycle gate and bicycle stairs)? To answer the research question the following sub questions have been covered:

1. *What is a suitable definition of capacity?*
2. *How can the variation of the flow at capacity be quantified?*
3. *How can the uncertainty of the capacity be quantified?*
4. *What is a practical way to measure bicycle flow?*
5. *What is a 95% confidence interval for the capacity at the case study locations?*
6. *What is the variation of the flow at capacity for each of the case studies?*

The conclusions below are numbered to match the sub questions. Each conclusion is discussed.

1. **The capacity of a bottleneck for people walking next to their bicycle in a cycle storage is the queue discharge rate.**

Other research shows issues in reporting a single capacity value, because capacity is defined as peak flow. That makes it unclear if capacity is actually reached during the whole measurement. By measuring only when there is a queue, the objective of this research is reached. Queue detection has in this research been achieved by eye. The intervals at which a queue was present have been combined, taking into account that the event log must be converted to a service time log before combining the intervals.
Additionally, there are factors which might have an influence on the capacity that have been neglected in this research. Factors that might have an influence include: type of traveller (purpose of trip, gender, age, etc.), weather and time of day or time of the year, the situation around the bottleneck.
Then there is the validity of the fundamental assumption of this research: when there is a queue, Flow is constant, except for stochastic variation around the mean. This assumption does appear to be reasonable when looking at the data, but could have been tested more thoroughly, by investigating if the flow does indeed not have a trend when after queuing starts. This could be a step for further research.

2. **The variation of the flow can be quantified by dividing the combined measurements into intervals, and calculating the standard deviation of these intervals. The flow shows autocorrelation, which should also be taken into account.**

The measurement over time has been divided into intervals for each bottleneck. The optimal number of intervals equals the number of people that passed during the measurement divided by the number of people that can use the bottleneck at the same time (1 for the gate, 3 for the check-in and 4 for the stairs).

Dividing into intervals reduces correlation between the capacity measurements. However, there might still be some correlation between the samples left. This would mean that the effective sample size is overestimated, and the confidence interval too small.
A major discussion point is the conversion of the standard deviation to other interval sizes, for example one second to one minute. Equation (1), which holds for averages of multiple samples from a normal distribution, cannot be used in this case, as is demonstrated in 5.3.3. It would be a big improvement if a robust method was found to convert from one interval span to another. Inspiration for such method can probably be found in literature on for example weather or economic data, which face similar characteristics.
The autocorrelation creates a disadvantage of combining intervals at capacity. At the point that two intervals are combined, the autocorrelation is expected to be zero. This means that when the analysis is done for a higher time step than the flow has been measured in, the effect of autocorrelation is reduced. The effect is that for a combination of many short intervals a lower standard deviation of the flow is calculated than for one big measurement. It might be useful to calculate if this effect is significant.

For this conclusion, the fundamental assumption (see paragraph 2.2.3) is of high importance. This assumption is that when there is a queue upstream of a bottleneck, flow can be described as a random variate with a constant mean and variation. This assumption is needed to combine intervals at which there was a queue, which is an important aspect of the data analysis in this thesis. An indication that the assumption is reasonable is Figure 5.10, in which the intervals at capacity are clearly visible as horizontal parts of the slanted curve, which indicates that the average flow does not change while the system is at capacity.

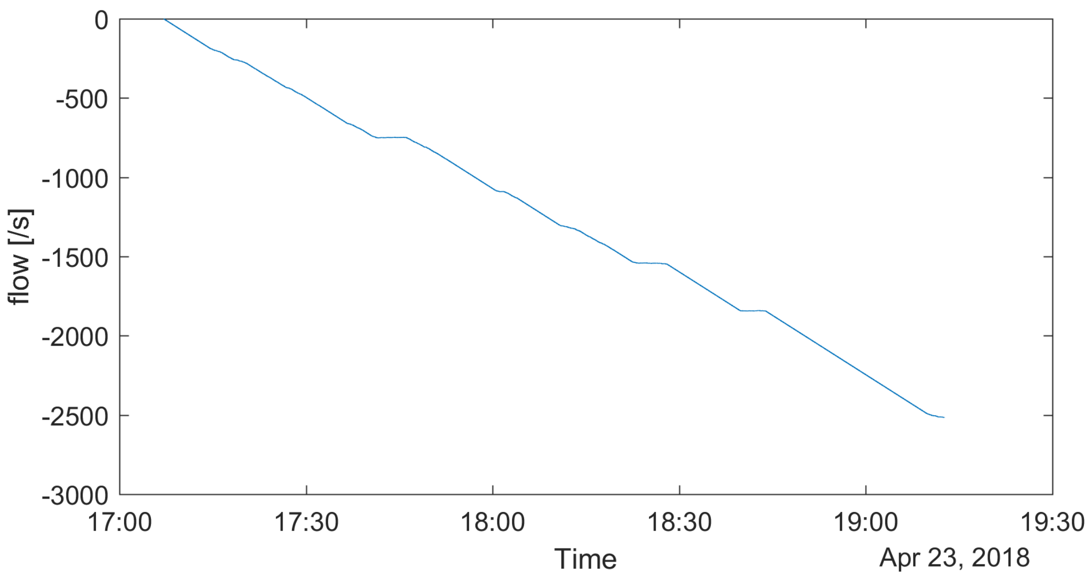

Figure 6.1 Slanted Cumulative Flow on stairs at Breda. Direction Up. Slanted at 0.416 persons per second. This graph is the same as Figure 5.10.

3. **The uncertainty of the capacity can be calculated using the standard deviation and the effective sample size.**

A main challenge in this research has been quantifying variation in a way that is both feasible and meaningful. Looking at stairs only, interesting patterns are visible in the data if you make a slanted cumulative curve, which suggests that this phenomenon can be exploited to quantify the variation. Some steps in that direction are shown in appendix 0. This method has not been developed further because it could not be applied to the other bottlenecks that have been considered. The approach which has finally been chosen, which divides the measurements into intervals of equal span, has a major challenge in choosing the interval size. Appendix 5.3.3 shows an exploration of how the standard deviation depends on the chosen span. Considerable differences are found between what one would expect if each interval was truly an uncorrelated sample from a normal distribution. It is suspected that this difference is caused by autocorrelation between intervals, therefore the autocorrelation is shown next to it.

4. **A practical way of measuring bicycle flow is to manually create an event based log of the flow.**

The event based log has been created with the help of a counting app. Alternative measurement methods that have been considered include a stereo camera pedestrian sensor, electromagnetic sensors, light sensors and video footage from security cameras or from handheld cameras. Manual measurements as they have been done were preferred for privacy reasons, practical reasons and time restrictions. Some challenges in measuring remain when measuring manually: it has to be busy enough for queues to form (Tuesday evening is usually best), the workload per measurement person needs to be managed (preferably one click per second per person at most), and queue detection stays a bit ambiguous.

5. **A 95% confidence interval of capacity values of the check-in in Utrecht, gate in Zwolle, and stairs in Breda are 21.2 ±1.2, 6.83 ±0.35, and 24.78 ±0.60 persons per minute respectively.**

Relatively, the 95% confidence intervals are 5.7%, 5.1% and 2.4% of the capacity respectively. This seems reasonably low, meaning that the effective sample size was high enough. The same can be said about the absolute size of the confidence intervals (1.2, 0.35 and 0.60 respectively) which are all around or lower than 1, which seems a reasonable threshold.
Could one expect the same capacity for check-in, gates and stairs at other locations? For example, stairs with a single ramp at a different location probably have a similar capacity. However, the capacity might be different because of a different angle, step dimensions, gutter type and other physical properties. For gates and check-in, different soft- and hardware would result in a different capacity, just as the available space for queueing and overtaking might play a role.
However, even for the bottlenecks themselves the reported values should be treated with caution, as approximations, for a number of reasons. Firstly there might have been measurement errors while counting. Although the measurements have been done with great care, some counts and queue detection might have been registered wrongly. This uncertainty could have been reduced by videotaping while measuring, so the measurement could be checked. Another ambiguity arises when judging at which instant a queue forms. In all case studies, this instant has some indistinctness to it, and although the effect is probably small, it cannot be quantified.

6. **The standard deviations of the capacity flow of the check-in in Utrecht, gate in Zwolle, and stairs in Breda are 3.5, 0.61 and 1.02 persons per minute respectively.**

The standard deviation is a measure of the variation of the flow. Assuming a normal distribution, if you do a single observation (observe flow while there is a queue for a minute), you would expect it to be close to the mean, and 68%, 95% and 99.7% of cases to be σ, 2σ and 3σ from the mean respectively. This is known as the empirical rule, and although it only holds for large samples, it is still a reasonable approximation for small sample sizes.

The coefficients of variation vary by about factors of two; the check-in had the highest c_v at 17%, the gate had about half of that (8.9%), and again the stairs had about half of that (4.1%). This indicates that the variation of the flow depends strongly on the process, and might mean that there are improvements possible at the check-in and the gate which might bring the variation down to the level that is observed at the stairs.

The standard deviation that is reported might be underestimated or overestimated. One thing that probably makes the standard deviation a little higher, is the fact that passing times are registered with second accuracy.

It has turned out that a standard deviation that is calculated for a certain interval span (for example per minute in this conclusion), cannot be converted easily to a different interval size. This means that if a standard deviation is needed for a specific interval size, it must be calculated directly from the data for that interval.

6.3 Practical recommendations

This section contains practical recommendations regarding application of the method that is presented in this thesis and things to consider when combining bottlenecks and balancing capacity and demand. Section 6.4 contains recommendations for further research.

The capacity determination method that is presented in this research can be recommended for future capacity measurements. For this method it is necessary that queues form at the bottleneck in question. In this thesis, the method has only been applied to bottlenecks for pedestrians with a bicycle, but the method is probably applicable to bottlenecks for pedestrians in general.

A major drawback of the method that is presented here is that it needs the bottleneck to be at capacity. To enable application of this method to bottlenecks at which no queues form in normal operation, queueing could be forced by holding people up, blocking alternative ways and by organizing an experiment with participants. The capacity values that are measured this way might not be the capacity values that would be measured if a queue of actual users would form, but it would supply a solid approximation. How big the difference is, could be investigated by performing the same experiment on a bottleneck that is already measured in this research, and comparing the results of the experiment with the results of this thesis. The confidence interval that the method supplies makes it possible to judge if the differences that are found are significant.

