



Bicycle Parking in Copenhagen

Analysis and Recommendations for Improved Bicycle Parking in Copenhagen, Denmark

An Interactive Qualifying Project to be submitted to the faculty of Worcester
Polytechnic Institute in partial fulfillment of the requirements for the Degree of
Bachelor of Science

Submitted by:

Christian Banker
Christine Keches
Megan Murphy
dcf-d06@wpi.edu

Submitted to:

Project Advisor:

Ruth Smith

Project Liaison:

Allan Carstensen, Danish Cyclist Federation

May 7, 2006

Abstract

This project, sponsored by the Danish Cyclist Federation, deals with enhancing the bicycle infrastructure in Copenhagen and specifically focuses on improving bicycle parking facilities at Nørreport Railway and Metro Station. The current parking situation, the opinions and behaviors of cyclists, and potential parking solutions are analyzed through field studies at Nørreport Station, interviews and a survey. Recommendations for the best improvements are made so that the city of Copenhagen can continue to promote cycling as an alternative mode of transportation.

Executive Summary

This project aids the Danish Cyclist Federation in promoting bicycle infrastructure in Copenhagen by conducting a study of bicycle parking at Nørreport Railway and Metro Station. Bicycle parking at major train and metro stations tends to be disorganized and haphazard due to factors such as the lack of space and shortage of racks. The trend in bicycle parking at Nørreport Station is to park as close as possible to the platform, bus stops, shopping areas, or kiosk, even if this means forgoing an actual parking space to toss the bicycle on the ground. The main problem lies in the overall bicycle parking system as well as the cyclists' behavior in relation to it. Improved parking facilities would provide convenience to cyclists, enhance aesthetics, improve safety and accessibility, and prevent theft.

The most important factor in developing effective and sustainable solutions to this problem is the opinion and acceptance of the various stakeholders. The stakeholders in this project include the commuting cyclists, government officials, the Danish railway system, the community, and the Danish Cyclist Federation. Feedback from these groups displays that cyclists are dissatisfied with the parking situation overall. They find several rack types to be ineffective or unattractive so they choose not to park their bicycle in them. Additionally, many are simply not aware of the different variety of parking options that are available. To accompany the stakeholder analysis, an extensive field study of Nørreport Station is conducted to determine patterns of bicycle parking, number of bicycles, and the layout of the bicycle parking areas. On average there are more parking spaces than bicycles at the station, yet cyclists complain that there is never a place to park. This indicates a problem with the ways cyclists are choosing their parking spaces, and is supplemented by the presence of abandoned bicycles or bicycles parked long-term.

We conclude that there are four main problems at Nørreport station. These include a lack of convenient bicycle parking, an abundance of abandoned bicycles, a poor accessibility of bicycles to trains and metro, and the attitude of cyclists. Based on the studies performed, a range of recommendations and solutions are proposed to help improve the parking situation at Nørreport station. The solutions fall into four broad categories, each addressing one of the parking problems at the station. The solutions addressing each aspect of the problem range from very simple and inexpensive to large-scale construction projects and implementing major policy

and attitude changes. In some cases there are multiple options that would produce similar results to provide alternatives at different levels of expense.

Many of the bicycle parking problems that exist at Nørreport station are also occurring throughout Copenhagen at various other stations. The majority of the recommended solutions could effectively be applied to other stations and parking areas exhibiting similar general problems to maintain cycling as a main form of transportation. By improving parking facilities, cyclists are encouraged to continue traveling by bicycle as part of their daily routine.

Table of Contents

Chapter 1: Introduction	1
Chapter 2: Background	3
2.1 Bicycles in Urban Transport Systems	3
2.1.1 Copenhagen, City of Cyclists	4
2.1.2 Danish Cyclist Federation.....	8
2.1.3 Nørreport Railway and Metro Station.....	9
2.2 Social Implications of the Bicycle Parking Problem	12
2.2.1 Convenience for Cyclists	12
2.2.2 Social and Political Commitment to Cycling.....	13
2.2.3 Aesthetics	16
2.2.4 Safety and Accessibility.....	17
2.3 Design Considerations	18
2.3.1 Bicycle Characteristics.....	18
2.3.2 Types of Bicycle Parking.....	21
2.3.3 Case Studies	26
Chapter 3: Methodology	29
3.1 Evaluating Stakeholder Needs	30
3.2 Assessing the parking problem	31
3.3 Determining Potential Solutions	33
Chapter 4: Analysis.....	34
4.1 Commuting by Bicycle	34
4.2 Bicycles and Public Transportation	35
4.3 København Kommune: Local Government	36
4.4 Nørreport Station	37
4.4.1 Parking at Nørreport Station	37
4.4.2 Patterns of Bicycle Parking.....	38
4.4.3 Number of Bicycles	40
4.4.4 Available Parking.....	41
4.5 Design and Aesthetics.....	43
4.6 Parking Solutions at Other Stations	44
Chapter 5: Conclusions	47
5.1 Lack of Convenient Bicycle Parking	47
5.2 Abundance of Abandoned Bicycles.....	48
5.3 Poor Accessibility of Bicycles to Train and Metro.....	48
5.4 Attitude of Cyclists	49
Chapter 6: Recommendations	50
6.1 Creating and Restructuring Ease of Bicycle Parking.....	50
6.1.1 Reorganizing Parking.....	50
6.1.2 Creating Additional Parking	52
6.1.3 Replacing and Improving Racks	54
6.1.4 Enhancing Underground Parking.....	55
6.2 Removal of Abandoned Bicycles.....	58
6.3 Improving Bicycle Accessibility to the Station	59
6.4 Policy Changes and Modifying the Attitude of Cyclists	60

6.5 Conclusion	61
Bibliography	62
Appendix A: Survey	65
Cykelparkerings Undersøgelse	65
Bicycle Parking Survey.....	68
Design of Questions	70
Results.....	73
Overall.....	73
Nørreport.....	87
Appendix B: Layout of Nørreport Station	96
Appendix C: Bicycle Counting.....	110
Appendix D: Parking Duration	119
Appendix E: Interviews	124
Urban Reflections: Sten Neilsen.....	124
København Kommune: Maria Strueli.....	126
Danish State Railways: Kristoffer Kejser	127
Roads and Parks Administration: Vibeke Forsting.....	130
Focus Group.....	131

Table of Figures

Figure 1: Summary of Means of Public Transportation at Nørreport Station	9
Figure 2: Diagram of the Two Main Islands at Nørreport Station.....	10
Figure 3: Part of the Nørreport Railway and Metro Station in Copenhagen, Denmark	11
Figure 4: Bicycles at a Dutch Railway Station	14
Figure 5: Diagram of a Bicycle (Enchanted Learning).....	19
Figure 6: Cargo Bicycle	20
Figure 7: Hoop Rack.....	22
Figure 8: Rolling Rack.....	22
Figure 9: Classic Copenhagen Rack	23
Figure 10: Angled Classic Copenhagen Rack	23
Figure 11: Parallel Wheel Holder	24
Figure 12: Head Tube Rack	25
Figure 13: Multi Level Bicycle Rack.....	25
Figure 14: Bicycle Lockers	26
Figure 15: Covered Unguarded Bicycle Racks.....	27
Figure 16: Guarded Bicycle Parking at a Railway Station in Amsterdam	28
Figure 17: Methodology Flow Chart	30
Figure 18: Nørreport Area 1 with added bicycle racks.....	53
Figure 19: Overall Layout of Nørreport Station	96
Figure 20: Nørreport Area 8	97
Figure 21: Nørreport Area 1	98
Figure 22: Nørreport Area 4	99
Figure 23: Nørreport Area 3	100
Figure 24: Nørreport Area 11	101
Figure 25: Nørreport Area 9	102
Figure 26: Nørreport Area 13	103
Figure 27: Nørreport Area 14	104
Figure 28: Nørreport Area 10	105
Figure 29: Nørreport Area 5	106
Figure 30: Nørreport Area 12	107
Figure 31: Nørreport Area 15	108
Figure 32: Nørreport Area 16	109
Figure 33: Bicycle Counting Schedule	110
Figure 34: Number of Available Bicycle Racks by Location.....	111
Figure 35: Average Number of Bicycles by Time and Area	112
Figure 36: Average Number of Bicycles Total.....	113
Figure 37: Total Number of Bicycles Chronologically	114
Figure 38: Bicycles Parked In and Out of Racks Chronologically.....	115
Figure 39: Differences in Bicycles during Rush Hours	116
Figure 40: Comparison of Available Racks and Number of Bicycles.....	117
Figure 41: Average Percent of Racks in Use	118
Figure 42: Parking Duration Counts up to 24 Hours	119
Figure 43: Parking Duration Counts up to 4 Weeks	120
Figure 44: Parking Duration Totals	120

Figure 45: Percent of Tagged Bicycles Remaining	121
Figure 46: Original Distribution of Tagged Bicycles	122
Figure 47: Distribution of Remaining Bicycles	123

Chapter 1: Introduction

Around the world, numerous urban areas face the challenging problem of how to efficiently transport rapidly growing populations. Motorized vehicles are very destructive to the environment and create roadway congestion and safety hazards. The United States, for example, relies heavily on personal automobiles which account for 86% of urban trips (Pucher and Renne, 2003). Automobiles produce about half the total air pollution in the United States and over 80% of the air pollution in most cities, making them major contributors to air quality problems and global warming (Ohio EPA, 2006). Globally, traffic is proportional to the number of cars in use, and this causes long delays at peak hours in most large cities. A car-centered transportation infrastructure also presents safety hazards for pedestrians. In addition to all of these problems, car transportation also lacks the important health benefits of walking and cycling, which provide excellent aerobic exercise and reduce the risk of disorders such as diabetes and hypertension (Pucher and Dijkstra, 2003). In some cases it is becoming clear that bicycling can offer a superior mode of transportation.

European countries have countered the issues created by automobile-based transportation through the promotion of cycling as a mode of transportation (Tolley, 2003). Countries such as Denmark, the Netherlands, and Germany are considered the leaders in this field. In Denmark, which has a population of about 5.5 million people, there are more than 4 million adult bicycles (DCF, 2006). About 36% of daily commuting in Copenhagen is done by bicycle and over 1.13 million kilometers are cycled each day (DCF, 2006). By increasing the number of bicycle facilities, improving safety conditions, and developing general cycling regulations, Denmark is allowing cyclists, pedestrians, cars, and public transit to safely and peacefully coexist.

However, with the growing popularity of cycling, Denmark is finding that their original facilities for cyclists are no longer adequate and require improvement in order to continue the promotion of this type of transportation. The expansion of the metro line as well as added bus stops are increasing bicycle parking needs at public transit stations, but the facilities have not been updated to reflect these changes. While this growth has been addressed in other countries, there has been a lack of attention to this issue in Denmark and more specifically, the city of Copenhagen. The Danish Cyclist Federation, which is a leading organization for bicycle infrastructure and policy improvements, actively works toward promoting bicycles as a primary

form of transportation. In past years the DCF has completed projects in areas such as bicycle helmet safety and locking mechanisms for bicycles. While the DCF has been successful in promoting bicycles as a main form of transportation, the serious problem of bicycle parking still remains.

Bicycle parking at major train and metro stations in Copenhagen, such as Nørreport Station, tends to be disorganized and haphazard due to factors such as the lack of space and shortage of racks. The trend in bicycle parking at Nørreport Station is to park as close as possible to the platform, bus stops, shopping areas, or kiosk, even if this means forgoing an actual parking space to toss the bicycle on the ground. This leads to other problems such as safety hazards to pedestrians and handicapped, bicycle damage and theft, and a decrease in quality of the aesthetics in the area. There are bicycle racks scattered all over the station, but at Nørreport they are not adequate for the manner in which cyclists use them. The main problem lies in the entire bicycle parking system as well as the cyclists' behavior in relation to it. Improved parking facilities would provide convenience to cyclists, enhance aesthetics, and improve safety and accessibility and prevent theft.

This project aids the Danish Cyclist Federation in promoting bicycle infrastructure in Copenhagen by conducting a study of bicycle parking at Nørreport Railway and Metro Station. This is accomplished by developing improved methods of bicycle parking, proposing policy changes and adapting the mentality of cyclists. By analyzing the current problems with bicycle parking and conducting research to determine the public opinion of the parking condition, we are identifying the needs of the stakeholders. We are taking into account cyclists' parking behaviors, analyzing parking usage trends and ultimately making a recommendation to the DCF for a range of bicycle parking solutions and plans of implementation for Nørreport Station.

Chapter 2: Background

Transportation systems are an essential part of any complex society. They have a hand in shaping urban design and our lifestyles. This chapter describes transportation in relation to Copenhagen, along with some problems associated with it and how many countries, including Denmark, have begun promoting cycling as a solution to these problems. It explains the various social aspects of cycling as a mode of transportation, taking specifically into account the aspects involved with bicycle parking at Nørreport Station in Copenhagen. It also presents technical design considerations that are essential for planning and implementing an improved bicycle parking system at this station that will work most effectively for Nørreport Station, the cyclists, and the community as a whole.

2.1 Bicycles in Urban Transport Systems

As urbanization increases, efficient and effective transportation systems become increasingly more important. Some countries have continued to rely on automobile-based transportation, while others have promoted more sustainable modes, such as walking, bicycling, and public transportation that relieve environmental, health, and congestion issues. Cars are proving to be problematic and many countries have already proven that transportation can be sustainable while still being effective and, in many cases, more efficient than car-based transportation.