The method to determine an effective sample size appears to work well. For capacity measurements, manual counting is a good, flexible and affordable option. For the bottlenecks that have been considered, a single rush 'hour' of two hours proved to be sufficient, in which 12 to 34 minutes of the times queues were present. Manually counting from video is even better, as it makes the measurement repeatable, and enables checking the data. When planning to count manually, it is important to manage the workload of the measurer. If needed, the counting can be divided over different people. A good rule of thumb is that a measurer can only click once per second. It is advised to ensure that the measurement time step is smaller than the lowest expected time between users.

For future capacity determination, it is recommended to measure on a Tuesday evening. Because most cycle storages can handle the in- and outflow reasonably well, it can be challenging to find a moment at which queues are present. Practice has shown for each location that Tuesdays are the busiest day, followed by Thursdays. The peak flows are higher in the evenings, because everyone comes out of a train at the same time, while arrival to the station is more spread out. Stations are sometimes characterised by the term attraction and production stations, based on if the stations are mainly a destination or an origin for travellers. Although this partly determines the demand for cycle storage, the peak moment for the cycle storage still is Tuesday evening, regardless if the station is an attraction or production station.

If a designer of a cycle storage needs to choose between two options with known capacity and standard deviation, a high capacity and low standard deviation are preferable. If it is not clear, a simple demand and capacity model can help compare two options. Standard deviations in combination with the effective sample size can also be used to judge if two capacity values are significantly different. Such model could use an estimated demand profile and capacity based on random draws from a normal distribution with the capacity and standard deviation of the bottleneck.

In a cycle storage, multiple elements can be combined. Some correlation of the flow at capacity is expected between elements, as it might be the same people who are slow at both elements, although it is probably acceptable to neglect this. When designing a combination of bottlenecks it should be prevented that people need to wait on stairs. If, for example, users have to walk down stairs before checking in, the check-in should not be a bottleneck, or there should be sufficient buffer space between the stairs and the check-in. Using the numbers that are supplied in the results section, one can make probability estimations of how often queues would emerge for given demand, and how much buffer space is needed.

Capacity and demand can be balanced for various timescales, for example per second or per hour. In a cycle storage, demand changes should be calculated in minutes, not for example per 15 minutes. It is advised to calculate in terms of minutes, because the processes in the cycle storage change quickly, and an acceptable waiting time is also around a minute.

6.4 Recommendations for further research

Future research would be interesting in two directions: practical and methodological. Practically it would be interesting and informative to apply the method of this research to other pedestrian bottlenecks, for example escalators and moving walkways. Also it would be interesting to do an experiment with a single check-in device (Payter), and compare it to the situation that is measured in this research which had three Payters. The standard deviation and effective sample size and the fact that flow has been shown to be normally distributed allow calculating if differences are significant. Furthermore, factors that influence the capacity could be researched, including signage, time of day, type of traveller, weather conditions etcetera.

The methodological direction would be to compare this method to other methods. A method that does not require queues (which potentially could be useful in many more locations) could be calibrated and validated with the method of this thesis. Some examples of such method could be to base the capacity of stairs on the speed of the users when there is no queue, or headway analysis, or peak flow measurements. The analysis in section 5.4 shows that a universal method to calculate the standard deviation from for example per minute to the standard deviation per second has not been found. Further research could investigate if this could indeed be done based on the autocorrelation, or find an alternative method to convert the values. The results of this thesis could be the input for a stochastic queueing model. It would be interesting to create and validate such a model in the future.

7 References

Bodendorf, H., Osterkamp, M., Seyfried, A., & Holl, S. (2014). Field studies on the capacity of escalators. *Transportation Research Procedia*, *2*, 213–218.

Davis, P., & Dutta, G. (2002). Estimation of Capacity of escalators in London Underground. *London School of Economics and Political Sciences, London*.

Dekking, F. M., Kraaikamp, C., Lopuhaä, H. P., & Meester, L. E. (2005). *A Modern Introduction to Probability and Statistics: Understanding why and how*. Springer Science & Business Media.

Leefmilieu Brussel. (2013, January 1). Functionele afmetingen van de fietsen en de voorzieningen. *Gids Duurzame Gebouwen*. Retrieved from https://www.gidsduurzamegebouwen.brussels/nl/3-afmetingen-van-de-fietsen.html?IDC=7732

Maurya, A. K., & Panda, J. (2015). *Study of pedestrian movement over foot over bridge* (Vol. 40). Discovery.

Minderhoud, M., Botma, H., & Bovy, P. (1997). Assessment of roadway capacity estimation methods. *Transportation Research Record: Journal of the Transportation Research Board*, (1572), 59–67.

NS. (2017). *NS Annual Report 2016* (p. 119). Retrieved from http://www.nsjaarverslag.nl/

Scheltema, N. (2013). *De eerste dag voor niets een plek voor je fiets*. NS Stations.

Steffen, B., & Seyfried, A. (2010). Methods for measuring pedestrian density, flow, speed and direction with minimal scatter. *Physica A: Statistical Mechanics and Its Applications*, *389*(9), 1902–1910.

van den Heuvel, J., Ton, D., & Hermansen, K. (2016). Advances in Measuring Pedestrians at Dutch Train Stations Using Bluetooth, WiFi and Infrared Technology. In *Traffic and Granular Flow'15* (pp. 11–18). Springer.

van Dijk, G. (2014). *Reizigersperspectief op het verbeteren van fietsparkeren op stations*. Amsterdam: STBY.

VVD, CDA, D66, & CU. (2017). *Vertrouwen in de toekomst. Regeerakkoord 2017 – 2021.* (p. 40). Bureau woordvoering kabinetsformatie. Retrieved from https://www.kabinetsformatie2017.nl/documenten/publicaties/2017/10/10/regeerakkoord-vertrouwen-in-de-toekomst

Weidmann, U. (1993). Transporttechnik der Fußgänger: transporttechnische Eigenschaften des Fußgängerverkehrs, Literaturauswertung. *IVT Schriftenreihe*, *90*.

Whaley, R. E. (1982). Valuation of American call options on dividend-paying stocks: Empirical tests. *Journal of Financial Economics*, *10*(1), 29–58. https://doi.org/10.1016/0304-405X(82)90029-0

Ye, J., Chen, X., & Jian, N. (2012). *Impact Analysis of Luggage-Carrying on Pedestrian Traffic*. Retrieved from https://trid.trb.org/view/1130690

Yuan, K., Knoop, V., & Hoogendoorn, S. P. (2015). Capacity drop: a relation between the speed in congestion and the queue discharge rate. In *Proceedings of the 94th Annual Meeting of the Transportation Research Board*.

Zięba, A., & Ramza, P. (2011). Standard Deviation of the Mean of Autocorrelated Observations Estimated with the Use of the Autocorrelation Function Estimated From the Data. *Metrology and Measurement Systems*, *18*(4), 529–542. https://doi.org/10.2478/v10178-011-0052-x

Appendix A Other measurement locations

A.1 Stairs, double ramp (Haarlem)

This paragraph contains pictures taken on the first measurement day (Figure 7.1 to Figure 7.5). The pictures illustrate that although there are 4 ramps, most of the time only two ramps are in use per flow direction. This is caused by the fact that the majority of people prefers to keep a bicycle on the right hand side, and to keep room for other users from the other direction. Also, the door might make it hard to squeeze additional flow. At some point during the measurement day it was raining, but that was not at the busiest moments, and did not appear to influence the flow when capacity was reached.

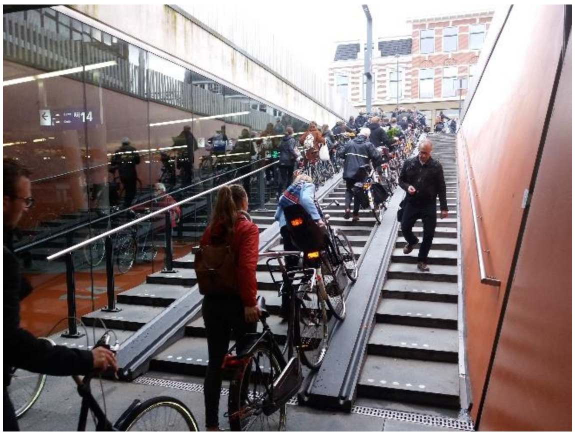

Figure 7.1 Haarlem in the evening. Other users of the stairs do not appear to hinder the flow, mainly because there are not so many of them.

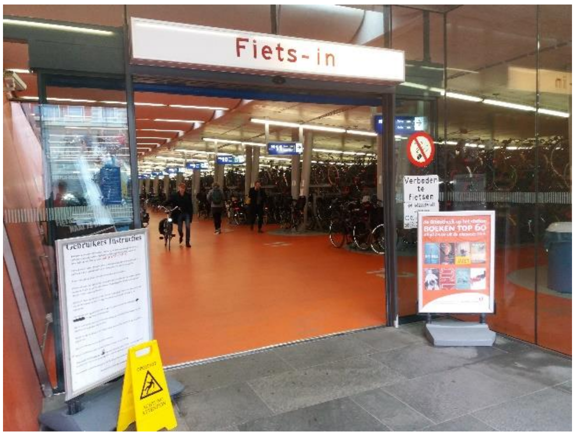

Figure 7.2 There is a door between the actual storage space and the stairs that lead to it. The door probably has influence on the flow.

Figure 7.3 This is what it looks like when the stairs operate at (almost) capacity. Note how only 2 of the four ramps are in use, almost everybody holds the bike on the right, and there are very few other users.

Figure 7.4 The schedule of leaving trains during the measurement.

Figure 7.5 View from upstairs.

In appendix 5.3.3.2a short analysis is presented to indicate that the measurement day was a typical day. The double ramp measurement has been done twice for upward flow and twice for downward flow, in the evening and in the morning respectively. For the upward flow, queues were present, which enables stronger conclusions than for the downward flow, at which no queues were present. Because queues were present, it was possible to use the average flow over an interval method.
Some phenomena are not (clearly) visible from the data, but were observed:

- Sometimes, a queue was forming at the upper side of the ramp on the stairs, possibly because people slow down during walking upwards. It might be the case that the capacity of the upper side is lower than the downside. This capacity difference means that true capacity might be measured for a shorter time when measuring at the lower side, and that measuring at the upper side gives a truer measurement of capacity. Measuring at the upper side makes it harder to spot the queue though.
- Bottlenecks are: the corridors to the exit, the exit, the beginning of the stairs, the end of the stairs
- The influence of the presence of a counting person was probably low. The counter was located at a spot outside of the natural flow path, and was not wearing a high-vis.
- The cyclists that were moving against the majority of the flow, as well as pedestrians without a bike did not appear to influence the flow. If the downwards flow would have been higher, the door (Figure 7.2) would probably have become the bottleneck, as well as possibly the corridors.
- 38 pedestrians were counted, 123 downward cycles and 1034 cycles upward.

Appendix B Scripts

MATLAB script 1. A confidence interval based on a small sample.

```
repetitions=10000;
N=10;
t=2;
for i=1:repetitions
    r = normrnd(0,1,[N,1]);
    rr = normrnd(0,1,[1,1]);
    test(i)=and(rr>mean(r)-t*std(r),rr<mean(r)+t*std(r));
end
mean(test)%expected 0.95 for large N
```

MATLAB script 2. Verification of the effect of averaging with all possible starting points.

```
clear all
rng('default')% for reproducibility
repetitions=10000;
N=1000;
span=60;
for i=1:repetitions
    r = normrnd(0,1,[N,1]);
    t = myFilter(r,span);
    intervalR(i,1:2)   =[mean(r)-1.96*std(r)/sqrt(N)…
mean(r)+1.96*std(r)/sqrt(N)];%t=1.96 for big sample size
    intervalT(i,1:2)   =[mean(t)-1.96*std(t)/sqrt(N/span)…
mean(t)+2.12*std(t)/sqrt(N/span)];%t=2.12 for N=16
end
confidenceR=sum(and(intervalR(:,1)<0,intervalR(:,2)>0))/repetitions;
% expected around 0.95
confidenceT=sum(and(intervalT(:,1)<0,intervalT(:,2)>0))/repetitions;
% expected around 0.95
%%
function output = myFilter(data,span)
%coefficients
a=1;
b=ones(1,span)/span;
% plak data van lengte span van het begin aan het eind en vice versa
tripleData=[data(end-span+1:end);data;data(1:span)];
% smooth de zo verkrege data
smoothTripleData = filter(b,a,tripleData);
% haal de echte data er weer uit
output=smoothTripleData(span+1:length(data)+span);
end
```

This code is used to created histograms from the data, and to calculate standard deviations and 95% confidence intervals. The data that this script loads is already selected for capacity, smeared out and outliers have been discarded.

MATLAB script 3. Main data processing code.

```
clear all
close all
location='Utrecht';%Zwolle, Breda, Utrecht
doSave=0;% save the figures (1) or not
tinyFigure=0;

switch location
    case 'Zwolle'
```

```
        load('zwolle.mat');
        data=zwolle;
        correctionSampleSize=1;%one person uses the gate at a time
    case 'Breda'
        load('breda.mat');
        data=breda;
        correctionSampleSize=4;% four people fit on the stairs
    case 'Utrecht'
        load('utrecht.mat');
        data=utrecht;
        correctionSampleSize=3;%three people can check-in at once
end
T=length(data);
N=floor(sum(data));
C=mean(data);
span=ceil(T/N)*correctionSampleSize;

smoothDataSpan=myFilter(data,span);
smoothData60s= myFilter(data,60);
figure(1);set(gcf,'name',sprintf('Location: %s, N=%d, T=%d, span=%d',location,N,T,span));
histogram(smoothDataSpan,'facecolor','none');hold on;
histogram(smoothDataSpan,'binwidth',0.0025,'facecolor','k');hold off
xlabel(sprintf('Mean flow per second over %d seconds',span));ylabel('Frequency');
if tinyFigure==1
    set(gcf,'Position',[100 100 560/3*2 420/3*2])
else
    xlim([0 1.1*max(smoothDataSpan)]);
end

figure(2);
plot(data);
xlabel('Time (s)');ylabel('Flow (s^{-1})');
xlim([0 T]);ylim([0 max(data)]);

%% autocorrelation
figure;acf(data,20);

%% std for different intervals

spanRange=1:120;%oneven
for i=1:length(spanRange)
    spanLoop=spanRange(i);
    smoothFlowLoop=myFilter(data,spanLoop);
    stdRange(i)             =std(smoothFlowLoop);
end
figure;set(gcf,'name','Std');plot(spanRange,stdRange,'x');
% expected line of standard deviation
intersection=1;
correctionStd=span;
parameter=stdRange(intersection);%*sqrt(intersection/correctionStd);

y=parameter./sqrt((spanRange-1)/correctionStd+1);

hold on; plot(spanRange,y);hold off
xlabel('Span (s)');ylabel('Standard deviation \sigma of capacity flow (s^{-1})');
legend('Data','Expected relationship');
ylim([0 parameter])
%%

N_eff   =floor(N/correctionSampleSize);
N_eff60 = min(N_eff,T/60); % formula (6) thesis
t60s = tinv(1-0.025,N_eff60-1); %t value for 95% confidence interval and N_eff60-1 degrees of freedom

stdSpan       = std(smoothDataSpan);
std1s         = std(data);
std60s        = std(smoothData60s);

confidenceSpan= 1.96/sqrt(N_eff)*stdSpan;
confidence1s  = 1.96/sqrt(N_eff)*std1s;
confidence60s = t60s/sqrt(N_eff60)*std60s;

VarNames =   {'Location',      'Mean',      'N','N_eff', 'T', 'Span'};
summary=table(string(location), C, N,  N_eff,    T,   span,'VariableNames',VarNames);
disp(summary)

spans         =[1            span           60]';
stdev         =[std1s        stdSpan        std60s]';
confidence    =[confidence1s confidenceSpan confidence60s]';
VarNames =   { 'Span', 'C',       'Std_s','Confidence_s'};%,'C_sum_span',       'Std_sum_span',
'Conf_sum_span'
variation=table(spans, round(C*ones(3,1),7,'significant'),round(stdev,7,'significant'),
round(confidence,2,'significant'), 'VariableNames',VarNames );%  C*ones(3,1).*spans, spans.*stdev,
spans.*confidence,'VariableNames',VarNames);
disp(variation)
```

```
% export figures and summary
if doSave==1
 figure(1); exportfig(sprintf('Histogram%s',location)); figure(2);
exportfig(sprintf('Plot%s',location));save(sprintf('summary%s.mat',location),'summary');
end

function output = myFilter(data,span)
%coefficients
a=1;
b=ones(1,span)/span;
% plak data van lengte span van het begin aan het eind en vice versa
tripleData=[data(end-span+1:end);data;data(1:span)];
% smooth de zo verkrege data
smoothTripleData = filter(b,a,tripleData);
% haal de echte data er weer uit
output=smoothTripleData(span+1:length(data)+span);
end
```

Appendix C Raw data

All data and scripts that are used in this thesis are available by email on request. This appendix contains the raw data, to enable the reader to do their own analysis. It contains the following tables:

- Breda Centrumzijde stairs up
  - Queue detection
  - Flow up
  - Not included but available upon request: flow downwards
- Zwolle
  - Gate flow out
  - Pedestrian joins the queue
  - Person with OV-fiets joins the queue
  - Person with regular bike joins the queue
  - Not included but available on request: same data for flow in.
- Utrecht, Check-in
  - Flow Payter left
  - Flow Payter middle
  - Flow Payter right
  - Staff interference
  - Queue detection
  - Not included but available on request: similar data for different day.
- Haarlem double stairs
  - Not included but available upon request.

Breda Centrumzijde up queue detection

Time	Value	Action (0-increment 1-decrement 2-restart 3-edit 4-create)
23/04/2018 19:12	0	1
23/04/2018 19:11	1	0
23/04/2018 18:43	0	1
23/04/2018 18:40	1	0
23/04/2018 18:39	0	1
23/04/2018 18:39	1	0
23/04/2018 18:27	0	1
23/04/2018 18:27	1	1
23/04/2018 18:27	2	1
23/04/2018 18:27	3	1
23/04/2018 18:27	4	1
23/04/2018 18:27	5	0
23/04/2018 18:27	4	0
23/04/2018 18:26	3	0
23/04/2018 18:25	2	0
23/04/2018 18:23	1	0
23/04/2018 18:12	0	1
23/04/2018 18:12	1	0
23/04/2018 18:12	0	1
23/04/2018 18:12	1	1
23/04/2018 18:12	2	0
23/04/2018 18:12	1	0
23/04/2018 18:12	0	1
23/04/2018 18:12	1	0
23/04/2018 18:11	0	1
23/04/2018 18:11	1	0
23/04/2018 18:11	0	1
23/04/2018 18:10	1	0
23/04/2018 18:01	0	1
23/04/2018 18:01	1	0
23/04/2018 17:46	0	1
23/04/2018 17:42	1	0