Transportation systems designed around the use of automobiles cause a variety of problems. The United States is an extreme example of this, where the transportation infrastructure of nearly the entire country is based heavily on personally owned automobiles. Most cities do not have effective enough public transit to significantly replace personal vehicles and automotive domination makes adequate cycling infrastructure difficult to implement. As a result only 0.9% of short trips in urban areas of the United States are made by bicycle, 8.6% by walking and 1.6% by public transit (Pucher and Renne, 2003). Many parts of the United States have become very suburban, making it difficult to use any form of transportation other than personal cars. This, combined with the fact that it is relatively inexpensive to drive a car due to subsidized fuel, has made automobile ownership the social norm and most families have multiple cars. Progress with promotion of walking and cycling is hindered by the higher level of danger

associated with these modes of transportation in the United States. The United States has bicycle and pedestrian fatality rates over thirteen times higher than the Netherlands (Pucher and Dijkstra, 2003).

Many countries around the world are using more sustainable forms of transportation and have limited their reliance on personal automobiles. In the Netherlands, 46% of trips in urban areas are made on foot or by bicycle and Denmark is not far behind with 41% (Pucher and Dijkstra, 2003). The main difference between these countries and the United States is the transportation infrastructure they have built. Adequate facilities for walking and bicycling have been implemented along with roadways to provide safe, healthy alternatives to driving. By building facilities to support multiple modes of transportation, these countries foster the safe coexistence of various types of transportation.

Driving personal automobiles is clearly not an environmentally friendly form of transportation and in most cities, walking or cycling is a more effective for the majority of trips. Most current cars rely on petroleum which is in limited supply and produces large amounts of toxic exhaust fumes and greenhouse gases. They are noisy, present hazards to pedestrians and cyclists, and take up a lot of space on the road. While non-motorized transportation is not effective for long trips, it can actually be faster for short trips in cities that experience traffic problems and parking deficiencies. As many countries in Europe have discovered, effective non-motorized transportation, along with effective public transit and rail systems can render personal automobiles almost unnecessary.

Transportation improvement is a very effective route toward more sustainable living and many countries have made huge advances in recent years. The United States is an extreme example of an automobile dependent society and the weaknesses of this are starting to show through. Examples set forth by other countries, especially in Europe, show that this does not have to be the case and that successful transportation can be achieved without a car in every garage.

2.1.1 Copenhagen, City of Cyclists

The bicycle was first introduced in the early nineteenth century in Europe and has since become a staple of everyday life. One of the first bicycles was developed in Germany in 1816 and was known as a hobby-horse or pushbike since it required the rider's feet to push off the

ground for movement (Woodforde, 1970). Regardless of its heavy weight and cumbersome design, the hobby-horse quickly became popular with the wealthy class. As inventors devised handlebars and pedals, the bicycle became a suitable toy for children and widely used for short tours and going on picnics (Sloane, 1970). In the 1890's huge leaps were made to improve features on the bicycle which resulted in the beginning of mass production of bicycles, with over 400 bicycle manufacturers in the United States (Sloane, 1970). The bicycle had quickly become the only way the average person could get around in the 1890's.

After mass production began in the 1890's, bicycles have had a large variety of uses including toys for children, recreation, fitness, transportation, sports and more (Woodforde, 1970). As motorized transportation became more widely used with the invention of the automobile, most of the world traded in bicycles for cars. However, in Denmark at this time many people were not wealthy enough to purchase an automobile and bought bicycles instead. Even so, bicycle use dwindled between 1905 and 1940 all over the world. Then, as urban areas experienced increasing problems with automobile based transportation, many countries began to see a reemergence of bicycle transportation. Beginning in the 1940's the promotion of bicycle usage really began to take off as people became more fitness oriented and environmentally concerned. To support the use of the bicycle as a mode of transportation for commuters and the general public, cities developed improved bicycling infrastructure. More for practical reasons than political, Denmark saw the renewal of bicycles as a means of getting to and from work easily. Later, in the 1970's, bicycles became even more popular in the country because of the oil crisis. At this time Danes became more concerned with the environment and pushed toward bicycles as a cultural choice.

Today Denmark's flat landscape makes cycling a quick and simple method of transportation. With the lack of major hills, even the elderly are able to ride bicycles as a means of transportation. The city of Copenhagen is especially ideal for cycling because it is compact enough to permit cycling to most destinations. When combined with Denmark's promotion of cycling and bicycle infrastructure improvements, these conditions allow the bicycle to play a large role in the city's transportation system. By combining bicycles and public transit, it is possible to reach almost any destination very quickly, which is especially useful to commuters.

The city of Copenhagen works hard to promote cycling around the city and is constantly working to improve the conditions for cyclists. In 2002, the Roads and Parks division of

København Kommune, the local city government, came out with the Cycle Policy. This document is a description of any problems with cycling infrastructure at the moment, specific goals to be completed, as well as nine focus areas to improve in by 2012. The overall goals of the Cycle Policy are outlined as follows:

- The proportion of people cycling to workplaces in Copenhagen shall increase from 34% to 40%.
- Cyclists' risk of serious injury or death shall decrease by 50%.
- The proportion of Copenhagen cyclists who feel safe cycling in town shall increase from 57% to 80%.
- Cyclists traveling speed on trips of over 5 km shall increase by 10%.
- Cyclists comfort shall be improved so that cycle track surfaces deemed unsatisfactory shall not exceed 5%.

In order to achieve these goals, the Cycle Policy sets out nine focus areas. These focus areas include aspects such as:

- Green cycle routes
- Improved cycling conditions in the City Centre
- Combining cycling and public transport
- Bicycle parking
- Improved signal intersections
- Better cycle track maintenance
- Better cycle track cleaning
- Campaigns and information

For each of these nine focus areas, there is a section in the Cycle Policy detailing the current problem as well as any actions already taken. In terms of bicycle parking at train and bus stations, there are many actions in progress to improve parking. The three main investors in bicycle parking improvements are the City of Copenhagen, Copenhagen Transport, and Danish State Railways. Every improvement to bicycle parking goes through at least one of these organizations, and is funded primarily, if not fully, by them. It is these investors that set some of the recommendations for bicycle parking facilities. In accordance with the Danish State Railways, bicycle parking facilities should be broken down to provide 25% of the spaces with lockable racks, and 50% of the spaces with a covering. One of the additional limitations on

expanding bicycle parking is that there cannot be bicycle parking 10 meters from any street corner.

Over the past few years, many improvements have been made in reference to these guidelines. At Østerport and Central station, both locked and covered parking is available. Cyclists can subscribe to the locked parking, or buy a ticket as needed. Another improvement made over the past decade to increase the amount of bicycle parking space at several stations is multi level parking. Multi level racks have two layers of bicycle parking spaces where the cyclist lifts their bicycle up onto the top rack or slides it in to the bottom rack.

Several projects and plans related to bicycle parking have been put into action recently. In 2002 there was a survey sent out that was designed to detail the exact need of bicycle parking in the city. An action plan for improving bicycle parking is currently being drawn up by the local government of Copenhagen. It will address bicycle parking in connection with public transport, at homes and workplaces, at shops and shopping centers, and on streets in general. For even further improvements, Copenhagen is looking to other Danish cities for ideas. The city of Odense, known as the National Cycle City of Denmark, has excellent parking facilities and road conditions. The outdoor parking facilities at train stations can hold up to 400 bicycles, with 150 of these spaces lockable for free. There is a locking mechanism that is built right into the ground, and open for all cyclists. There are an additional 250 spaces that are indoors and lockable, with extra compartments for luggage and carriages.

In future years, the Bicycle Account will be used as a follow up so the cyclists can see which Cycle Policy goals are being met along the way. The Bicycle Account is a document that is compiled every two years by the City of Copenhagen. It is in the form of a census that focuses solely on bicycle use around the city. Each year that it is published reflects the results from the previous year, so the 2004 Bicycle Account was published in 2005. Every two years, the city surveys the cyclist on how satisfied they are with different aspects related to cycling around the city.

In each Bicycle Account, one of the first sections is the “What Cyclists Think” section. This is a chart that shows how the cyclists rated each of the following: Copenhagen as a city of cyclists, cyclist sense of security, the number of cycle tracks, cycle track width, cycle track maintenance, road maintenance, cycle parking generally, and the feasibility of combining cycling

with public transport. From year to year, the contents of the rest of the account are set up differently depending on which issues need to be addressed the most.

The most recent Bicycle Account from 2004, showed that bicycle traffic has risen by 41% while motorized traffic has only risen by 18%. In general cyclists were happier with Copenhagen as a city of cyclists, the number of cycle tracks, their width, and their maintenance. They remained less satisfied, however, with the general state of bicycle parking. Only 30% of cyclists were satisfied with parking in 2004 as compared to previous years where it had been 40%. To improve this situation, the Roads and Park department has begun organizing a series of projects such as adding new parking spaces in certain districts of the city.

2.1.2 Danish Cyclist Federation

The Danish Cyclist Federation is the main organization in Denmark that advocates the practicalities of everyday cycling in the country. With approximately 26,000 members, the DCF gives cyclists a collective identity as well as representation. They act somewhat as a moderator between the cyclist and the governing bodies. Their main objectives are geared towards promoting cycling and the needs of the cyclist. By improving safety and comfort for cyclists they are encouraging more commuters to use bicycles. Through ensuring that the bicycle is considered a serious form of transportation, they aid the cyclists in using the bicycle as interplay between other forms of transportation. Reducing the effects of traffic on the environment and creating safe cycling routes between destinations are additional objectives of the federation.

The general infrastructure of the Danish Cyclist Federation includes 41 branch associations, each having their own officers and district representatives who are volunteers. These 41 branches are united through a central association in Copenhagen, with a full time professional staff. Annual meetings for delegates are held and several services such as a free bimonthly magazine, a bicycle shop, and bicycle tours are also offered.

The Federation was founded in October of 1905, and has been working actively since that time to promote fun and safe cycling for the residents of Denmark. In 1910, the federation helped in the creation of traffic rules and, in turn, the First Road Traffic Act in 1923. After the introduction of motor vehicles, cycling as a mode of transportation became unsafe in Denmark. The DCF led mass demonstrations for better road and safety conditions for cyclists. More recent projects sponsored by DCF have been focused on city-bike maintenance and availability, bicycle

helmets, and the study of whether the right hand turns at red lights law is a safe law for cyclists (City of Copenhagen, 1997).

2.1.3 Nørreport Railway and Metro Station

The Nørreport Railway and Metro station is one of the busiest public transit stations in Copenhagen since it has all three forms of public transportation, train, metro, and bus, running through it. Built around 1918, it is a relatively small station in regards to physical size, but a well-used stop on the transportation schedule, especially with the addition of the metro line in the past 4 years (Copenhagen Post, 2004).

Nørreport is one of the four main stations through which 9 of the 11 S-train lines run. The S-trains, or S-tog, are the local trains that run frequently through downtown Copenhagen and the surrounding towns. These trains come every couple of minutes on weekdays, especially during rush hours. All of the S-trains are equipped with a car in which cyclists can travel with their bicycle. In addition to the S-trains, there are two tracks which are reserved for the regional trains going to other areas of Denmark and other countries. Currently Nørreport is the only main S-train station that has a metro stop connected to it as well. There are two lines of the metro, M1 and M2, both of which stop every two minutes at Nørreport. Metro cars are also equipped with areas for cyclists to travel with their bicycle. Finally, this station is also a major stop on several bus routes. In total, 15 bus lines have stops at Nørreport Station. A summary of all the public transportation lines at Nørreport station can be seen in Figure 1. All together this makes Nørreport a very accessible and convenient area for commuters traveling to and from the center of Copenhagen.

Train (S-tog)	Bus	Metro
A	6A, 5A	M1
A+	350S, 150S	M2
E	14	
Ex	42	
C	43	
H	184	
H+	185	
B	173E	
B+	81N, 84N, 94N, 95N, 96N	

Figure 1: Summary of Means of Public Transportation at Nørreport Station

While there is a high volume of people and transportation moving through the station, the physical size of the station is rather small. The main area of the station consists of the five islands on Nørre Voldgade. The left most island, Area 8, is just a small bicycle parking lot. The two main islands, Areas 3 and 1 seen in Figure 2, are where the entrances to the S-trains, metro, and regional lines are, as well as the ticket kiosk, and all of the locked, covered, and multi level bicycle parking. To the right of the second main island are several bus stops. Beyond the bus stops is the fourth island which has one bicycle parking rack as well as an entrance to the two regional tracks. On one side of the first main island is a small bus lane where several bicycle racks are positioned next to six bus stops. These five islands make up the main part of the station and house the bulk of the bicycle parking for Nørreport. Individual maps of these areas can be found in Appendix B.

The area surrounding Nørreport station, on either side of Nørre Voldgade, also has a significant amount of bicycle parking and this is used by cyclists as both station parking and parking for the shops and grocery stores. This section is also split up into individual areas and the maps can be found in Appendix B.