Breda Centrumzijde flow up

Time	Value	Action (0-increment 1-decrement 2-restart 3-edit 4-create)
23/04/2018 19:12	618	0
23/04/2018 19:12	617	0
23/04/2018 19:12	616	0
23/04/2018 19:12	615	0
23/04/2018 19:12	614	0
23/04/2018 19:12	613	0
23/04/2018 19:12	612	0
23/04/2018 19:12	611	0
23/04/2018 19:12	610	0
23/04/2018 19:12	609	0
23/04/2018 19:12	608	0
23/04/2018 19:12	607	0
23/04/2018 19:12	606	0
23/04/2018 19:11	605	0
23/04/2018 19:11	604	0
23/04/2018 19:11	603	0
23/04/2018 19:11	602	0
23/04/2018 19:11	601	0
23/04/2018 19:11	600	0
23/04/2018 19:11	599	0
23/04/2018 19:11	598	0
23/04/2018 19:11	597	0
23/04/2018 19:11	596	0
23/04/2018 19:11	595	0
23/04/2018 19:11	594	0
23/04/2018 19:11	593	0
23/04/2018 19:11	592	0
23/04/2018 19:11	591	0
23/04/2018 19:11	590	0
23/04/2018 19:11	589	0
23/04/2018 19:11	588	0
23/04/2018 19:10	587	0
23/04/2018 19:10	586	0
23/04/2018 19:10	585	0
23/04/2018 19:10	584	0
23/04/2018 19:10	583	0
23/04/2018 19:10	582	0
23/04/2018 19:10	581	0
23/04/2018 19:10	580	0
23/04/2018 19:10	579	0
23/04/2018 19:10	578	0
23/04/2018 19:10	577	0
23/04/2018 19:10	576	0
23/04/2018 19:10	575	0
23/04/2018 19:09	574	0
23/04/2018 19:09	573	0
23/04/2018 18:43	572	0
23/04/2018 18:43	571	0
23/04/2018 18:43	570	0
23/04/2018 18:43	569	0
23/04/2018 18:43	568	0
23/04/2018 18:43	567	0
23/04/2018 18:43	566	0
23/04/2018 18:43	565	0
23/04/2018 18:43	564	0
23/04/2018 18:43	563	0
23/04/2018 18:43	562	0
23/04/2018 18:43	561	0
23/04/2018 18:43	560	0
23/04/2018 18:43	559	0
23/04/2018 18:43	558	0
23/04/2018 18:43	557	0
23/04/2018 18:43	556	0
23/04/2018 18:43	555	0
23/04/2018 18:43	554	0
23/04/2018 18:43	553	0
23/04/2018 18:43	552	0
23/04/2018 18:42	551	0
23/04/2018 18:42	550	0
23/04/2018 18:42	549	0
23/04/2018 18:42	548	0
23/04/2018 18:42	547	0
23/04/2018 18:42	546	0
23/04/2018 18:42	545	0
23/04/2018 18:42	544	0
23/04/2018 18:42	543	0
23/04/2018 18:42	542	0
23/04/2018 18:42	541	0
23/04/2018 18:42	540	0
23/04/2018 18:42	539	0
23/04/2018 18:42	538	0
23/04/2018 18:42	537	0
23/04/2018 18:42	536	0
23/04/2018 18:42	535	0
23/04/2018 18:42	534	0
23/04/2018 18:42	533	0
23/04/2018 18:42	532	0
23/04/2018 18:42	531	0
23/04/2018 18:42	530	0
23/04/2018 18:42	529	0
23/04/2018 18:42	528	0
23/04/2018 18:42	527	0
23/04/2018 18:42	526	0
23/04/2018 18:41	525	0
23/04/2018 18:41	524	0
23/04/2018 18:41	523	0
23/04/2018 18:41	522	0
23/04/2018 18:41	521	0
23/04/2018 18:41	520	0
23/04/2018 18:41	519	0
23/04/2018 18:41	518	0
23/04/2018 18:41	517	0
23/04/2018 18:41	516	0
23/04/2018 18:41	515	0
23/04/2018 18:41	514	0
23/04/2018 18:41	513	0
23/04/2018 18:41	512	0
23/04/2018 18:41	511	0
23/04/2018 18:41	510	0
23/04/2018 18:41	509	0
23/04/2018 18:41	508	0
23/04/2018 18:41	507	0
23/04/2018 18:41	506	0
23/04/2018 18:41	505	0
23/04/2018 18:41	504	0
23/04/2018 18:41	503	0
23/04/2018 18:41	502	0
23/04/2018 18:41	501	0
23/04/2018 18:40	500	0
23/04/2018 18:40	499	0
23/04/2018 18:40	498	0
23/04/2018 18:40	497	0
23/04/2018 18:40	496	0
23/04/2018 18:40	495	0
23/04/2018 18:40	494	0
23/04/2018 18:40	493	0
23/04/2018 18:40	492	0
23/04/2018 18:40	491	0
23/04/2018 18:40	490	0
23/04/2018 18:40	489	0
23/04/2018 18:40	488	0
23/04/2018 18:40	487	0
23/04/2018 18:40	486	0
23/04/2018 18:40	485	0
23/04/2018 18:40	484	0
23/04/2018 18:40	483	0
23/04/2018 18:40	482	0
23/04/2018 18:40	481	0
23/04/2018 18:40	480	0
23/04/2018 18:40	479	0
23/04/2018 18:40	478	0
23/04/2018 18:40	477	0
23/04/2018 18:39	476	0
23/04/2018 18:39	475	0
23/04/2018 18:39	474	0
23/04/2018 18:39	473	0
23/04/2018 18:27	472	0
23/04/2018 18:27	471	0
23/04/2018 18:27	470	0
23/04/2018 18:27	469	0
23/04/2018 18:27	468	0
23/04/2018 18:27	467	0
23/04/2018 18:27	466	0
23/04/2018 18:27	465	0
23/04/2018 18:27	464	0
23/04/2018 18:27	463	0
23/04/2018 18:27	462	0
23/04/2018 18:27	461	0
23/04/2018 18:27	460	0
23/04/2018 18:27	459	0
23/04/2018 18:27	458	0
23/04/2018 18:27	457	0
23/04/2018 18:27	456	0
23/04/2018 18:27	455	0
23/04/2018 18:27	454	0
23/04/2018 18:27	453	0
23/04/2018 18:27	452	0
23/04/2018 18:26	451	0
23/04/2018 18:26	450	0
23/04/2018 18:26	449	0
23/04/2018 18:26	448	0
23/04/2018 18:26	447	0
23/04/2018 18:26	446	0
23/04/2018 18:26	445	0
23/04/2018 18:26	444	0
23/04/2018 18:26	443	0
23/04/2018 18:26	442	0
23/04/2018 18:26	441	0
23/04/2018 18:26	440	0
23/04/2018 18:26	439	0
23/04/2018 18:26	438	0
23/04/2018 18:26	437	0
23/04/2018 18:26	436	0
23/04/2018 18:26	435	0
23/04/2018 18:26	434	0
23/04/2018 18:26	433	0
23/04/2018 18:26	432	0
23/04/2018 18:26	431	0
23/04/2018 18:26	430	0
23/04/2018 18:26	429	0
23/04/2018 18:26	428	0
23/04/2018 18:25	427	0
23/04/2018 18:25	426	0
23/04/2018 18:25	425	0
23/04/2018 18:25	424	0
23/04/2018 18:25	423	0
23/04/2018 18:25	422	0
23/04/2018 18:25	421	0
23/04/2018 18:25	420	0
23/04/2018 18:25	419	0
23/04/2018 18:25	418	0
23/04/2018 18:25	417	0
23/04/2018 18:25	416	0
23/04/2018 18:25	415	0
23/04/2018 18:25	414	0
23/04/2018 18:25	413	0
23/04/2018 18:25	412	0
23/04/2018 18:25	411	0
23/04/2018 18:25	410	0
23/04/2018 18:25	409	0
23/04/2018 18:25	408	0
23/04/2018 18:25	407	0
23/04/2018 18:25	406	0
23/04/2018 18:25	405	0
23/04/2018 18:25	404	0
23/04/2018 18:25	403	0
23/04/2018 18:24	402	0
23/04/2018 18:24	401	0
23/04/2018 18:24	400	0
23/04/2018 18:24	399	0
23/04/2018 18:24	398	0
23/04/2018 18:24	397	0
23/04/2018 18:24	396	0
23/04/2018 18:24	395	0
23/04/2018 18:24	394	0
23/04/2018 18:24	393	0
23/04/2018 18:24	392	0
23/04/2018 18:24	391	0
23/04/2018 18:24	390	0
23/04/2018 18:24	389	0
23/04/2018 18:24	388	0
23/04/2018 18:24	387	0
23/04/2018 18:24	386	0
23/04/2018 18:24	385	0
23/04/2018 18:24	384	0
23/04/2018 18:24	383	0
23/04/2018 18:24	382	0
23/04/2018 18:24	381	0
23/04/2018 18:24	380	0
23/04/2018 18:24	379	0
23/04/2018 18:23	378	0
23/04/2018 18:23	377	0
23/04/2018 18:23	376	0
23/04/2018 18:23	375	0
23/04/2018 18:23	374	0
23/04/2018 18:23	373	0
23/04/2018 18:23	372	0
23/04/2018 18:23	371	0
23/04/2018 18:23	370	0
23/04/2018 18:23	369	0
23/04/2018 18:23	368	0
23/04/2018 18:23	367	0
23/04/2018 18:23	366	0
23/04/2018 18:23	365	0
23/04/2018 18:23	364	0
23/04/2018 18:23	363	0
23/04/2018 18:23	362	0
23/04/2018 18:23	361	0
23/04/2018 18:23	360	0
23/04/2018 18:23	359	0
23/04/2018 18:23	358	0
23/04/2018 18:23	357	0
23/04/2018 18:22	356	0
23/04/2018 18:22	355	0
23/04/2018 18:22	354	0
23/04/2018 18:22	353	0
23/04/2018 18:22	352	0
23/04/2018 18:22	351	0
23/04/2018 18:22	350	0
23/04/2018 18:22	349	0
23/04/2018 18:22	348	0
23/04/2018 18:19	347	0
23/04/2018 18:18	346	0
23/04/2018 18:17	345	0
23/04/2018 18:17	344	0
23/04/2018 18:17	343	0
23/04/2018 18:17	342	0
23/04/2018 18:17	341	0
23/04/2018 18:17	340	0
23/04/2018 18:17	339	0
23/04/2018 18:17	338	0
23/04/2018 18:16	337	0
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23/04/2018 17:07	0	4

Zwolle gate out

Time	Value	Action (0-increment 1-decrement 2-restart 3-edit 4-create)
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12/06/2018 07:11	39	0
12/06/2018 07:11	38	0
12/06/2018 07:11	37	0
12/06/2018 07:10	36	0
12/06/2018 07:10	35	0
12/06/2018 07:09	34	0
12/06/2018 07:09	33	0
12/06/2018 07:09	32	0
12/06/2018 07:09	31	0
12/06/2018 07:08	30	0
12/06/2018 07:08	29	0
12/06/2018 07:07	28	0
12/06/2018 07:07	27	0
12/06/2018 07:07	26	0
12/06/2018 07:07	25	0
12/06/2018 07:07	24	0
12/06/2018 07:07	23	0
12/06/2018 07:07	22	0
12/06/2018 07:07	21	0
12/06/2018 07:07	20	0
12/06/2018 07:06	19	0
12/06/2018 07:06	18	0
12/06/2018 07:06	17	0
12/06/2018 07:06	16	0
12/06/2018 07:06	15	0
12/06/2018 07:06	14	0
12/06/2018 07:06	13	0
12/06/2018 07:05	12	0
12/06/2018 07:05	11	0
12/06/2018 07:05	10	0
12/06/2018 07:05	9	0
12/06/2018 07:04	8	0
12/06/2018 07:04	7	0
12/06/2018 07:04	6	0
12/06/2018 07:04	5	0
12/06/2018 07:04	4	0
12/06/2018 07:03	3	0
12/06/2018 07:02	2	0
12/06/2018 07:01	1	0
12/06/2018 07:01	0	1
12/06/2018 07:01	1	0

12/06/2018 17:14	30	0
12/06/2018 17:14	29	0
12/06/2018 17:14	28	0
12/06/2018 17:14	27	0
12/06/2018 17:14	26	0
12/06/2018 17:14	25	0
12/06/2018 17:14	24	0
12/06/2018 17:14	23	0
12/06/2018 17:13	22	0
12/06/2018 17:13	21	0
12/06/2018 17:13	20	0
12/06/2018 17:13	19	0
12/06/2018 17:13	18	0
12/06/2018 17:13	17	0
12/06/2018 17:12	16	0
12/06/2018 17:12	15	0
12/06/2018 17:11	14	0
12/06/2018 17:11	13	0
12/06/2018 17:10	12	0
12/06/2018 17:10	11	0
12/06/2018 17:09	10	0
12/06/2018 17:08	9	0
12/06/2018 17:08	8	0
12/06/2018 17:07	7	0
12/06/2018 17:06	6	0
12/06/2018 17:05	5	0
12/06/2018 17:05	4	0
12/06/2018 17:05	3	0
12/06/2018 17:03	2	0
12/06/2018 17:01	1	0
12/06/2018 17:00	0	1
12/06/2018 17:00	1	0
12/06/2018 16:48	0	2
12/06/2018 08:59	233	0
12/06/2018 08:59	232	0
12/06/2018 08:56	231	0
12/06/2018 08:55	230	0
12/06/2018 08:52	229	0
12/06/2018 08:51	228	0
12/06/2018 08:51	227	0
12/06/2018 08:51	226	0
12/06/2018 08:49	225	0
12/06/2018 08:49	224	0
12/06/2018 08:48	223	0
12/06/2018 08:48	222	0
12/06/2018 08:47	221	0
12/06/2018 08:47	220	0
12/06/2018 08:46	219	0
12/06/2018 08:45	218	0
12/06/2018 08:45	217	0
12/06/2018 08:45	216	0
12/06/2018 08:44	215	0
12/06/2018 08:44	214	0
12/06/2018 08:43	213	0
12/06/2018 08:43	212	0
12/06/2018 08:43	211	0
12/06/2018 08:43	210	0
12/06/2018 08:42	209	0
12/06/2018 08:40	208	0
12/06/2018 08:39	207	0
12/06/2018 08:39	206	0
12/06/2018 08:39	205	0
12/06/2018 08:37	204	0
12/06/2018 08:36	203	0
12/06/2018 08:36	202	0
12/06/2018 08:35	201	0
12/06/2018 08:35	200	0
12/06/2018 08:34	199	0
12/06/2018 08:34	198	0
12/06/2018 08:31	197	0
12/06/2018 08:30	196	0
12/06/2018 08:29	195	0
12/06/2018 08:26	194	0
12/06/2018 08:22	193	0
12/06/2018 08:20	192	0
12/06/2018 08:19	191	0
12/06/2018 08:19	190	0
12/06/2018 08:16	189	0
12/06/2018 08:15	188	0
12/06/2018 08:15	187	0
12/06/2018 08:15	186	0
12/06/2018 08:15	185	0
12/06/2018 08:14	184	0
12/06/2018 08:14	183	0
12/06/2018 08:14	182	0
12/06/2018 08:14	181	0
12/06/2018 08:13	180	0
12/06/2018 08:13	179	0
12/06/2018 08:13	178	0
12/06/2018 08:13	177	0
12/06/2018 08:13	176	0
12/06/2018 08:13	175	0
12/06/2018 08:13	174	0
12/06/2018 08:13	173	0
12/06/2018 08:12	172	0
12/06/2018 08:12	171	0
12/06/2018 08:12	170	0
12/06/2018 08:12	169	0
12/06/2018 08:12	168	0
12/06/2018 08:11	167	0
12/06/2018 08:11	166	0
12/06/2018 08:11	165	0
12/06/2018 08:11	164	0
12/06/2018 08:11	163	0
12/06/2018 08:11	162	0
12/06/2018 08:11	161	0
12/06/2018 08:11	160	0
12/06/2018 08:10	159	0
12/06/2018 08:10	158	0
12/06/2018 08:10	157	0
12/06/2018 08:09	156	0
12/06/2018 08:09	155	0
12/06/2018 08:09	154	0
12/06/2018 08:09	153	0
12/06/2018 08:08	152	0
12/06/2018 08:08	151	0
12/06/2018 08:07	150	0
12/06/2018 08:07	149	0
12/06/2018 08:07	148	0
12/06/2018 08:06	147	0
12/06/2018 08:05	146	0
12/06/2018 08:04	145	0
12/06/2018 08:04	144	0
12/06/2018 08:03	143	0
12/06/2018 08:03	142	0
12/06/2018 08:02	141	0
12/06/2018 08:01	140	0
12/06/2018 08:00	139	0
12/06/2018 07:59	138	0
12/06/2018 07:59	137	0
12/06/2018 07:58	136	0
12/06/2018 07:57	135	0
12/06/2018 07:55	134	0
12/06/2018 07:52	133	0
12/06/2018 07:51	132	0
12/06/2018 07:50	131	0
12/06/2018 07:50	130	0
12/06/2018 07:50	129	0
12/06/2018 07:48	128	0
12/06/2018 07:48	127	0
12/06/2018 07:48	126	0
12/06/2018 07:47	125	0
12/06/2018 07:47	124	0

Regular bike out

Time	Value	Action (0-increment 1-decrement 2-restart 3-edit 4-create)
12/06/2018 18:52	162	0
12/06/2018 18:52	161	0
12/06/2018 18:51	160	0
12/06/2018 18:51	159	0
12/06/2018 18:50	158	0
12/06/2018 18:50	157	0
12/06/2018 18:50	156	0
12/06/2018 18:49	155	0
12/06/2018 18:49	154	0
12/06/2018 18:49	153	0
12/06/2018 18:48	152	0
12/06/2018 18:48	151	0
12/06/2018 18:48	150	0
12/06/2018 18:47	149	0
12/06/2018 18:47	148	0
12/06/2018 18:47	147	0
12/06/2018 18:46	146	0
12/06/2018 18:46	145	0
12/06/2018 18:46	144	0
12/06/2018 18:39	143	0
12/06/2018 18:38	142	1
12/06/2018 18:38	143	1
12/06/2018 18:38	144	0
12/06/2018 18:28	143	0
12/06/2018 18:22	142	0
12/06/2018 18:21	141	0
12/06/2018 18:20	140	0
12/06/2018 18:20	139	0
12/06/2018 18:20	138	0
12/06/2018 18:20	137	0
12/06/2018 18:20	136	0
12/06/2018 18:19	135	0
12/06/2018 18:19	134	0
12/06/2018 18:19	133	0
12/06/2018 18:19	132	0
12/06/2018 18:18	131	0
12/06/2018 18:18	130	0
12/06/2018 18:18	129	0
12/06/2018 18:18	128	0
12/06/2018 18:18	127	0
12/06/2018 18:17	126	0
12/06/2018 18:17	125	0
12/06/2018 18:17	124	0
12/06/2018 18:17	123	0
12/06/2018 18:17	122	0
12/06/2018 18:16	121	0
12/06/2018 18:16	120	0
12/06/2018 18:16	119	0
12/06/2018 18:15	118	0
12/06/2018 18:15	117	0
12/06/2018 18:15	116	0
12/06/2018 18:15	115	0
12/06/2018 18:15	114	0
12/06/2018 18:15	113	0
12/06/2018 18:15	112	0
12/06/2018 18:15	111	0
12/06/2018 18:14	110	0
12/06/2018 18:14	109	0
12/06/2018 18:14	108	0
12/06/2018 18:14	107	0
12/06/2018 18:14	106	0
12/06/2018 18:14	105	0
12/06/2018 18:14	104	0
12/06/2018 18:14	103	0
12/06/2018 18:12	102	0
12/06/2018 18:10	101	0
12/06/2018 18:07	100	0
12/06/2018 18:05	99	0
12/06/2018 17:59	98	1
12/06/2018 17:58	99	0
12/06/2018 17:58	98	0
12/06/2018 17:58	97	0
12/06/2018 17:54	96	0
12/06/2018 17:52	95	0
12/06/2018 17:51	94	0
12/06/2018 17:51	93	0
12/06/2018 17:51	92	0
12/06/2018 17:50	91	0
12/06/2018 17:50	90	0
12/06/2018 17:50	89	0
12/06/2018 17:49	88	0
12/06/2018 17:49	87	0
12/06/2018 17:49	86	0
12/06/2018 17:48	85	0
12/06/2018 17:48	84	0
12/06/2018 17:48	83	0
12/06/2018 17:48	82	0
12/06/2018 17:48	81	0
12/06/2018 17:48	80	0
12/06/2018 17:47	79	0
12/06/2018 17:47	78	0
12/06/2018 17:47	77	0
12/06/2018 17:47	76	0
12/06/2018 17:47	75	0
12/06/2018 17:47	74	0
12/06/2018 17:47	73	0
12/06/2018 17:47	72	0
12/06/2018 17:47	71	0
12/06/2018 17:46	70	0
12/06/2018 17:46	69	0
12/06/2018 17:46	68	0
12/06/2018 17:46	67	0
12/06/2018 17:46	66	0
12/06/2018 17:45	65	0
12/06/2018 17:45	64	0
12/06/2018 17:45	63	0
12/06/2018 17:45	62	0
12/06/2018 17:45	61	0
12/06/2018 17:45	60	0
12/06/2018 17:45	59	0
12/06/2018 17:44	58	0
12/06/2018 17:44	57	0
12/06/2018 17:44	56	0
12/06/2018 17:44	55	0
12/06/2018 17:43	54	0
12/06/2018 17:43	53	0
12/06/2018 17:43	52	0
12/06/2018 17:43	51	0
12/06/2018 17:42	50	0
12/06/2018 17:42	49	1
12/06/2018 17:42	50	0
12/06/2018 17:41	49	0
12/06/2018 17:41	48	0
12/06/2018 17:37	47	0
12/06/2018 17:31	46	0
12/06/2018 17:26	45	0
12/06/2018 17:26	44	0
12/06/2018 17:25	43	0
12/06/2018 17:23	42	0
12/06/2018 17:21	41	0
12/06/2018 17:21	40	0
12/06/2018 17:20	39	0
12/06/2018 17:19	38	0
12/06/2018 17:18	37	0
12/06/2018 17:18	36	0
12/06/2018 17:18	35	0
12/06/2018 17:17	34	0
12/06/2018 17:17	33	0
12/06/2018 17:17	32	0
12/06/2018 17:17	31	0
12/06/2018 17:16	30	0
12/06/2018 17:16	29	0
12/06/2018 17:15	28	0
12/06/2018 17:15	27	0
12/06/2018 17:15	26	0
12/06/2018 17:15	25	0
12/06/2018 17:15	24	0
12/06/2018 17:15	23	0
12/06/2018 17:15	22	0
12/06/2018 17:14	21	0
12/06/2018 17:14	20	0
12/06/2018 17:14	19	0
12/06/2018 17:14	18	0
12/06/2018 17:14	17	0
12/06/2018 17:13	16	0
12/06/2018 17:13	15	0
12/06/2018 17:13	14	0
12/06/2018 17:13	13	0
12/06/2018 17:13	12	0
12/06/2018 17:13	11	0
12/06/2018 17:13	10	0
12/06/2018 17:13	9	0
12/06/2018 17:13	8	0
12/06/2018 17:10	7	0
12/06/2018 17:10	6	0
12/06/2018 17:08	5	0
12/06/2018 17:08	4	0
12/06/2018 17:05	3	0
12/06/2018 17:02	2	0
12/06/2018 17:01	1	0
12/06/2018 16:50	0	2
12/06/2018 08:50	48	0
12/06/2018 08:47	47	0
12/06/2018 08:46	46	0
12/06/2018 08:45	45	0
12/06/2018 08:45	44	0
12/06/2018 08:45	43	0
12/06/2018 08:43	42	0
12/06/2018 08:43	41	0
12/06/2018 08:43	40	0
12/06/2018 08:43	39	0
12/06/2018 08:31	38	0
12/06/2018 08:30	37	0
12/06/2018 08:29	36	0
12/06/2018 08:22	35	0
12/06/2018 08:20	34	0
12/06/2018 08:15	33	0
12/06/2018 08:15	32	0
12/06/2018 08:14	31	0
12/06/2018 08:14	30	0
12/06/2018 08:13	29	0
12/06/2018 08:11	28	0
12/06/2018 08:11	27	0
12/06/2018 08:11	26	0
12/06/2018 08:02	25	0
12/06/2018 07:59	24	0
12/06/2018 07:58	23	0
12/06/2018 07:57	22	0
12/06/2018 07:51	21	0
12/06/2018 07:50	20	0
12/06/2018 07:48	19	0
12/06/2018 07:48	18	0
12/06/2018 07:48	17	0
12/06/2018 07:47	16	0
12/06/2018 07:47	15	0
12/06/2018 07:47	14	0
12/06/2018 07:47	13	0
12/06/2018 07:46	12	0
12/06/2018 07:46	11	0
12/06/2018 07:44	10	0
12/06/2018 07:43	9	0
12/06/2018 07:42	8	0
12/06/2018 07:42	7	0
12/06/2018 07:39	6	0
12/06/2018 07:17	5	0
12/06/2018 07:14	4	0
12/06/2018 07:14	3	0
12/06/2018 07:14	2	0
12/06/2018 07:13	1	0