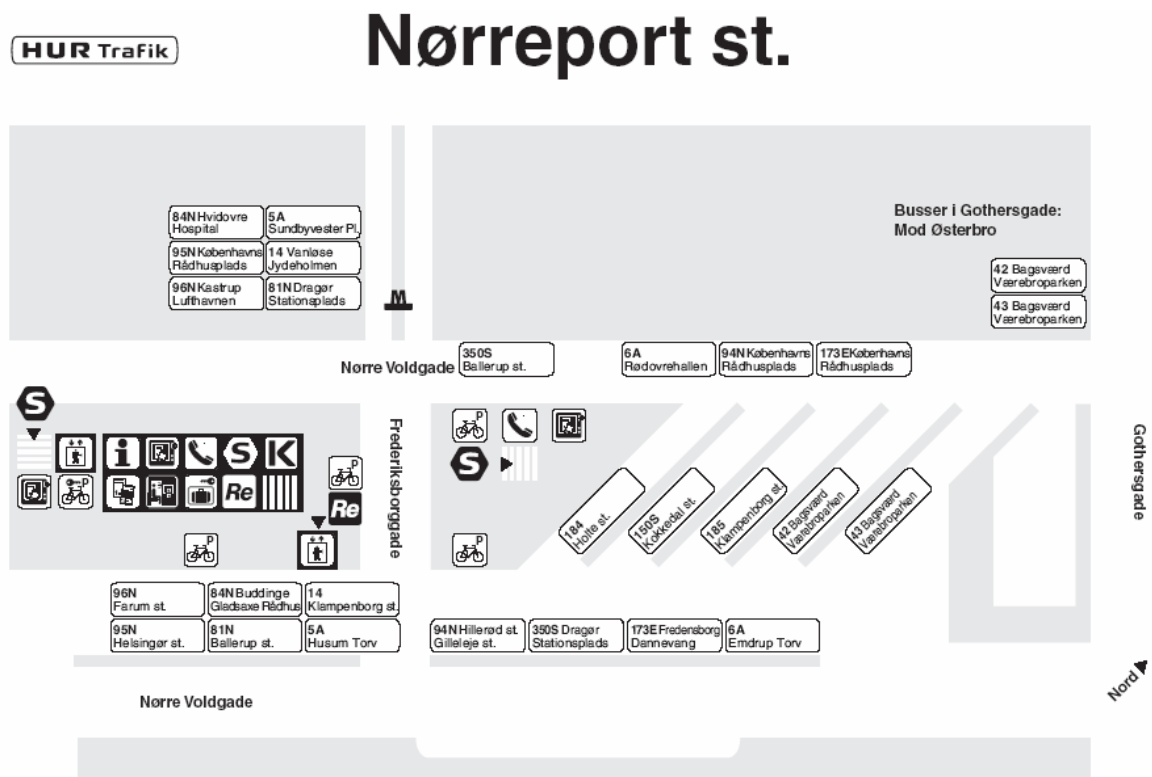


Figure 2: Diagram of the Two Main Islands at Nørreport Station

Nørreport Station is currently experiencing many different problems, and no one solution has been able to address all of these problems. In the underground tracks that host the regional trains, the emissions and pollution from the train are at unsafe levels since many of these trains run on diesel fuel. Also, the underground platforms present a major fire hazard. In the event of a fire on any of these tracks not everyone would be able to evacuate in a safe amount of time (DSB 2006). In addition to these problems, a general overflow of traffic is congesting and slowing the station.

The bicycle parking situation just adds to the problems that Nørreport is currently experiencing. It is most prominent because it is the most aesthetically noticeable issue. As seen in Figure 3, the traffic going through the station creates an excess of bicycles parked over the course of the day. In addition to daytime parking, there are also a significant number of bicycles parked at the station during the night. Although many suggestions have been made, not one solution has been able to effectively correct all of the problems the stations is having.



Figure 3: Part of the Nørreport Railway and Metro Station in Copenhagen, Denmark

2.2 Social Implications of the Bicycle Parking Problem

In countries such as Denmark, where a large percentage of the population commutes by bicycle, parking in public areas has become an overwhelming problem. This project helps promote an effective cycling infrastructure by making bicycles more accessible to the commuters, making the parking areas more aesthetically pleasing, providing greater security, and creating a safer environment for the community. Currently bicycles are parked haphazardly and strewn all over public transportation areas. This creates problems for owners trying to locate their bicycles, and presents a safety hazard for pedestrians and handicapped. By creating a more organized parking system, bicycles are readily accessible and stored in prescribed locations which, in turn, are more aesthetically pleasing. Without an effective racking system bicycles cannot be consistently secured, therefore the implementation of adequate parking facilities allows bicycles to be kept safe and undamaged.

2.2.1 Convenience for Cyclists

Convenience to the user is the most important aspect of bicycle parking. This is especially true in the case of bicycle commuters, who are generally under strict time constraints. If bicycle parking facilities are not convenient, there is little likelihood that cyclists choose to use them. The aspects of convenient bicycle parking relevant to cyclists are distance from their destination, ease of use, and accessibility. If these requirements are not met, cyclists will choose to store their bicycles in more convenient areas, even if it causes problems for other members of the community.

The distance of bicycle parking from a cyclist's destination strongly influences whether or not they are willing to park there. One of the major advantages generally associated with bicycle commuting is that it is a nearly point-to-point transportation solution, involving minimal effort to park close to a destination. Quality bicycle parking solutions can help reinforce this view of bicycle commuting and make it a more attractive means of transportation (Zuks, 2002). If prescribed parking spaces do not provide this advantage, they are less likely to be used. Hossain et al. (2003) showed that the acceptability of parking varies exponentially with the distance from the destination. The farther away a parking facility is from the destinations it serves, the less likely it is to get used to its maximum potential.

Ease of use is another very important factor to cyclists. If a storage system requires the cyclist to overcome any difficulties, they will probably not choose to use it (Zuks, 2002). Rack systems must be simple to operate and should avoid moving parts to simplify the user experience (AASHTO, 1999). Additionally, storage systems must work easily with most types of locking systems. Even if a bicycle can be placed in the rack easily, it does not do much good if it is difficult or impossible to lock the bicycle. Ideally a rack will provide the ability to lock the frame and at least one wheel using a cable lock or a high-security U-lock (UCSC, 1988).

Accessibility is essential for bicycle parking facilities, because it is one of the most obvious advantages to using such facilities. Although it is easier to park a bicycle by leaning it against a wall or throwing it into a pile of other bicycles, retrieving the bicycle becomes very difficult. Bicycle parking facilities should offer an organized system for parking and retrieving bicycles, making the bicycle readily accessible to the user (ASCE, 1980). Another aspect of accessibility is the availability of an adequate amount of space. In many locations in Copenhagen, there simply is not enough space for all of the cyclists to park, so they are forced to find their own parking solutions. Accessibility is often the primary reason for cyclists to use parking facilities rather than just parking a bicycle in the most convenient place.

For a bicycle commuter, the availability of convenient parking is a necessity. If parking in defined facilities is not available, cyclists will frequently park in less appropriate areas even if it causes problems for others. For facilities to be acceptable and widely used, they must be located within an adequate distance of the cyclist's destination, easy to use and provide easy access for parking and retrieving bicycles.

2.2.2 Social and Political Commitment to Cycling

In order to effectively promote cycling, countries like Denmark, the Netherlands, Germany, and Switzerland have developed bicycle master plans which dictate regulations, requirements, and concerns related to bicycle transportation. Several common objectives in these plans include the improvement of bicycle infrastructure, the creation of good connections with public transport, the fostering of road safety, the prevention of bicycle theft, and the promotion of bicycle usage (Zuks, 2002).

Improvement of bicycle infrastructure encourages cycling as a method of transportation by making bicycling a natural and easy choice for commuters. With a network of continuous

paths that are well kept, safe, comfortable, direct, attractive, and coherent, people are more apt to choose to cycle to their destination as opposed to drive there (ECF, 1991; Zuks, 2002). The Netherlands and Germany have experienced increased success in their promotion of cycling, partially due to their extensive networks of bicycle paths and lanes. Germany has tripled the total length of bicycle paths in the country while the Netherlands' have more than doubled theirs (Pucher, 2003). This creates a convenient network of paths making typical destinations easily accessible to cyclists.

The creation of good connections with public transport is essential for linking the bicycle and public transportation as a substitute for the automobile. This link allows large numbers of people to get to the public transit stations without generating congestion on the roadways (Zuks, 2002). This is a typical substitution for the automobile in the Netherlands and Denmark where 36-44% of commuters going to the train station get there by bicycle (Dutch MOT, 2002; DCF). A few considerations come into effect with this concept however. The need for adequate parking facilities, as seen in Figure 4, is essential as well as allowing bicycles to be carried on trains and buses (Zuks, 2002).



Figure 4: Bicycles at a Dutch Railway Station

Fostering of road safety is essential to ensure the security of the cyclist and the motorists. Regulations such as speed limits require motorists to drive especially carefully, with the interest of protecting pedestrians and cyclists. Around cyclist-friendly areas, speeds limits in Denmark, Germany and the Netherlands are limited to 30 km per hour, reducing traffic injuries by an average of 53% (Pucher, 2003). Also in these countries, right turns on red are illegal and police are very strict in ticketing any violators of traffic regulations, whether they are motorists, pedestrians, or cyclists. These policies allow all three groups to coexist with maximum assurance of safety.

Prevention of bicycle theft is another key component to promoting cycling because bicycle theft is the main reason why people do not cycle everywhere (ECF, 1991). In Denmark and the Netherlands this is a common problem, especially for the Netherlands where 1 million of their 15 million bicycles are stolen annually. This fear of bicycles being stolen leads to cyclists owning cheap, poorly maintained bicycles as opposed to investing in more expensive, high quality bicycles (Dutch MOT, 2002). Having secured and effective methods for bicycle parking in public areas will encourage cyclists to ride to their destinations since their fears of having their bicycle stolen will have been eased (Zuks, 2002).

Finally, the promotion of bicycle usage encourages environmental, social, and economic benefits. Reduction in pollution due to automobiles benefits the overall good of the environment and helps create cleaner, healthier air. Social benefits are encountered through interactions between cyclists since they are all moving through common areas while participating in an enjoyable form of exercise. Since bicycles do not require fuel and are less expensive than automobiles, cyclists also experience significant economic benefits (Zuks, 2002).

As a result of European countries promoting cycling, bicycles have become a popular method of transportation allowing cyclists to get exercise and, for the most part, reach their destinations simply and efficiently. However, discouragement arises when cyclists reach their destination and have no where to park their bicycle. Whether problems are due to lack of space, security issues, or complicated racks, having adequate facilities to sufficiently park bicycles is an essential social commitment to encouraging this mode of transportation (ECF, 1991).

2.2.3 Aesthetics

The Nørreport railway and metro station has been described as a “dark, dank, polluted hub” by the Copenhagen Post (“Beautification”, 2004). Because of the physical appearance of the station, it is by no means a favorite station to travel through, but rather a necessary stopover on route to other destinations. The bicycle parking does not adequately accommodate the cyclists’ preferences, so the bicycles are parked haphazardly. This mess of bicycles simply adds to the already unappealing façade of the station.

A good structure, in any area of architecture, has to portray the perfect balance of function and form. The design of bicycle parking has, in most cases, the first priority of function, and then of form. In many areas, bicycles are parked inappropriately, even though there are still vacant bicycle racks. This is due to the form of the racks; they need to be appealing to the cyclists or else they will not be used. The Danish Road Directorate (2001) has created the following list of things that need to be accomplished in order to create a functionally and aesthetically appealing bicycle parking facility.

- Be very close to the destination
- Have enough racks and stands
- Be easy to use
- Have a simple layout and be secure
- Be easy to locate
- Be safe and secure when coming to and leaving
- Support the bicycle without damaging it
- Be locked up or afford the possibility of locking the bicycle securely
- Be attractive, fit in with its surroundings and, preferably, enhance its surroundings
- Protect the bicycle, especially the saddle, from rain and snow
- Be solid and easy to maintain and clean

While, the functionality of parking facilities clearly takes precedence over form, aesthetics are an important part of the design process. When a cyclist comes across a beautifully designed facility, such as that seen in Amsterdam (Figure 8), they are much more inclined to take the time to use the racks. However, when the cyclist comes across the mess of bicycles at

Nørreport station, there is no motivation to park a bicycle when no others have been parked properly (Pacione 2005).

Nørreport station needs a reorganization of bicycle parking, not only for mechanical reasons, but for the overall appearance of the station. As of late, commuters do not enjoy traveling to or from the station, because it is not a pleasant experience (“Beautification”, 2004). If the bicycles were all put away in racks, there would be more open walking space around the actual station. This would create a more aesthetically pleasing environment so commuters will be more inclined to use the facilities.

2.2.4 Safety and Accessibility

Almost 177,000 bicycles and mopeds pass into the city center each day, and each of these bicycles are being ridden and ultimately parked throughout the city (City of Copenhagen, 2006). Since there are not enough parking spaces for each and every bicycle, many bicycles are parked inappropriately at train and metro stations. This system of parking presents many safety hazards to pedestrians and citizens of Copenhagen. The presence of bicycles creates obstacles for pedestrians trying to access train platforms as well as a fire hazard for the station. However, the most impressive issue that inappropriate bicycle parking causes is hindering handicap access to public transportation.

The major concern of inappropriate bicycle parking is access for handicap citizens. When there are bicycles tossed on top of each other, it can create an obstacle and prevent wheelchair access to the train or elevators. It is estimated that 12 to 14 % of the population of most countries are in some way disabled. Between 5 to 10 % of the population are handicapped in the form of walking, and require the aide of a wheelchair or walker (Mitchell, 1997). Because of their disabilities, they have a hard time performing standard jobs, making it difficult to maintain a regular income. This is why handicapped people, in particular, rely on less expensive forms of transportation, such as the city bus and train systems, to get to and from work. It is essential that they be able to get to and from work, since they rely so heavily on income for their lifestyles.