Pedestrian out (1)

Time	Value	Action (0-increment 1-decrement 2-restart 3-edit 4-create)
12/06/2018 18:50	23	0
12/06/2018 18:39	22	0
12/06/2018 18:28	21	0
12/06/2018 18:14	20	0
12/06/2018 17:59	19	0
12/06/2018 17:46	18	0
12/06/2018 17:34	17	0
12/06/2018 17:34	16	0
12/06/2018 17:31	15	0
12/06/2018 17:30	14	0
12/06/2018 17:20	13	0
12/06/2018 17:20	12	0
12/06/2018 17:17	11	0
12/06/2018 17:14	10	0
12/06/2018 17:12	9	0
12/06/2018 17:12	8	0
12/06/2018 17:11	7	0
12/06/2018 17:10	6	0
12/06/2018 17:09	5	0
12/06/2018 17:07	4	0
12/06/2018 17:05	3	0
12/06/2018 17:05	2	0
12/06/2018 17:05	1	0
12/06/2018 16:51	0	0
12/06/2018 16:51	-1	1
12/06/2018 16:51	0	1
12/06/2018 16:51	1	0
12/06/2018 16:50	0	2
12/06/2018 08:59	182	0
12/06/2018 08:59	181	0
12/06/2018 08:56	180	0
12/06/2018 08:55	179	0
12/06/2018 08:52	178	0
12/06/2018 08:51	177	0
12/06/2018 08:51	176	0
12/06/2018 08:49	175	0
12/06/2018 08:49	174	0
12/06/2018 08:48	173	0
12/06/2018 08:48	172	0
12/06/2018 08:47	171	0
12/06/2018 08:44	170	0
12/06/2018 08:41	169	0
12/06/2018 08:40	168	1
12/06/2018 08:40	169	0
12/06/2018 08:40	168	0
12/06/2018 08:39	167	0
12/06/2018 08:39	166	0
12/06/2018 08:39	165	0
12/06/2018 08:38	164	0
12/06/2018 08:36	163	0
12/06/2018 08:36	162	0
12/06/2018 08:36	161	0
12/06/2018 08:35	160	0
12/06/2018 08:34	159	0
12/06/2018 08:34	158	0
12/06/2018 08:34	157	0
12/06/2018 08:26	156	0
12/06/2018 08:19	155	0
12/06/2018 08:15	154	0
12/06/2018 08:14	153	0
12/06/2018 08:14	152	0
12/06/2018 08:14	151	0
12/06/2018 08:13	150	0
12/06/2018 08:13	149	0
12/06/2018 08:13	148	0
12/06/2018 08:13	147	0
12/06/2018 08:13	146	0
12/06/2018 08:12	145	0
12/06/2018 08:12	144	0
12/06/2018 08:12	143	0
12/06/2018 08:12	142	0
12/06/2018 08:12	141	0
12/06/2018 08:11	140	0
12/06/2018 08:11	139	0
12/06/2018 08:11	138	0
12/06/2018 08:11	137	0
12/06/2018 08:11	136	0
12/06/2018 08:11	135	0
12/06/2018 08:10	134	0
12/06/2018 08:10	133	0
12/06/2018 08:10	132	0
12/06/2018 08:10	131	0
12/06/2018 08:09	130	0
12/06/2018 08:09	129	0
12/06/2018 08:09	128	0
12/06/2018 08:09	127	0
12/06/2018 08:08	126	0
12/06/2018 08:08	125	0
12/06/2018 08:07	124	0
12/06/2018 08:07	123	0
12/06/2018 08:06	122	0
12/06/2018 08:05	121	0
12/06/2018 08:05	120	0
12/06/2018 08:04	119	0
12/06/2018 08:04	118	0
12/06/2018 08:03	117	0
12/06/2018 08:03	116	0
12/06/2018 08:01	115	0
12/06/2018 08:00	114	0
12/06/2018 07:59	113	0
12/06/2018 07:55	112	0
12/06/2018 07:50	111	0
12/06/2018 07:50	110	0
12/06/2018 07:47	109	0
12/06/2018 07:47	108	0
12/06/2018 07:46	107	0
12/06/2018 07:46	106	0
12/06/2018 07:44	105	0
12/06/2018 07:44	104	0
12/06/2018 07:44	103	0
12/06/2018 07:43	102	0
12/06/2018 07:43	101	0
12/06/2018 07:43	100	0
12/06/2018 07:43	99	0
12/06/2018 07:43	98	0
12/06/2018 07:43	97	0
12/06/2018 07:42	96	0
12/06/2018 07:42	95	0
12/06/2018 07:42	94	0
12/06/2018 07:42	93	0
12/06/2018 07:41	92	0
12/06/2018 07:41	91	0
12/06/2018 07:40	90	0
12/06/2018 07:40	89	0
12/06/2018 07:40	88	0
12/06/2018 07:40	87	0
12/06/2018 07:39	86	0
12/06/2018 07:39	85	0
12/06/2018 07:38	84	0
12/06/2018 07:38	83	0
12/06/2018 07:38	82	0
12/06/2018 07:37	81	0
12/06/2018 07:37	80	0
12/06/2018 07:37	79	0
12/06/2018 07:37	78	0
12/06/2018 07:37	77	0
12/06/2018 07:36	76	0
12/06/2018 07:36	75	0
12/06/2018 07:35	74	0
12/06/2018 07:35	73	0
12/06/2018 07:34	72	0
12/06/2018 07:34	71	0
12/06/2018 07:34	70	0
12/06/2018 07:34	69	0
12/06/2018 07:34	68	0
12/06/2018 07:33	67	0
12/06/2018 07:33	66	0
12/06/2018 07:33	65	0
12/06/2018 07:30	64	0
12/06/2018 07:30	63	0

Pedestrian out (2)

12/06/2018 07:29	62	0
12/06/2018 07:29	61	0
12/06/2018 07:28	60	0
12/06/2018 07:28	59	0
12/06/2018 07:28	58	0
12/06/2018 07:28	57	0
12/06/2018 07:22	56	0
12/06/2018 07:21	55	0
12/06/2018 07:16	54	0
12/06/2018 07:14	53	1
12/06/2018 07:14	54	0
12/06/2018 07:14	53	0
12/06/2018 07:14	52	0
12/06/2018 07:14	51	0
12/06/2018 07:13	50	0
12/06/2018 07:13	49	0
12/06/2018 07:13	48	0
12/06/2018 07:12	47	0
12/06/2018 07:12	46	0
12/06/2018 07:12	45	0
12/06/2018 07:12	44	0
12/06/2018 07:12	43	0
12/06/2018 07:12	42	0
12/06/2018 07:11	41	0
12/06/2018 07:11	40	0
12/06/2018 07:11	39	0
12/06/2018 07:11	38	0
12/06/2018 07:11	37	0
12/06/2018 07:10	36	0
12/06/2018 07:10	35	0
12/06/2018 07:09	34	0
12/06/2018 07:09	33	0
12/06/2018 07:09	32	0
12/06/2018 07:09	31	0
12/06/2018 07:08	30	0
12/06/2018 07:07	29	0
12/06/2018 07:07	28	0
12/06/2018 07:07	27	0
12/06/2018 07:07	26	0
12/06/2018 07:07	25	0
12/06/2018 07:07	24	0
12/06/2018 07:07	23	0
12/06/2018 07:07	22	0
12/06/2018 07:07	21	0
12/06/2018 07:06	20	0
12/06/2018 07:06	19	0
12/06/2018 07:06	18	0
12/06/2018 07:06	17	0
12/06/2018 07:06	16	0
12/06/2018 07:06	15	0
12/06/2018 07:06	14	0
12/06/2018 07:05	13	0
12/06/2018 07:05	12	0
12/06/2018 07:05	11	0
12/06/2018 07:05	10	0
12/06/2018 07:04	9	0
12/06/2018 07:04	8	0
12/06/2018 07:04	7	0
12/06/2018 07:04	6	0
12/06/2018 07:04	5	0
12/06/2018 07:03	4	0
12/06/2018 07:03	3	0
12/06/2018 07:02	2	0
12/06/2018 07:01	1	0