While these citizens have limitations on their specific lifestyles, it does not mean that their disabilities should prevent them from using any public transportation. Section 15(a) of the 1970 amendment to the U.S. Urban Mass Transportation Act of 1964 states:

“it is hereby declared to be the national policy that elderly and handicapped persons have the same right as other persons to utilize mass transportation facilities and services; that special efforts shall be made in the planning and design of mass transportation facilities and services so that the availability to elderly and handicapped persons”

With that said, no citizen should be kept from using the same public transit system as the rest of their community. Over the past two decades many efforts have been made, both in the United States as well as in Europe, to integrate the handicapped citizens better into society.

While all these improvements are a great asset to the disabled, there are gaps. There is handicap access on the buses and trains, but how are they to get to the buses if there are obstacles in the way. “Another change in perception has been the appreciation of the importance of the complete transport chain from origin to destination. Making one link of the chain accessible had little effect while other links remain inaccessible” (Mitchell, 1997). All of the parts of their journey need to work together or else the benefits of each individual section are useless. The presence of inappropriately parked bicycles at train stations creates a kink in that chain of accessibility.

2.3 Design Considerations

In devising improved methods for bicycle parking, several technical considerations are taken in to account to supplement the social aspects of the problem. Knowing the dimensions and characteristics of the bicycles being parked at Nørreport Station is essential to producing an effective parking system for all types of bicycles. These characteristics along with the types of bicycle racks and case studies from other areas assist in developing the type of bicycle parking appropriate for the situation.

2.3.1 Bicycle Characteristics

The social aspects of the bicycle parking problem by far supersede technical aspects since the cyclists dictate how useful an improved system would be. However it is also important to understand the related technicalities such as the types of bicycles used in Copenhagen and the

mechanics of a bicycle that are relevant to parking. The basic design of a bicycle should be understood, along with special types of bicycles. Specific aspects, such as the wheel size, weight, and locking mechanisms need to be understood to provide insight into how bicycles interface with racks.

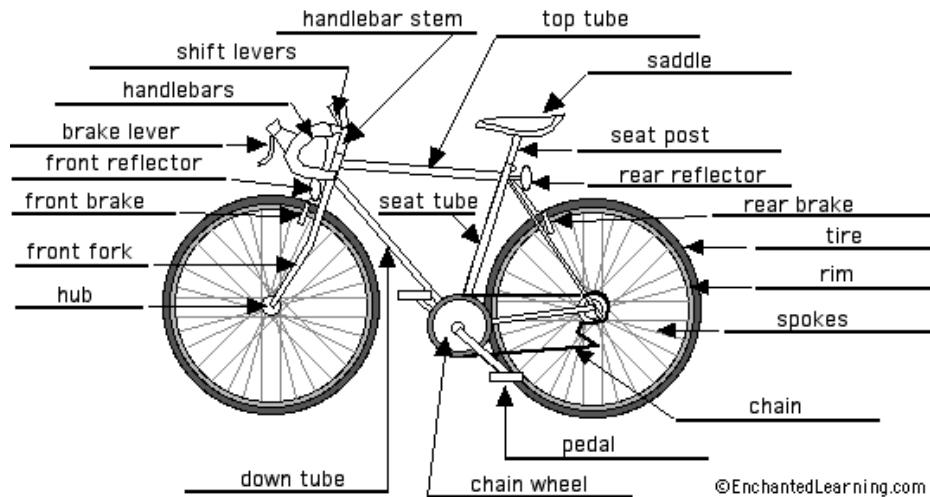


Figure 5: Diagram of a Bicycle (Enchanted Learning)

Figure 5 shows the parts of a typical bicycle, pointing out the parts of the frame and the various components. Although the majority of bicycles follow this time-tested double triangle design, there are also exceptions. Some of the more unusual designs can cause issues with parking bicycles due to added wheels and wider profiles. Cargo bicycles like the very popular Christiania Bikes are quite common in Copenhagen for carrying children, pets and groceries. These bicycles typically have a single rear wheel and a two-wheeled cargo box in front. In a city where many people do not own cars, the advantages to this style of bicycle are obvious; however it can also cause parking problems. Nearly all racks in Copenhagen hold bicycles by one of the wheels, and this is not possible with the front wheels of a cargo bicycle, and the width of the cargo box will often prevent this style of bicycle from fitting into a single parking space, as seen in Figure 6. These bicycles are often seen parked next to racks or blocking multiple parking spaces. Folding bicycles are also widely used due to their portability. These bicycles are typically very small and have much smaller wheels than typical bicycles. Some racks have trouble accommodating these small wheels if the rack's wheel holder is too high off the ground.



Figure 6: Cargo Bicycle

The bicycle wheel size is important to analyze, because if the bicycles do not fit into the racks, then cyclists are less apt to use them. The most important aspect of a bicycle wheel in relation to parking is the tire width. Since nearly all bicycle racks used in Copenhagen grasp the bicycle by the tire, the width of the tire will determine whether the bicycle is able fit into the rack. Street tires are typically 1¼” or smaller, while mountain bike tires are typically at least 1 ¾”. This large difference in tire sizes must be kept in mind for any parking solutions, as mountain bikes are very common in Copenhagen.

Bicycles range in weight depending on the function they are designed for. Heavier bicycles are designed for stability and durability; while some much lighter bicycles are meant for racing, and not everyday use. In Copenhagen, the average bicycle weighs 14 to 15 kg and the typical range for weights is about 10 to 20 kg (DCF). Weight generally does not play too much of a role for standard rack designs that hold the wheel of the bicycle, but it can become an

important consideration when bicycles must be lifted to use the rack. This is the case with multi-level racks, which may not be viable options if the bicycles are too heavy to lift.

The locking mechanisms used by cyclists must also be taken into consideration. Bicycle theft is a harsh reality in Denmark, where 8% of the population has had a bicycle stolen from them (Glynn, 2005). Because of the prevalence of bicycle theft, locks are absolutely necessary and it is very rare to see an unlocked bicycle. Most bicycles in Copenhagen are equipped with frame locks, which are permanently attached to the frame and have a crossbar that goes through the spokes of the rear wheel. Although the bicycle is not secured to an immovable object, it is rendered unable to be ridden, and would generally not be a convenient or desirable bicycle to steal. The other lock option in wide use is the cable lock, which is a locking cable that can be used to lock the rear wheel of the bicycle to the frame or to lock the frame of the bicycle to a fixed object, such as a railing, bicycle rack or signpost. Cyclists desiring extra security will sometimes use a cable lock in conjunction with a frame lock, to prevent the front wheel from being removed or to lock the bicycle frame to a stationary object. Although most cyclists do not require the ability to lock their bicycles to the rack in which they park, it is helpful for them to have somewhere to pass a cable lock through if they choose to lock their bicycle to the rack.

2.3.2 Types of Bicycle Parking

Designing an adequate parking facility requires the proper planning, space, capacity and security in order to make it effectively used by cyclists (Danish Road Directorate, 2001). There are many different types of bicycle racks, ranging from small home single bicycle storage to mass community bicycle parking facilities. The type of bicycle rack depends on the situation in which bicycle parking is needed. Bicycle parking facilities can be categorized into three major types: stands or racks, lockers, and shelters or sheds.

Bicycle stands or racks are the most common method of bicycle parking currently used. There are several different types of racks depending on what part of the bicycle they secure. Wheel systems grip the wheel of the bicycle, lean on systems support just the frame of the bicycle, and combination systems allow for both the wheel and the frame to be locked (Guit, 1992). The hoop rack and the rolling rack seen in Figures 7 and 8 are two examples of racks designed by the DERO Bike Rack Company that function as combination systems, locking both

the wheel and the frame. These systems offer the maximum security while still being cost effective and for the most part space efficient.



Figure 7: Hoop Rack



Figure 8: Rolling Rack

The classic Copenhagen rack, seen in Figures 9 and 10, consists of two horizontal bars with attached pairs of vertical metal rings that spread apart at an angle. This design allows a wide range of bicycle tires to fit, due to the angled wheel holders. This style is by far the most common at Nørreport station and around Copenhagen. Some variations on this design involve different shaped rings, such as a half-circle. This style of rack is also available in 45 degree angled versions for areas with a limited amount of space behind the rack, such as sidewalks. Angled racks also help to prevent handlebars from hitting each other



Figure 9: Classic Copenhagen Rack



Figure 10: Angled Classic Copenhagen Rack

Racks with parallel wheel holders, seen in Figure 11, work by holding the wheel of a bicycle in the same manner as the classic Copenhagen rack, but have parallel wheel holders rather than angled ones, which limit their ability to accommodate a variety of tire sizes. This causes problems because versions that are wide enough for mountain bike tires do not hold a thinner wheel securely. Variations on these racks include different shapes of wheel holders, such as an “L” shape and a “sideways M” shape, along with 45 degree angled versions.



Figure 11: Parallel Wheel Holder

The head tube rack, seen in Figure 12, consists of pairs of short, 45 degree angled rods, sticking out from a wall. They are intended to cradle the head tube of a bike. This type of rack takes up little space and is easy to mount to a wall, but will accommodate very few types of bicycles. Head tube height varies widely between bicycles, so there are many that will not fit this type of rack at all. Additionally, front mounted baskets and racks are very common in Copenhagen, which prevent this type of rack from holding even more bicycles. It is rare to see more than one or two bicycles parked correctly in the instance of this rack installed at Nørreport, even though there are typically several bicycles parked directly in front of it.

Multi level racks are used at many of the train stations around Copenhagen as a space saver for bicycle parking. They are double-level racks, as see in Figure 13, where the cyclist has to lift his or her own bicycle up to the top rack. The location of the tracks for the bicycles on the top rack alternates between level and on a downward slope. The tracks on the bottom racks alternate between ground level and either and upward or downward slope depending on the location. This is so that bicycles can fit very close together without the handlebars getting tangled with each other. There are two pieces of metal in the front of the rack that are designed to hold the front wheel in place while parked.



Figure 12: Head Tube Rack



Figure 13: Multi Level Bicycle Rack

Bicycle lockers and shelters or sheds are used for long term parking in order to provide maximum possible security. Bicycle lockers, as shown in Figure 14, allow a single bicycle and any accessories or belongings of the cyclist to be locked in a safe or locker, only accessible to the

cyclist (Guit, 1992). This mode of bicycle parking can be ineffective on a large scale, however, since it requires a large amount of space to store a moderate volume of bicycles (Zuks, 2002). Bicycle shelters or sheds are guarded, locked facilities that store many bicycles. These are commonly used for overnight parking and storing of bicycles in a neighborhood or at a central location. This is the most expensive type of bicycle parking since the facility must be constantly guarded and equipped with locks (Guit, 1992).

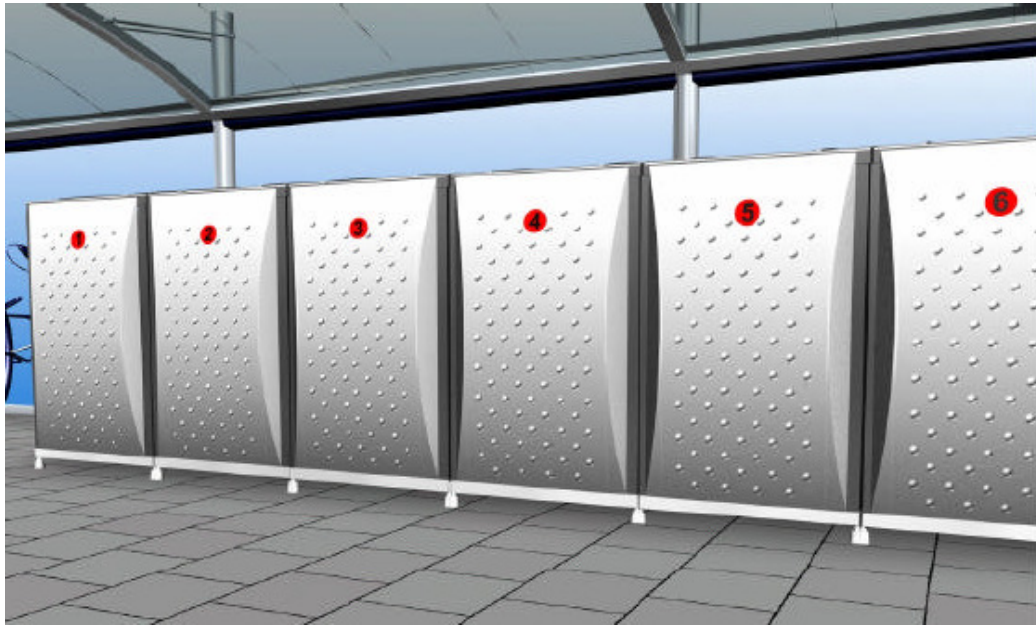


Figure 14: Bicycle Lockers

2.3.3 Case Studies

There have been several case studies conducted in different settings related to the issue of organizing bicycle parking for commuting cyclists. Several university campuses as well as some European railway stations have conducted studies concerning bicycle parking which have led to the implementation of improved facilities.

University campuses commonly experience problems with bicycle parking since a large number of faculty and students ride to school. Campuses such as the University of Waterloo and the University of California Santa Cruz have studied the bicycle parking situation on their campuses. Stutman (1997) outlines three categories of bicycle parking facilities in a project aimed at improving bicycle parking at the University of Waterloo. He defines the three classes of bicycle parking facilities classified by the amount of security they offer the cyclist. The

Bicycle Subcommittee at UCSC describes the main purposes of bicycle parking facilities and the necessary characteristics they must possess. The main purposes include preventing bicycles from being stolen and keeping parked bicycles from becoming a hazard to pedestrians. Several characteristics the parking facilities must possess are the ability to lock one wheel and the frame, the option of locking both wheels, the assurance that the parking rack will not cause damage to the bicycle, and the ability to protect the bicycle from weather.

Another study done on the management of bicycle parking in Dutch railway stations proposes implementations of these categories of bicycle parking facilities, mentioned above. A private company, NS Fiets BV has found that at the 380 railway stations in the Netherlands, the demand for guarded and unguarded bicycle parking is split fifty-fifty. Therefore the design of future parking facilities will attempt to meet this demand. Bicycle safes or lockers, as seen in Figure 14, are used to completely store a single bicycle and all of a cyclist's gear while unguarded bicycle sheds, shown in Figure 15, are used to collectively store many bikes on racks fitted with ceiling coverings. This meets the needs of various commuters desiring medium to high security facilities (Vermeul).

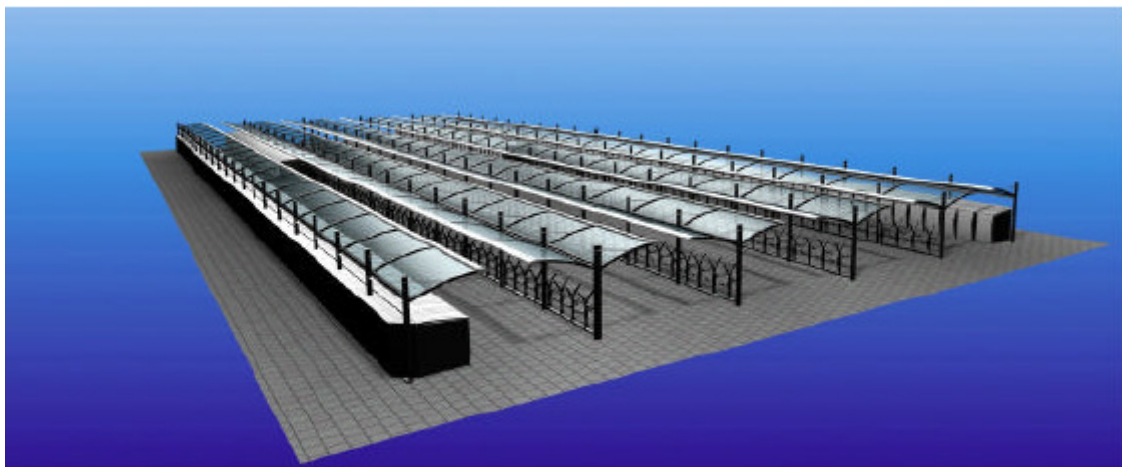


Figure 15: Covered Unguarded Bicycle Racks

Finally, Michael Replogle (1992) describes the Dutch approach to public transit overall. He says that most bicycle parking at railway stations in the Netherlands is in the form of guarded parking as seen in Figure 16. These parking facilities, which are watched by camera or human guards, typically hold around 1,000 to 2,000 bicycles while smaller stations with fewer than

1,500 bicycles present per day use unguarded roofed bicycle parking. These parking facilities typically accommodate 70 to 800 bicycles. At very small stations, bicycle lockers are common and are available for 10 to 50 bicycles. While these parking facilities satisfy demands today, in the future the Netherlands Railway foresees that they will require 75% more space for bicycle parking. One approach the Dutch are taking is to have bicycle parking under railway stations. This keeps the land space free while still having the bicycle parking area close to the station.



Figure 16: Guarded Bicycle Parking at a Railway Station in Amsterdam

Chapter 3: Methodology

This project aids the Danish Cyclist Federation in promoting bicycle infrastructure in Copenhagen by conducting a study of bicycle parking at Nørreport Railway and Metro Station. This is accomplished by developing improved methods of bicycle parking, proposing policy changes and adapting the mentality of cyclists. By analyzing the current problems with bicycle parking and conducting research to determine the public opinion of the parking condition, we are identifying the needs of the stakeholders. We are taking into account cyclists' parking behaviors, analyzing parking usage trends and ultimately making a recommendation to the DCF for a range of bicycle parking solutions and plans of implementation for Nørreport Station.

This study is applicable to the entire country of Denmark. However, we are focusing on an analysis of the problems at Nørreport Railway and Metro Station and making recommendations to improve bicycle parking there. We hope that our work with the Danish Cyclist Federation assists the organization and the country to continue promoting cycling as an effective mode of transportation.

Our team fulfills these goals by accomplishing the following main objectives, which are also detailed in Figure 17:

- Determining stakeholder needs
- Assessing the parking problem
- Evaluating potential solutions
- Proposing recommendations

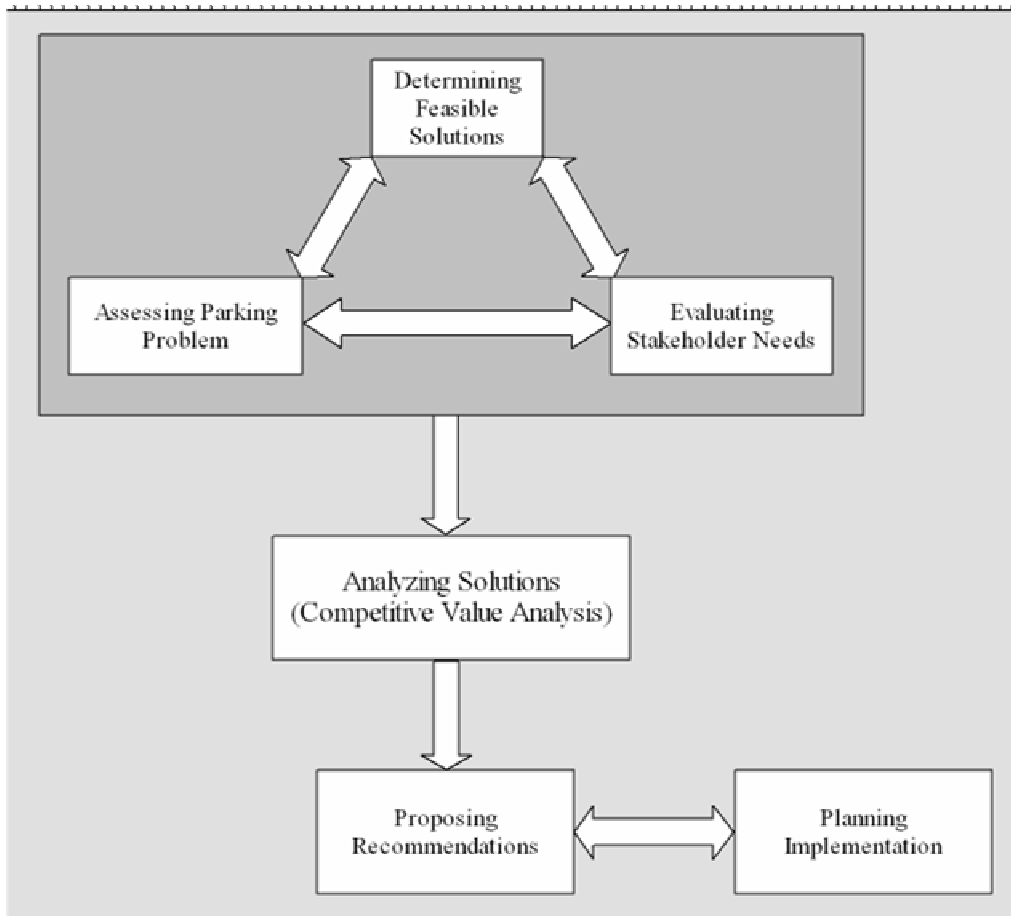


Figure 17: Methodology Flow Chart

3.1 Evaluating Stakeholder Needs

The most important factor in developing effective and sustainable solutions to the bicycle parking system at Nørreport station is the opinion and acceptance of the various stakeholders.

The stakeholders in this project include the following:

- Commuting cyclists
- Government officials
- Nørreport station management
- Community
- The Danish Cyclist Federation

The commuting cyclist is the most important stakeholder in this project because a revised bicycle parking system is successful only if it fits into the cyclists' daily routine. The opinions of local government officials are important to keep in mind since it is this branch of the government

that is involved with bicycle parking and implementing changes in the future. The needs of the station management are considered to ensure that any solutions will be integrated into the other functions of the station. The community is given the opportunity to voice their opinion in the matter since a new parking system affects the general design of the city as a whole. We also are considering the needs and opinions of the DCF, as we are working with them.

In determining the needs of cyclists and the community, it is most effective to hold focus groups and distribute a survey. A focus group with the employees of the DCF allows us to hold a discussion on their views of the parking problem. It also helps to prepare our thoughts for a later focus group and to provide ideas for future steps. Distribution of the survey to the general public, along with a focus group, gauges their opinions, responses, and illustrates any conflicting points of view. For the government officials and station management an open-ended interview is most effective since it allows them to address any concerns and to point us toward valuable resources. These interviews and survey feedback lead us to develop an initial list of parking solution characteristics to consider.

Along with circulating a survey to the general public and conducting interviews with officials, it is essential to observe the cyclists parking their bicycles at Nørreport station. One essential part of analyzing the problem is to figure out why the bicycles are parked where they are. This is an important part of determining the core problem at the station and it leads to developing solutions to improve it.

Circulating surveys and observing cyclists gathers subjective data, and then interviews and focus groups teach us more about the relevance of the survey results and issues brought up by the open-ended survey questions. All of this feedback combines to paint a picture of the real problems at Nørreport station.

3.2 Assessing the parking problem

Another factor in determining solutions to the parking problems at Nørreport station is to analyze the current situation and determine the outstanding needs of the station. This sets up one part of the final analysis of the most appropriate method to solve the parking problem. Several aspects are investigated, including:

- Patterns of bicycle parking
- Number of bicycles

- Layout of bicycle parking area

The different aspects of these observations combine into a single field study that spans multiple weeks and identifies the reasons bicycles are being parked at Nørreport Station. Bicycle parking patterns integrate into a study of the number of bicycles by subdividing the bicycle parking into defined areas. Bicycles are counted to determine the number of bicycles parked in each area of the station on a daily basis. The total number of bicycles at the station is calculated by summing the totals of each area. This has the added benefit of showing the popularity and extent of the problem for each area in addition to showing the total number of bicycles at the station. This helps determine the main reason for the bicycle parking problem since it shows whether bicycles are being stored at Nørreport long term or just during the work day.

The layout of the bicycle parking area is determined by drawing maps of each area of the station and indicating the position and size of each bicycle rack, along with information on which type of bicycle rack it is. The maps give an idea of where each parking area is located in relation to important parts of the station. Data is collected by tallying the numbers of bicycles parked in and out of racks in each area. The number of bicycles at the station is counted at various times during the day over a period of four weeks. These counts cover the time before and after morning rush hour, each hour during the work day, before and after evening rush hour, late night, and weekends. For each time interval, bicycles are counted on three different dates in order to get an average and account for any variation. With these averages it is possible to plot the number of bicycles parked at the station throughout the course of the day in order to get an idea of the net movement of bicycles over an average day at Nørreport station. In conjunction with data showing the number of bicycles in each area, the percentage of racks in use is determined to evaluate the popularity of various locations. This work involves mostly observation around the station and produces quantitative data, consisting of numbers of bicycles and measurements.

Observing the characteristics of each type of available parking involves taking measurements of how space efficient each rack design is and distinguishing what types of bicycles it will accommodate. The space efficiency of a rack is determined by dividing the number of bicycles the rack holds by the ground area it takes up, including bicycles and necessary empty space around the rack. It is desirable for a design to be more space efficient, but this should not be at the expense of compatibility or convenience. Knowing the physical characteristics of each rack type in use is helpful in choosing new racks, which may be a

necessary part of the final solution. By looking at the space efficiency data, an efficient rack style can be chosen. More detailed specifications for rack designs can come from the measurements of the more effective designs currently in use.

Observations of parking duration at the station identify any parking tendencies of the cyclists in terms of location and time frame in which the bicycles are parked. To accomplish a study of parking duration, it is necessary to tag bicycles with a small piece of tape and count how many of the tagged bicycles remain after various time intervals.

3.3 Determining Potential Solutions

To determine potential solutions, the feedback received in communication with the stakeholders and the quantitative data on the station is thoroughly analyzed. This allows us to develop several factors crucial to potential solutions. These factors become more obvious as we receive feedback but they will account for things such as reasons bicycles are parked at the station and future growth.

Different solutions are appropriate to improve this problem because there are various reasons that the bicycles create a parking problem. It is necessary to also account for growth of the station and increased use of bicycle parking in the future. With improved bicycle parking, the popularity of bicycling increases, resulting in a need for even more bicycle parking. It has been found that more parking than is currently needed should be created to account for this phenomenon. Additionally, expansion of the transportation system in Copenhagen alters the need for bicycle parking. If Nørreport station is expanded further by the addition of more train, bus or metro lines, the need for bicycle parking increases drastically. Conversely, if metro stops are added to other stations nearby, the result is a decreased need for parking. The cost of any solution as well as the convenience, amount of space, and aesthetics is still kept in mind in order to make the solutions appealing on many different levels.