Zwolle flow out, evening

OV-fiets

Time	Value	Action (0-increment 1-decrement 2-restart 3-edit 4-create)
12/06/2018 16:50	0	2
12/06/2018 08:45	5	1
12/06/2018 08:45	6	0
12/06/2018 08:43	5	0
12/06/2018 08:19	4	0
12/06/2018 08:15	3	0
12/06/2018 08:12	2	0
12/06/2018 07:50	1	0

Utrecht check-in

Staff interference

Time	Value	Action (0-increment 1-decrement 2-restart 3-edit 4-create)
21/06/2018 09:01	0	0
21/06/2018 08:45	0	0
21/06/2018 08:45	-1	0
21/06/2018 08:45	-2	0
21/06/2018 08:45	-3	0
21/06/2018 08:45	-4	0
21/06/2018 08:45	-5	0
21/06/2018 08:45	-6	1
21/06/2018 08:45	-5	1
21/06/2018 08:45	-4	1
21/06/2018 08:45	-3	1
21/06/2018 08:45	-2	1
21/06/2018 08:45	-1	1
21/06/2018 08:44	0	1
21/06/2018 08:44	1	0
21/06/2018 08:38	0	1
21/06/2018 08:38	1	0
21/06/2018 08:25	0	1
21/06/2018 08:24	1	0
21/06/2018 08:12	0	1
21/06/2018 08:12	1	0
21/06/2018 08:02	0	1
21/06/2018 08:01	1	0
21/06/2018 07:58	0	1
21/06/2018 07:58	1	0
21/06/2018 06:38	0	4

Queues

Time	Value	Action (0-increment 1-decrement 2-restart 3-edit 4-create)
21/06/2018 09:01	0	1
21/06/2018 09:00	1	0
21/06/2018 08:59	0	1
21/06/2018 08:59	1	0
21/06/2018 08:57	0	1
21/06/2018 08:57	1	0
21/06/2018 08:53	0	1
21/06/2018 08:53	1	0
21/06/2018 08:50	0	1
21/06/2018 08:50	1	0
21/06/2018 08:47	0	1
21/06/2018 08:46	1	0
21/06/2018 08:46	0	1
21/06/2018 08:45	1	0
21/06/2018 08:42	0	1
21/06/2018 08:42	1	0
21/06/2018 08:41	0	1
21/06/2018 08:41	1	1
21/06/2018 08:41	2	0
21/06/2018 08:40	1	0
21/06/2018 08:40	0	1
21/06/2018 08:40	1	1
21/06/2018 08:40	2	0
21/06/2018 08:39	1	0
21/06/2018 08:38	0	1
21/06/2018 08:38	1	0
21/06/2018 08:37	0	1
21/06/2018 08:37	1	0
21/06/2018 08:35	0	1
21/06/2018 08:35	1	0
21/06/2018 08:34	0	1
21/06/2018 08:32	1	0
21/06/2018 08:29	0	1
21/06/2018 08:27	1	0
21/06/2018 08:27	0	1
21/06/2018 08:26	1	0
21/06/2018 08:23	0	1
21/06/2018 08:23	1	0
21/06/2018 08:22	0	1
21/06/2018 08:21	1	0
21/06/2018 08:20	0	1
21/06/2018 08:19	1	0
21/06/2018 08:19	0	1
21/06/2018 08:18	1	0
21/06/2018 08:17	0	1
21/06/2018 08:14	1	0
21/06/2018 08:13	0	1
21/06/2018 08:12	1	0
21/06/2018 08:10	0	1
21/06/2018 08:09	1	0
21/06/2018 08:07	0	1
21/06/2018 08:07	1	0
21/06/2018 08:06	0	1
21/06/2018 08:05	1	0
21/06/2018 08:04	0	1
21/06/2018 08:03	1	0
21/06/2018 08:02	0	1
21/06/2018 08:01	1	0
21/06/2018 08:01	0	1
21/06/2018 08:00	1	0
21/06/2018 07:59	0	1
21/06/2018 07:59	1	0
21/06/2018 07:58	0	1
21/06/2018 07:58	1	1
21/06/2018 07:57	2	0
21/06/2018 07:56	1	0
21/06/2018 07:55	0	1
21/06/2018 07:54	1	0
21/06/2018 07:54	0	1
21/06/2018 07:53	1	0
21/06/2018 07:52	0	1
21/06/2018 07:51	1	0
21/06/2018 07:50	0	1
21/06/2018 07:50	1	0
21/06/2018 07:49	0	1
21/06/2018 07:48	1	0
21/06/2018 07:46	0	1
21/06/2018 07:44	1	0
21/06/2018 07:44	0	1
21/06/2018 07:43	1	0
21/06/2018 07:42	0	1
21/06/2018 07:41	1	0
21/06/2018 07:39	0	1
21/06/2018 07:39	1	0
21/06/2018 07:38	0	0
21/06/2018 07:38	-1	1
21/06/2018 07:37	0	1
21/06/2018 07:37	1	0
21/06/2018 07:34	0	1
21/06/2018 07:32	1	0
21/06/2018 07:31	0	1
21/06/2018 07:30	1	0
21/06/2018 07:29	0	1
21/06/2018 07:27	1	0
21/06/2018 07:27	0	1
21/06/2018 07:27	1	1
21/06/2018 07:27	2	0
21/06/2018 07:26	1	0
21/06/2018 07:25	0	1
21/06/2018 07:25	1	0
21/06/2018 07:23	0	1
21/06/2018 07:23	1	0
21/06/2018 07:20	0	1
21/06/2018 07:19	1	0
21/06/2018 07:15	0	1
21/06/2018 07:15	1	0
21/06/2018 07:11	0	1
21/06/2018 07:11	1	0
21/06/2018 06:37	0	4