Chapter 4: Analysis

Since the most important objective in this project is evaluating stakeholder needs, the gathering and analysis of opinions and feedback from cyclists becomes critical. The feedback gathered from the Nørreport community shows how they view the problem in relation to their culture. This is a very important aspect since we can not naturally develop the full cultural sense of the problem but can only get a glimpse at it ourselves while we are in the country. Several main methods of field studies, surveys, interviews, and focus groups are used in order to collect qualitative and quantitative data characterizing the bicycle problem at Nørreport Station. The analysis of this data is what illustrates the reasons for the problem at Nørreport and forms the basis on which the solutions are built.

4.1 Commuting by Bicycle

Copenhagen has been called the ‘City of Cyclists’ since many people use their bicycle in every aspect of their daily routine including cycling to work, grocery shopping, and even walking the dog. It creates a feeling of self-sufficiency. Cyclists are happy to be on their bicycle and in control of their commute. Cycling provides a relief of aggression, a healthy form of exercise and a source of competition with the other cyclists on the road. It creates a convenient way to run errands such as grocery shopping before or after work. Aggravation does come into play when cyclists get held up because of excess numbers of bicycles on the road but they are free from the worry of automobiles holding up their progress. Even if they are moving at a slow pedestrian pace or are held up by traffic, cyclists would rather be on their bicycle and want to stay on it as long as possible en route to their destination.

The habits of the cyclist dictate what parking factors must be considered most heavily. The most important factor is that cyclists desire a space to park their bicycle, which needs to be as close as possible to their destination. Cyclists are not in the habit of spending long amounts of time looking for an appropriate parking space. If there is a quick and easy space available, they will use it. However, if they do not see anything right away, it is most likely that their bicycle will be parked outside of a rack.

One of the main factors that influence this parking behavior is how old their bicycle is and how much they value it. Cyclists who do not care about the condition of their bicycle will

often park it right in between two racked bicycles, using the other bicycles as support for theirs. A cyclist who has a nicer bicycle would not park it in between two others, because it is likely to get scratched or damaged. Another factor that influences this behavior is the presence of a kickstand on the bicycle. If a bicycle has a kickstand it can be parked anywhere and remain standing. If a bicycle needs added support to remain upright, then the cyclists will go further away to lean it against a building or other structure.

It is these habits of the commuting cyclists that both create the problem at Nørreport station and dictate the plausible solutions. Therefore particular attention is paid to understanding and incorporating the cyclists' thoughts and feelings into the analysis of the situation.

4.2 Bicycles and Public Transportation

In working to promote cycling as an alternative mode of transportation, one necessary aspect is to examine how bicycles interface with public transportation. The use of bicycles in combination with the S-trains or the Metro creates a convenient commute for workers if planned properly. The cycling community must be aware of all their options in order for this to be an effective method.

Each year there are over 90 million commuters by train (DSB 2006), and 25% of these commuters travel to the train by bicycle. Throughout Copenhagen, there are 74,000 bicycle racks at the train stations in the greater Copenhagen area. The DSB calculates that there are 54,000 bicycles at these stations during the day and 5,400 to 10,800 bicycles parked at night. Given our observations on the number of bicycles parked outside of racks, it is likely that a number of racks are not easily accessible. This may be because the bicycles parked improperly are blocking the available racks or that the cyclists are not aware of some of the more available space since it is farther away from the platform entrance. From studies conducted by DSB, cyclists are willing to walk a distance of a 1200m diameter around the station. Of the 31 surveyed cyclists that park their bicycles at Nørreport, 80% said they would walk farther than 100 meters to park their bicycle but this does not coincide at all with the patterns of parking observed at the station. The majority of the bicycles are parked in a crowded mass directly in front of the kiosk and platform entrance in Area 1 while less than 100 meters away there is a completely empty bicycle parking lot across the street.

Once at the train station, approximately 2% of passengers bring their bicycles on the train with them (DSB 2006). The reasons why so few passengers choose to bring their bicycle with them is due to a variety of reasons. Some cyclists have expressed feelings of burdening other passengers and being a nuisance when traveling on a train with a bicycle. Many cyclists have expressed and demonstrated the difficulty of just bringing a bicycle down to the train platform. Cyclists either have to carry their bicycle all the way down the stairs or hold it upright on the escalator. Since the bicycles used in Copenhagen are typically older, heavier, more cumbersome bicycles, this is not a simple task. To make this easier ramps have been designed to be cut into stairwells so the cyclist can roll their bicycle down, however only one staircase at Nørreport has these ramps. If there is an elevator nearby, it is often being used by mothers with baby carriages and many cyclists don't want to have to wait for an elevator since it interferes with the self-sufficient aspect of this type of transportation. If there were a way to ride a bicycle all the way down to the platform, it is likely that the number of cyclists bringing their bicycles on the trains would greatly increase because this allows the cyclist to be completely self-dependant all the way to their destination. However, there is concern that if it becomes too easy to bring a bicycle onto the platform there will be an excess of bicycles on the trains.

Once the bicycle has been brought down to the platform, taking it on the train or metro is another struggle. In the metro cars, there are no bicycle racks and the cyclist has to hold their bicycle upright for the duration of the ride. On most of the newer S-Trains there are bicycle racks in specific bicycle cars, but they are not sturdy enough to leave the bicycle there unattended.

In terms of future growth, authorities expect somewhat of a jump in the number of public transit passengers over the next few years. In the fall of 2007 the metro will be opening a new line stretching from Vanløse to Lufthavnen, the airport. The DSB expects the airport line alone to increase traffic growth 10-15%. In addition, there are also plans to create two more new lines of the metro by 2010.

4.3 København Kommune: Local Government

Both the DSB and the regional government of Copenhagen, the København Kommune, are involved with bicycle parking plans, but the main concern that causes delays in working on the bicycle parking problem is money. The reason nothing has been implemented at Nørreport

Station so far is because there is no monetary budget allotted to it. However, politicians are working to improve this and the new budget, coming out in fall of this year, should include more financing for bicycle parking improvements.

København Kommune is currently working on a study very similar to ours that runs throughout the whole city, and is not limited to just one station. The main concerns this study addresses are what will function well at a particular site and what volumes of bicycles need to be accommodated for. Another part of this includes cleaning up abandoned bicycles and is illustrated by the bicycle removal program at Vesterport Station that was conducted. Bicycles were tagged and after 5 weeks 30-45% of the total bicycles at the station were able to be removed. This illustrates that if there is a large percentage of bicycles at a station that are abandoned, making cleanups like this one at Vesterport a routine clears out a large number of excess bicycles.

The Cycle Policy, which is the overall city plan for improving cycling, will be revised over the next year or so, and bicycle parking is expected to be one of the major concerns for Copenhagen. The main goals include making norms for the city bicycle plan and changing cyclists' attitudes towards parking. Also, the København Kommune will be meeting with the Police to discuss technicalities of bicycle parking such as determining if bicycle racks can be allowed less than 10 meters from street corners, because it is where the cheapest and easiest parking is located.

4.4 Nørreport Station

Nørreport Railway and Metro station is the busiest station on the S-train line in Copenhagen with 52,700 people moving through the station annually. This high volume of people, combined with the fact that 25% of people commute to train stations by bicycle in Copenhagen, cause a significant amount of bicycle and pedestrian traffic in a fixed area. This section analyzes Nørreport station in relation to duration of bicycle parking, characteristics and availability of parking, number of bicycles and parking solutions at other stations.

4.4.1 Parking at Nørreport Station

There are several important points that cyclists have brought up about the parking conditions at Nørreport station. Overall the most common response cyclists had about the

situation in general and the question about parking in racks is that there is not enough space. They say there are too few racks at Nørreport and they choose to park outside them or elsewhere since they can never find an available space. Since our calculation of the number of available rack spaces is more than the total number of observed bicycles this shows problems in the distribution and types of parking.

One of the most common comments in response to the inquiry about the minimal use of the multi level parking is that it smells and is filthy. Other points made were that the tracks are too thin for mountain bike tires, the aisle is too small, and many cyclists' bicycles are too heavy to lift to the top level.

Survey results show that 71% of surveyed cyclists who use Nørreport station are not aware of the underground bicycle parking. This shows that there is a serious lack of awareness about this parking area. Currently, there is only a small sign at the stairs to the underground parking, which is not visible from the road. In the station, the doors to this area are marked by the partial shape of a bicycle in red paint, but have nothing written on them besides a small light colored label on the upper door frame. The way these entrances are marked makes it very difficult for cyclists to learn about these facilities other than by word of mouth or randomly stumbling upon them. Another issue is the lack of marking on the doors from exiting from the underground parking to the metro station. The doors from the parking to the metro are plain grey doors that look very much like the other doors that are for electrical closets and maintenance rooms. Many cyclists use the underground parking without knowing that it goes directly to the station.

4.4.2 Patterns of Bicycle Parking

Evaluating bicycle parking patterns tells a lot about what the station is being used for and if there are many bicycles parked long term or abandoned at the station. From a quantitative angle, this study involves counting and marking bicycles and checking whether they have been moved after multiple time intervals. From a more qualitative standpoint, observing the behavior and tendencies of the cyclists as they park their bicycles shows the cultural, social, and practical reasons for the state of bicycle parking.

From our duration study of 4 weeks, we can conclude that just over 1/10th of the bicycles are being parked for a long-term duration of at least 4 weeks, if not abandoned. This shows that

there may be a need to do a bicycle clean up more often than what is currently being done by the city. If all of these bicycles are not abandoned, then this also indicates a need for more organized parking in terms of duration. Since cyclists are complaining about lack of space to park their bicycle, it may be that these bicycles parked long term or abandoned are taking up premium spaces. Currently there is no program in place in Copenhagen for cyclists to dispose of old bicycles. Four times a year people can leave large scrap outside to be picked up, but bicycles are not allowed in this collection due to concerns about stolen bicycles. This leaves the cyclists of Copenhagen with few options for disposing of bicycles. Because of this many people leave scrapped bicycles at train stations or around the city when they are done with them.

Even though one of the building areas, Area 1, had a decrease in percentage of overall distribution, it still accounts for 41% of the overall bicycle parking, as well as bicycles parked for long durations. This, in conjunction with the other building area, Area 3, accounts for over half of the bicycle parking, both short-term and long-term. This shows that these two specific areas need bicycle clean ups much more frequently than the other areas, because they are the more overused parking areas and are in the most convenient locations for commuters.

The two pie charts in Appendix D, Figures 46 and 47, show the distribution of the tagged bicycles at initial and 4 week marks. The first one represents the overall distribution of bicycles in each assigned area. The chart after 4 weeks shows the distribution of the remaining bicycles that can be deemed as long term parking. The areas that have the largest percent of remaining bicycles are the two parking lots Areas 8 and 11, both of which are of significant distance from the station, the underground parking area, and the parking in Area 4 along the bus lane. The parking along the bus lane is extremely close to the station, but appears to be used for more long-term parking instead of by everyday commuters.

There are specific areas that have very high turnover rates, and others that have little or no turnover. The areas in which the tagged bicycles had been removed from at the end of the first day were the ones closest to the station; the bus lanes, perimeters of the buildings, and along side streets. Also, the bicycles in front of the grocery store and the shops were almost completely turned over by the night count the first night. The parking lots that are further away from the station, as well as the underground parking, are being used for more long-term parking. These areas have almost no turnover during the first day, which could mean that the bicycles are being left there for days at a time or that they are not used by everyday commuters. This is

encouraging because it means that cyclists are already somewhat considerate of where they park their bicycles. They are not taking up spaces very close to the train station when they are parking for long durations. It is also likely that a number of commuters work very close to the station and need to leave their bicycle overnight. They chose to leave it in the safest or most covered place possible. This accounts for the extra numbers of bicycles in the dual-level and locked areas during late night counts.

4.4.3 Number of Bicycles

One of the most involved field studies deals with determining the number of bicycles parked in various areas of the station. This information is important because it quantifies the actual demand for bicycle parking spaces and shows where the most popular parking areas are. Additionally, it provides more information about the habits of cyclists and how the various areas of the station are used.

The graph in Appendix C, Figure 36 shows the average number of bicycles parked at Nørreport station over the course of one day. A large increase can be seen during the morning rush hours up until noon and a similar decline is seen in the evening rush hours after 14:00, indicating a large number of commuters use the station for parking during the work day. The range bars in this graph show the maximum and minimum values for each time. The lowest number of bicycles observed at the station was 1,220 and the highest was 1,944.

The data on the total number of bicycles can be further divided into which ones are parked in and out of racks. The graph displaying the number of bicycles in and out of racks in Appendix C, Figure 38 shows that the number of bicycles parked in racks stays relatively constant across various days and times. The number of bicycles not parked in racks varies widely and drops off significantly for the night and early morning times. Based on our studies there are an average of 852 racks spaces in use out of the 1,772 total rack spaces, which is only about 48% of the total available parking. The amount of available parking is never enough to fulfill the needs of the cyclists and at least 480 additional bicycles are always parked outside of racks. When the need increases further, during the work day and at peak usage times for the station, the additional bicycles are almost all parked outside of racks. This again calls attention to the subject of long term or abandoned bicycles taking up premium parking spaces at the station.

The rush hours graph in Appendix C, Figure 39 shows the difference in bicycles before and after the morning and evening rush hours, divided up by area. For the purpose of this project, “rush hours” are defined as 6:00 to 9:00 and 15:00 to 18:00. Although the peak change in bicycles actually occurs during a shorter period of time, the selected times ensure that there are the fewest number of bicycles moving during the hours when the counts are performed. There are generally more bicycles parked at the station after the morning rush hour and fewer parked there following the evening rush hour, which is a typical schedule for a commuter parking at the station during their work day. This effect varies widely between the different parking areas. Areas 1, 5, 15 and 16 all show patterns similar to commuter parking, with a relatively symmetrical increase and decrease corresponding to the beginning and end of the work day. The perimeter of area 1 shows the largest increase in bicycles during the work day and also happens to be the closest area to the major S-train platforms. This suggests that there are many commuters who park their bicycles near the entrance to the platform and take a train to their final destination. Area 11 has fewer bicycles during the work day than during the morning and evening times, which may mean it is a popular location for overnight parking and commuters who ride their bicycle from the station to their place of employment. This might be due to its proximity to many major bus stops and the regional train platform.

4.4.4 Available Parking

Having information on which types of racks are installed in each area being studied allows the analysis of which rack styles are preferred by cyclists. The information on types of racks is used in conjunction with data on the number of bicycles parked in each area to show relationships between type of rack and whether cyclists choose to use it. If there is a trend that a set of racks are unused while there are many inappropriately parked bicycles in an area, it is an indication that the type of rack in that area is not convenient or effective.

In some cases, the type of rack will affect what types of bicycles are able to park there. A common problem arises with mountain bikes having wide tires, which some rack designs do not accommodate. Problems also occur when a rack relies on an inconsistent part of the bicycle, for example some racks hold a bicycle by its head tube, which varies greatly in height and is frequently obscured by baskets. Bicycle spacing is another important issue, since cyclists skip spaces or put bicycles in between others if the space between bicycles is too thin or too wide.

The comparison of available racks and bicycles in Appendix C, Figure 40 shows how many rack spaces are available in each parking area, along with the total number of bicycles parked there. This chart details how effectively the available parking at the station is distributed to meet the needs of cyclists. Building 1 and Areas 8 and 12 all show very high rack to bicycle ratios, indicating that there are more racks than bicycles. The perimeter of Area 1 displays the opposite problem, having far more bicycles than rack spaces. This is the most popular parking area, but does not have nearly enough racks to accommodate all of the bicycles. The fact that the building of Area 1 has far more racks than bicycles, while the perimeter does not have nearly enough racks, shows that there may be a problem with the dual-level bicycle racks since they are the only type of rack in the building.

Multi level racks attempt to solve the parking space dilemma by doubling the number of bicycles that can be stored in a given area. Unfortunately, the specific design used at Nørreport has some serious flaws that make it confusing or difficult to use. One of the biggest difficulties with these racks is that the user must manually lift their bicycle into the top rack positions, which is a difficult task for most riders. Even the bottom rack requires the front of the bicycle to be lifted slightly, rather than simply rolling it into the rack like most other styles. The problem of heavy lifting is added to by the fact that the spacing between bicycles in these racks is fairly close, causing bicycles to become entangled with each other. In addition, the wheel troughs are too thin for most mountain bike tires, which prevent many cyclists from using even the more convenient bottom racks.

Area 8 has many racks, but is hardly used at all, despite being very close to the station entrances in terms of distance. This may be an indication that it is difficult to reach for reasons other than distance, such as having crosswalks and stoplights that take extra time to get through. Area 12, which is the underground bicycle parking, shows the same lack of use.

The graph in Appendix C, Figure 41 shows the percentage of rack spaces in each area that are typically in use. There is a very wide range for these values, from 11% for Area 8, all the way up to 84% in Area 11. This percentage varies because racks in a given area can be underused because there is either not enough demand for parking or because the racks do not suit the needs of the cyclists. By taking into account data comparing the total number of bicycles to the number of available racks, it becomes clear which case is shown in each parking area. In Areas 4, 5, 8, 10, 12,, and 16, there are fewer bicycles than rack spaces. This is also the case for

building 1. This is a high demand area since it is on Area 1 but this low rack use percentage indicates a problem with the multi level racks here as mentioned before.

The valuable data obtained through counting bicycles shows a lot about the parking patterns and cyclist preferences. It also helps to show the popularity of the various parking locations and the effectiveness of different rack designs. Although there are enough parking spaces around the area of the station to accommodate all of the bicycles parked there, some are clearly not situated properly or are not the best style of rack, since bicycles are piled up in some areas, while there are hundreds of empty rack spaces in others.

4.5 Design and Aesthetics

Although parking solutions involve many considerations about location and convenience, the design and aesthetics of the physical racks is still an important part of any parking solution. The chosen racks must meet the aesthetics requirements of the area, while being effective and easy to use.

The functional design of a rack must take into account several factors, including compatibility, durability and ease of use. One of the most important issues is compatibility, since a rack is useless if it will not accommodate bicycles. Our observations show that many of the racks that are currently in use do not accommodate the wider tires used on mountain bikes. As mountain bikes grow in popularity, this becomes more of an issue. Mountain bikes will generally have tires with a width of about 2", so racks that hold or cradle the wheels of a bicycle must be made wide enough to accommodate these wide tires.

Spacing between bicycles in a rack is another relevant issue. Sten Nielsen, a bicycle rack and outdoor furniture designer, explained that 50 cm has been determined to be an ideal spacing for most purposes (2006). For angled versions of the classic Copenhagen rack, slightly closer spacing of 45 cm can be effectively used, which is the case in the underground parking area at Nørreport. Spacing any tighter than these recommendations causes cyclists to skip spaces and wider spacing often tempts users to park their bicycles in between two occupied rack spaces.

Beyond simply being able to fit the bicycle into the rack, it must also be simple to park and retrieve the bicycle. Lifting of bicycles and contact with the rack should be avoided whenever possible. Designs should be easy to figure out, which makes familiar designs, such as the classic Copenhagen style, more effective (Nielsen, 2006).

Durability is important to any parking solution that will be used heavily for many years. The racks should be strong and should not be prone to being damaged by a person kicking the rack or standing on top of it. An effective way to improve the long-term durability is through modularity. If a rack has removable wheel holders, they can easily be replaced if they become damaged. Damage to wheel holders is a very realistic concern, as there are many rack spaces in the Nørreport station area that are unusable because the wheel holders have been bent together close enough so that a wheel will no longer fit between them.

A rack must also be aesthetically pleasing so that it can fit in well with the general scenery of an area. Bicycle racks should be closely matched in style and color to other outdoor furniture in the area (Nielsen, 2006). Small details, such as the top caps of the posts on the rack, make a big difference in the aesthetic qualities of the rack (Nielsen, 2006). Many designers design outdoor furniture in sets, so that every item can look similar, which might include bicycle racks, benches, chairs, tables and railings. Nielsen also pointed out the difference that can be made by using different materials. For example, polished stainless steel might be used for up-class establishments, while galvanized or powder-coated steel might be more fitting at a train station or public park (2006). This is an important aspect at Nørreport because cyclists comment that one of the main reasons that they do not use the multi level racks is that the atmosphere is generally displeasing. The black metal bars combined with the lack of lighting and stench of urine create an all together unpleasant atmosphere.

4.6 Parking Solutions at Other Stations

Studying parking solutions at other stations provides useful information about what has worked effectively for other stations nearby and provides further insight into cyclists' parking preferences. Although Nørreport uses a variety of different parking methods, there are plenty of other options that should be taken into consideration such as how to deal with space constraints and general layout of the parking area. As we see other solutions, we begin to determine whether they could be effectively implemented at Nørreport and what would be required to do so.

The bicycle parking at København H is spread out around the entire perimeter of the station. Because the station has so many different entrances, all of the bicycle racks are still within close range to the cyclists' destination. There are a number of multi level racks in place,

but they seem to be ineffective, as shown by their lack of use, for the same reasons as those at Nørreport. Due to this, many bicycles are parked next to or leaning against the rack instead of on the rack. Then there is a large parking lot with both single and double level racks for bicycles however it is currently out of use for the next two years due to building renovations. This will cause quite an inconvenience to the cyclists and present a greater parking problem at the station.

At the Vanløse station, there is an excellent solution to bicycle parking in the form of a bicycle parking garage. The garage consists of two floors, the bottom one being slightly below ground level. Each level has plenty of bicycle parking spaces, is well lit, and the bottom layer is covered. The garage easily meets the requirements of 50% of the available spaces covered, just by being two floors. One of the most important aspects of the garage is that the entrances to both floors are ramps, so that the cyclist can simply ride their bicycle right up to a rack space. The actual racks used are a variation of the classic Copenhagen style, made to accommodate a wider variety of bicycle tire widths. Additionally, the individual wheel holders are not welded directly to the whole rack, and can easily be replaced if damaged. Although this solution is expensive, it provides an ideal space saving solution that is cyclist friendly.

At Frederickssund Station, located 45 km from the Nørreport area, 4,500 passengers a day go though on the S-trains. From responses to surveys, as well as observations by the DSB, it was determined that the station needed more bicycle parking on the Eastern side of the station, as well as lockable parking. There are two abandoned buildings on the east side of the station, which would be transformed to a locked parking garage and bicycle repair shop. From field observations, it was determined that 45% of the cyclists traveling to the station would pass by the new facilities once they were in place.

At Sydhavn, there are two different proposals to improve bicycle traffic and parking. The first one involves a bridge that travels over the tracks to lead the bicycles to parking spaces. Unfortunately, there is no budget for this kind of project currently. The second part to the proposal is to create multiple bicycle parking sheds next to the tracks. These sheds would mostly be used for commuter bicycles. A commuter bicycle is used for travel from the train station to work, and it sponsored by the cyclist's workplace. The bicycle is paid for half by the company and half by the cyclist, and in turn the bicycles display advertising for the company. The bicycles have lockable parking facilities both at the train station and at the workplace, and there are extra bicycles available in case of a breakdown. These are a great new concept, because they

give commuters who work far from a train station inexpensive access to a bicycle. Currently the DSB is testing out 20 of these bicycles in the Sydhavn area with commuters. They hope to slowly build up the numbers of commuter bicycles in the future.

At Roskilde there are over 2,500 bicycles parked daily at the station, all arriving at the station in three different directions. There are a variety of solutions that have been proposed to deal with the parking situation here. One idea is to create a spiral, two floor parking garage as a new building in place of the current bicycle parking area. The parking garage would have access to for cyclists to walk straight down to the train platforms. In conjunction with this idea is the placement of rooftop parking on the already existing building. The problem with rooftop parking is the issue of getting a bicycle up and down conveniently. A second solution is to place bicycle parking directly on the platform since it is so wide at this station. The problems that arise from bicycle parking on a platform are safety and fire hazards. If the parking got out of control, it could also present obstacles for pedestrians and other commuters to get onto the train. Additionally, it is extremely dangerous for cyclists to ride their bicycles directly onto the platform. Finally, another proposal is to create underground parking in the front of the station, with direct access to the platforms.

Chapter 5: Conclusions

This study and analysis leads to conclusions about the problems causing the bicycle parking issues at Nørreport station. The overall problem is a combination of four main factors that are taken into consideration in the development of solutions. These four main factors are a lack of convenient bicycle parking, an abundance of abandoned bicycles, a poor accessibility of bicycles to trains and metro, and the attitude of cyclists.

5.1 Lack of Convenient Bicycle Parking

The lack of convenient bicycle parking is one of the main issues associated with the problem at Nørreport. Although there are over 1,700 bicycle racks in the Nørreport area, on average only 850 of the racks are actually in use. This suggests that cyclists will generally choose to use a certain number of bicycle racks that are most conveniently located. There are a given number of bicycle racks that are accessible and easy to use, and those racks are the ones that get used on a daily basis. The remaining racks are not frequently used and are serving little purpose at the station. Part of the problem of convenient parking is that there are not enough parking spaces in the places where cyclists want to park. Bicycle racks in popular locations are often blocked by excessive layers of parked bicycles, while the racks in undesirable parking places have plenty of open spaces. Since incorrectly parked bicycles make some of these racks unusable there needs to be many more accessible bicycle racks in these major areas. We anticipate that parking solutions are most effective if they are matched to the need for parking in each area of the station. Adding more parking in areas that are already underused would clearly not be an effective improvement.

The type of rack at the station also causes inconvenience to cyclists since the parallel wheel holder racks and multi level racks are not effective at accommodating a variety of bicycles. This problem with bicycles not fitting into racks accounts for a significant percentage of the bicycles parked outside of racks at Nørreport. Our studies show that at most only 55% of the multi level racks in Area 1 and 3 are being used. While the racks, if at maximum capacity, would hold 552 bicycles, they typically hold only slightly more than half that number. The combination of bicycle fit and difficulty of use are the main reasons for this low usage.

The underground parking at Nørreport could be a valuable resource; however, it is not being used nearly to its potential. This lack of use is mainly due to inadequate publicity of the area. The signs to the entrance are small and there is no indication of the direct access to the metro station. Additionally, there exist problems with accessibility which leads many cyclists to complain about the difficulty of getting their bicycle down the stairs to the parking area.

5.2 Abundance of Abandoned Bicycles

At many train stations all over Copenhagen there is an abundance of abandoned bicycles taking up valuable rack and walking space. Just under a third of the bicycles parked in the multi level racks have been parked there for over four weeks. Since this parking is the only covered parking in the main area of Nørreport station, these bicycles are taking up valuable space that could be used daily by commuting cyclists desiring covered parking. From duration counts, approximately 10.5% of the bicycles currently at Nørreport would be removed by a bicycle removal. This bicycle removal, in combination with creating specific areas for long term parking, would free up a large percentage of bicycle parking in high demand places.