Flow check-in Utrecht

left Payter

Time	Value	Action (0-increment 1-decrement 2-restart 3-edit 4-create)
21/06/2018 09:05	557	0
21/06/2018 09:04	556	0
21/06/2018 09:04	555	0
21/06/2018 09:04	554	0
21/06/2018 09:04	553	0
21/06/2018 09:04	552	0
21/06/2018 09:02	551	0
21/06/2018 09:02	550	0
21/06/2018 09:02	549	0
21/06/2018 09:01	548	0
21/06/2018 09:01	547	0
21/06/2018 09:01	546	0
21/06/2018 09:00	545	0
21/06/2018 09:00	544	0
21/06/2018 09:00	543	0
21/06/2018 09:00	542	0
21/06/2018 09:00	541	0
21/06/2018 09:00	540	0
21/06/2018 08:59	539	0
21/06/2018 08:59	538	0
21/06/2018 08:59	537	0
21/06/2018 08:59	536	0
21/06/2018 08:58	535	0
21/06/2018 08:58	534	0
21/06/2018 08:57	533	0
21/06/2018 08:57	532	0
21/06/2018 08:57	531	0
21/06/2018 08:57	530	0
21/06/2018 08:56	529	0
21/06/2018 08:56	528	0
21/06/2018 08:56	527	0
21/06/2018 08:55	526	0
21/06/2018 08:55	525	0
21/06/2018 08:55	524	0
21/06/2018 08:55	523	0
21/06/2018 08:54	522	0
21/06/2018 08:54	521	0
21/06/2018 08:53	520	0
21/06/2018 08:53	519	0
21/06/2018 08:53	518	0
21/06/2018 08:53	517	0
21/06/2018 08:53	516	0
21/06/2018 08:52	515	0
21/06/2018 08:52	514	0
21/06/2018 08:52	513	0
21/06/2018 08:51	512	0
21/06/2018 08:51	511	0
21/06/2018 08:51	510	0
21/06/2018 08:51	509	0
21/06/2018 08:50	508	0
21/06/2018 08:50	507	0
21/06/2018 08:50	506	0
21/06/2018 08:50	505	0
21/06/2018 08:49	504	0
21/06/2018 08:49	503	0
21/06/2018 08:49	502	0
21/06/2018 08:49	501	0
21/06/2018 08:48	500	0
21/06/2018 08:48	499	0
21/06/2018 08:47	498	0
21/06/2018 08:47	497	0
21/06/2018 08:47	496	0
21/06/2018 08:47	495	0
21/06/2018 08:47	494	0
21/06/2018 08:47	493	0
21/06/2018 08:47	492	0
21/06/2018 08:47	491	0
21/06/2018 08:46	490	1
21/06/2018 08:46	491	0
21/06/2018 08:46	490	0
21/06/2018 08:46	489	0
21/06/2018 08:45	488	0
21/06/2018 08:45	487	0
21/06/2018 08:45	486	0
21/06/2018 08:45	485	0
21/06/2018 08:44	484	0
21/06/2018 08:44	483	0
21/06/2018 08:44	482	0
21/06/2018 08:43	481	0
21/06/2018 08:43	480	0
21/06/2018 08:43	479	0
21/06/2018 08:42	478	0
21/06/2018 08:42	477	0
21/06/2018 08:42	476	0
21/06/2018 08:42	475	0
21/06/2018 08:41	474	0
21/06/2018 08:41	473	1
21/06/2018 08:41	474	0
21/06/2018 08:41	473	0
21/06/2018 08:41	472	0
21/06/2018 08:41	471	0
21/06/2018 08:40	470	0
21/06/2018 08:40	469	0
21/06/2018 08:40	468	0
21/06/2018 08:40	467	0
21/06/2018 08:40	466	0
21/06/2018 08:40	465	0
21/06/2018 08:39	464	0
21/06/2018 08:39	463	0
21/06/2018 08:39	462	0
21/06/2018 08:38	461	0
21/06/2018 08:38	460	0
21/06/2018 08:38	459	0
21/06/2018 08:37	458	0
21/06/2018 08:37	457	0
21/06/2018 08:37	456	0
21/06/2018 08:37	455	0
21/06/2018 08:36	454	0
21/06/2018 08:36	453	0
21/06/2018 08:36	452	0
21/06/2018 08:35	451	0
21/06/2018 08:35	450	0
21/06/2018 08:35	449	0
21/06/2018 08:35	448	0
21/06/2018 08:35	447	0
21/06/2018 08:35	446	0
21/06/2018 08:35	445	0
21/06/2018 08:34	444	0
21/06/2018 08:34	443	0
21/06/2018 08:34	442	0
21/06/2018 08:34	441	0
21/06/2018 08:34	440	0
21/06/2018 08:34	439	0
21/06/2018 08:34	438	0
21/06/2018 08:33	437	0
21/06/2018 08:33	436	0
21/06/2018 08:33	435	0
21/06/2018 08:33	434	0
21/06/2018 08:33	433	0
21/06/2018 08:33	432	0
21/06/2018 08:32	431	0
21/06/2018 08:32	430	0
21/06/2018 08:32	429	0
21/06/2018 08:32	428	0
21/06/2018 08:31	427	0
21/06/2018 08:31	426	0
21/06/2018 08:31	425	0
21/06/2018 08:30	424	0
21/06/2018 08:30	423	0
21/06/2018 08:30	422	0
21/06/2018 08:30	421	0
21/06/2018 08:30	420	0
21/06/2018 08:30	419	0
21/06/2018 08:29	418	0
21/06/2018 08:29	417	0
21/06/2018 08:29	416	0
21/06/2018 08:29	415	0
21/06/2018 08:28	414	0
21/06/2018 08:28	413	0
21/06/2018 08:28	412	0
21/06/2018 08:28	411	0
21/06/2018 08:28	410	0
21/06/2018 08:28	409	0
21/06/2018 08:28	408	0
21/06/2018 08:27	407	0
21/06/2018 08:27	406	0
21/06/2018 08:27	405	0
21/06/2018 08:27	404	0
21/06/2018 08:27	403	0
21/06/2018 08:27	402	0
21/06/2018 08:27	401	0
21/06/2018 08:27	400	0
21/06/2018 08:26	399	0
21/06/2018 08:26	398	0
21/06/2018 08:26	397	0
21/06/2018 08:26	396	0
21/06/2018 08:25	395	0
21/06/2018 08:25	394	0
21/06/2018 08:24	393	0
21/06/2018 08:24	392	0
21/06/2018 08:23	391	0
21/06/2018 08:23	390	0
21/06/2018 08:23	389	0
21/06/2018 08:23	388	0
21/06/2018 08:23	387	0
21/06/2018 08:23	386	0
21/06/2018 08:23	385	0
21/06/2018 08:22	384	0
21/06/2018 08:22	383	0
21/06/2018 08:22	382	0
21/06/2018 08:21	381	0
21/06/2018 08:21	380	0
21/06/2018 08:21	379	0
21/06/2018 08:21	378	0
21/06/2018 08:21	377	0
21/06/2018 08:21	376	0
21/06/2018 08:21	375	0
21/06/2018 08:21	374	0
21/06/2018 08:20	373	0
21/06/2018 08:20	372	0
21/06/2018 08:20	371	0
21/06/2018 08:20	370	0
21/06/2018 08:20	369	0
21/06/2018 08:20	368	0
21/06/2018 08:19	367	0
21/06/2018 08:19	366	0
21/06/2018 08:19	365	0
21/06/2018 08:19	364	0
21/06/2018 08:19	363	0
21/06/2018 08:18	362	0
21/06/2018 08:18	361	0
21/06/2018 08:18	360	0
21/06/2018 08:18	359	0
21/06/2018 08:17	358	0
21/06/2018 08:17	357	0
21/06/2018 08:16	356	0
21/06/2018 08:16	355	0
21/06/2018 08:16	354	0
21/06/2018 08:16	353	0
21/06/2018 08:16	352	0
21/06/2018 08:15	351	0
21/06/2018 08:15	350	0
21/06/2018 08:15	349	0
21/06/2018 08:15	348	0
21/06/2018 08:15	347	0
21/06/2018 08:15	346	0
21/06/2018 08:15	345	0
21/06/2018 08:15	344	0
21/06/2018 08:15	343	0
21/06/2018 08:14	342	0
21/06/2018 08:14	341	0
21/06/2018 08:14	340	0
21/06/2018 08:14	339	0
21/06/2018 08:14	338	0
21/06/2018 08:14	337	0
21/06/2018 08:13	336	0
21/06/2018 08:13	335	0
21/06/2018 08:13	334	0
21/06/2018 08:13	333	0
21/06/2018 08:13	332	0
21/06/2018 08:12	331	0
21/06/2018 08:12	330	0
21/06/2018 08:12	329	0
21/06/2018 08:12	328	0
21/06/2018 08:12	327	1
21/06/2018 08:12	328	0
21/06/2018 08:12	327	0
21/06/2018 08:11	326	0
21/06/2018 08:11	325	0
21/06/2018 08:11	324	0
21/06/2018 08:11	323	0
21/06/2018 08:10	322	0
21/06/2018 08:10	321	0
21/06/2018 08:10	320	0
21/06/2018 08:09	319	0
21/06/2018 08:09	318	0
21/06/2018 08:09	317	0
21/06/2018 08:09	316	0
21/06/2018 08:09	315	0
21/06/2018 08:08	314	0
21/06/2018 08:08	313	0
21/06/2018 08:08	312	0
21/06/2018 08:08	311	0
21/06/2018 08:08	310	0
21/06/2018 08:08	309	0
21/06/2018 08:07	308	0
21/06/2018 08:07	307	0
21/06/2018 08:07	306	0
21/06/2018 08:07	305	0
21/06/2018 08:07	304	0
21/06/2018 08:07	303	0
21/06/2018 08:07	302	0
21/06/2018 08:07	301	0
21/06/2018 08:06	300	0
21/06/2018 08:06	299	0
21/06/2018 08:06	298	0
21/06/2018 08:06	297	0
21/06/2018 08:06	296	0
21/06/2018 08:06	295	0
21/06/2018 08:06	294	0
21/06/2018 08:05	293	0
21/06/2018 08:05	292	0
21/06/2018 08:05	291	0
21/06/2018 08:05	290	0
21/06/2018 08:05	289	0
21/06/2018 08:05	288	0
21/06/2018 08:04	287	0
21/06/2018 08:04	286	0
21/06/2018 08:04	285	0
21/06/2018 08:04	284	0
21/06/2018 08:04	283	0
21/06/2018 08:04	282	0
21/06/2018 08:03	281	0
21/06/2018 08:03	280	0
21/06/2018 08:03	279	0
21/06/2018 08:03	278	0
21/06/2018 08:03	277	0
21/06/2018 08:03	276	0
21/06/2018 08:03	275	0
21/06/2018 08:03	274	0
21/06/2018 08:02	273	0
21/06/2018 08:02	272	0
21/06/2018 08:02	271	0
21/06/2018 08:02	270	0
21/06/2018 08:01	269	0
21/06/2018 08:01	268	0
21/06/2018 08:01	267	0
21/06/2018 08:01	266	0
21/06/2018 08:01	265	0
21/06/2018 08:01	264	0
21/06/2018 08:00	263	0
21/06/2018 08:00	262	0
21/06/2018 08:00	261	0
21/06/2018 08:00	260	0
21/06/2018 08:00	259	0
21/06/2018 08:00	258	0
21/06/2018 08:00	257	0
21/06/2018 08:00	256	0
21/06/2018 07:59	255	0
21/06/2018 07:59	254	0
21/06/2018 07:59	253	0
21/06/2018 07:59	252	0
21/06/2018 07:59	251	0
21/06/2018 07:59	250	0
21/06/2018 07:59	249	0
21/06/2018 07:58	248	0
21/06/2018 07:58	247	0
21/06/2018 07:58	246	0
21/06/2018 07:58	245	0
21/06/2018 07:58	244	0
21/06/2018 07:58	243	0
21/06/2018 07:57	242	0
21/06/2018 07:57	241	0
21/06/2018 07:57	240	0
21/06/2018 07:57	239	0
21/06/2018 07:57	238	0
21/06/2018 07:57	237	0
21/06/2018 07:57	236	0
21/06/2018 07:57	235	0
21/06/2018 07:56	234	0
21/06/2018 07:56	233	0
21/06/2018 07:56	232	0
21/06/2018 07:55	231	0
21/06/2018 07:55	230	0
21/06/2018 07:55	229	0
21/06/2018 07:55	228	0
21/06/2018 07:55	227	0
21/06/2018 07:55	226	0
21/06/2018 07:54	225	0
21/06/2018 07:54	224	0
21/06/2018 07:54	223	0
21/06/2018 07:54	222	0
21/06/2018 07:54	221	0
21/06/2018 07:54	220	0
21/06/2018 07:54	219	0
21/06/2018 07:53	218	0
21/06/2018 07:53	217	0
21/06/2018 07:53	216	0
21/06/2018 07:53	215	0
21/06/2018 07:53	214	0
21/06/2018 07:53	213	0
21/06/2018 07:53	212	0
21/06/2018 07:53	211	0
21/06/2018 07:52	210	0
21/06/2018 07:52	209	0
21/06/2018 07:52	208	0
21/06/2018 07:52	207	0
21/06/2018 07:52	206	0
21/06/2018 07:51	205	0
21/06/2018 07:51	204	0
21/06/2018 07:51	203	0
21/06/2018 07:51	202	0
21/06/2018 07:50	201	0
21/06/2018 07:50	200	0
21/06/2018 07:50	199	0
21/06/2018 07:50	198	0
21/06/2018 07:50	197	0
21/06/2018 07:50	196	0
21/06/2018 07:49	195	0
21/06/2018 07:49	194	0
21/06/2018 07:49	193	0
21/06/2018 07:48	192	0
21/06/2018 07:48	191	0
21/06/2018 07:48	190	0
21/06/2018 07:48	189	0
21/06/2018 07:48	188	0
21/06/2018 07:48	187	0
21/06/2018 07:48	186	1
21/06/2018 07:48	187	0
21/06/2018 07:47	186	0
21/06/2018 07:47	185	0
21/06/2018 07:47	184	0
21/06/2018 07:47	183	0
21/06/2018 07:47	182	0
21/06/2018 07:47	181	0
21/06/2018 07:47	180	0
21/06/2018 07:47	179	0
21/06/2018 07:46	178	0
21/06/2018 07:46	177	0
21/06/2018 07:46	176	0
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21/06/2018 07:11	2	0
21/06/2018 07:11	1	0
21/06/2018 06:38	0	4

Middle Payter

Time	Value	Action (0-increment 1-decrement 2-restart 3-edit 4-create)
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Right Payter

Time	Value	Action (0-increment 1-decrement 2-restart 3-edit 4-create)
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