Survey respondents pointed out that there is no clear system for disposal of unwanted bicycles in Copenhagen. Surrounding towns allow bicycles to be taken with large rubbish disposal at a regular interval but citizens of Copenhagen do not have this option. Because they lack this option, leaving bicycles at the station has become the easiest way for many cyclists to dispose of their old bicycles. This shows that a significant part of the problem with abandoned bicycles could be that there is no convenient method of bicycle disposal.

5.3 Poor Accessibility of Bicycles to Train and Metro

Many cyclists complain about the difficulty of taking their bicycles onto the trains and metro system. Of the cyclists surveyed who use Nørreport station, 35% state that they would be more willing to bring their bicycle on the train if the platforms were easier to access. Currently there are limited means available to assist cyclists in bringing their bicycles onto the train and metro. The first step for cyclists desiring to take their bicycle on a train or the metro is to get the bicycle down to the platform, which is not an easy task, especially at Nørreport station. Nørreport station primarily has stairs to and from the platforms, with very limited use of escalators. The existence of a consistent system of tracks for bicycles along the sides of the

stairs would present cyclists with a much simpler method of transporting their bicycle down to the train and metro. Once cyclists reach the platform, they find inadequate bicycle parking on the trains and metro. The improvement of the bicycle racks on the S-train cars would allow bicycles to stand upright by themselves, making it much easier to handle a bicycle on a moving train. The addition of bicycle racks in metro cars would improve the situation on this type of transportation.

This poor accessibility for bicycles leads more cyclists to leave their bicycles at the station, rather than taking their bicycle all the way to their destination. Improvements to the trains and stations could allow cyclists to take their bicycle with them, freeing up more spaces at the station.

5.4 Attitude of Cyclists

The attitude of cyclists is not so much a problem as a complicating factor. In Copenhagen, the typical cyclist mentality is that a trip on bicycle should be point-to-point and should involve little or no walking. This is compounded by the attitude that bicycles do not need to be parked in racks and any open space will suffice. This presents problems when there is not enough space to park every bicycle exactly where the cyclists would prefer to be. Many cyclists prefer to park their bicycles close to the kiosk and ticket office in Area 1. When there are no racks available they add their bicycles to the pile rather than walking to another parking area nearby. This attitude is a large part of the bicycle parking problem at the station. If all cyclists were willing to be more considerate in choosing parking spaces, then parking would be a very minor issue. At the same time, the planning of parking has to meet the cyclists' needs so that they are continued to be encouraged to ride their bicycle.

Chapter 6: Recommendations

Based on these studies we are able to make a range of recommendations to help improve the parking situation at Nørreport station. In some cases there are multiple options that would produce similar results, providing alternatives at different costs. In an ideal situation with unlimited resources, all of the best and more expensive options could be implemented. Unfortunately, this is obviously not realistic. Instead, the solutions to be put into action will have to be selected based on available monetary and human resources. The proposed solutions range from very simple and inexpensive to large-scale construction projects, along with major policy and attitude changes.

Based on the problems presented in the conclusions, the solutions in this section are divided into four broad categories, each addressing one of the parking problems at the station:

- creating and restructuring ease of bicycle parking
- removal of abandoned bicycles
- improving bicycle accessibility to the station
- policy changes and modifying the attitude of cyclists

6.1 Creating and Restructuring Ease of Bicycle Parking

Creating and restructuring bicycle parking at Nørreport focuses on optimizing the convenience of bicycle parking for cyclists through various improvements. By creating new parking spaces and restructuring current parking in a more logical manner, the best balance of parking locations can be obtained.

6.1.1 Reorganizing Parking

Reorganizing parking involves restructuring the locations and types of parking at the station to optimize the overall convenience of parking. This involves relocating areas catering toward long-term parking durations and encouraging cyclists to consider where they choose to park. Cyclists wishing to have a secure or covered parking area or to store their bicycle for a long period of time should be willing to walk slightly farther than those who need to purchase a rail pass or hop on an S-train.

There are many bicycles at Nørreport that are parked for long durations and it would be beneficial to have these out of the way of the daily traffic at the station. One way of doing this would be to define certain areas as short-term parking, leaving farther locations for bicycles parked for longer durations. It would be best to label the most convenient locations around the station as short-term with signs stating how long bicycles are allowed to be parked there.

Without associated programs to mark and remove bicycles at regular intervals, this may not be especially effective. Conscientious cyclists would certainly obey the signs, but it is likely they are the ones who are already considerate enough to park further away when they are parking for a long duration. To make parking duration limits successful, the city would need to tag and remove bicycles at a regular interval to ensure that cyclists would follow the regulations. Bicycle clean-up should be performed on the short-term parking giving a shorter time for the cyclist to remove their bicycle before the city does. The first few times these are completed there needs to be adequate warning and publicity, so all the cyclists are aware of the upcoming clean-up. For the areas that are deemed long-term parking the standard four to five weeks is sufficient and longer times could be used if there is adequate parking space in these areas.

In order to keep the station well maintained through these programs a sufficient amount of labor and trucks will be needed. The price would initially be high for mass clean-ups, but over time they should decrease as cyclists learn not to leave their bicycles in the areas designated for daily commuters.

Distinct long-term and short term parking areas can be combined with incentives that encourage cyclists to park farther away. By placing more favorable parking slightly farther from the main station entrances, many cyclists looking for these features could be willing to spend slightly more time walking for better parking facilities. If the parking in long-term areas is covered and secured, some cyclists parking for shorter durations may choose to use this parking, freeing up even more space at the station.

In addition to improving convenience, reorganization can facilitate the cleanup of abandoned bicycles. In short term parking areas, cleanups can occur more regularly and shorter notice can be given before removal. For the long term parking areas, removal will not be necessary as often, resulting in fewer cleanups in those areas. Overall, the same amount of labor could have a greater effect in areas organized by parking duration.

Parking duration and distance from the destination are two large parts of the cyclist mentality. Currently, cyclists do not always take parking duration into account when choosing a location, although this sometimes occurs inadvertently because of a desire to avoid the disorganization at the station. Most cyclists choose their parking spaces based on the location that allows them to park as close as they can to their destination. This type of reorganization will affect the mentality of the cyclist in that it would in some way motivate these mentalities to change since the different types of parking are separate from each other. These attitude changes could have far reaching effects, helping cyclists think more about the implications of where they park their bicycle anywhere in the city.

6.1.2 Creating Additional Parking

Creating additional parking involves adding more racks in the areas of the station that are most convenient. Another aspect of adding parking is improving accessibility to current areas to make them more convenient to cyclists. By creating additional spaces, it naturally becomes easier for cyclists to find space in a rack. With more rack spaces, there will be fewer bicycles parked outside of racks, cleaning up the parking area and making parking more convenient. There are several ways to do this by adding parking close to the station as well as in Area 8.

There are some areas at Nørreport station with many bicycles, but no racks to organize them. Although there is not a lot of available space at the station, any additional racks that can be added in convenient areas will help to improve the parking situation. The green lines on the map of Area 1 in Figure 18 show the places where additional racks could be added. This would be very inexpensive and would only require the cost of the racks and installation. It may also be necessary to remove abandoned bicycles in some areas before racks could be installed. One remaining concern would be whether racks could be placed in all available locations, because of a regulation preventing bicycle racks from being placed within 10 meters of an intersection. If this policy were changed, it would open up several spaces for additional racks.

Area 8 is an area with very low usage that shows a lot of potential for good bicycle parking. It is a wide open area with lots of space that is quite close to the station. Improving this area and implementing methods to encourage cyclists to use this area, could make this a major solution to the parking problem at the station. The main issue with this area right now is accessibility to the station, since it does not have an entrance to the platforms and a busy road

must be crossed to access the station. One solution would be to build a bridge from Area 8 to Area 1, where the ticket office, kiosk and two of the platform entrances are located. This would be especially useful if the bridge were built to be gently sloping without stairs, so cyclists could either ride over it or easily roll their bicycle over.

Another more expensive, but very effective, option would be to create a set of stairs directly to the train platform from Area 8. This would not only make Area 8 a popular place to park and access the station but it would also spread out the general pedestrian traffic. Since the DSB has been proposing a complete renovation and restructuring of Nørreport station this option is possible and would have major benefits if incorporated into their plans.

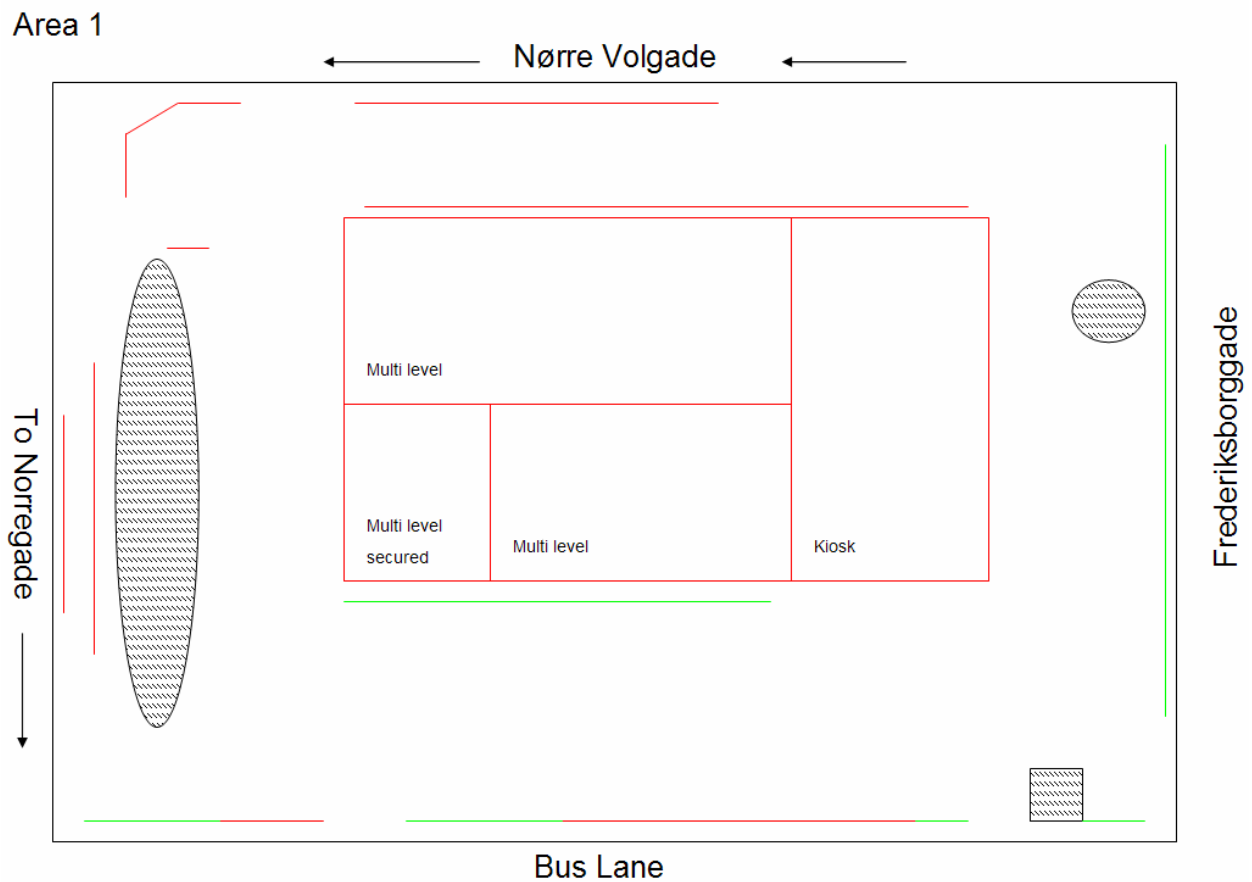


Figure 18: Nørreport Area 1 with added bicycle racks

Along with either of these accessibility improvements, it would be wise to improve the parking in Area 8. Placing well-organized, covered parking would draw cyclists from other areas and would be very convenient. This could make Area 8 a valuable alternative for cyclists

looking for covered or long-term parking. Additional accessible parking away from the main area of the station draws bicycles away from the most crowded areas, freeing up space for more short term parking in Areas 1 and 3. Furthermore, if stairs to the platform were created, this area would provide another valuable option for short-term parking.

Creating additional parking has clear advantages for enhancing convenience for cyclists. Even parking farther away can improve convenience by providing a combination of quick, readily available bicycle parking and easy access to the station. Cyclists will not need to be convinced to use additional parking at the main areas of the station, but they will at least need to be informed about additional parking areas and accessibility improvements. Cyclists who realize the benefits of using added parking in different areas may also be more willing to try similar parking areas in other parts of the city.

6.1.3 Replacing and Improving Racks

There are some rack designs at the station that are less effective than others due to their design or spacing. Replacing these racks could increase the usage rate in many areas of the station and could allow bicycles to fit more efficiently into a given space. The multi level parking in Areas 1 and 3 of the station is a major concern, along with racks having parallel wheel holders.

Users of bicycles with wide tires frequently experience problems finding a rack that will fit their bicycle. It can be a great inconvenience having to go from rack to rack, looking for an open spot and then testing if the tire will fit. In some parts of the station, this can mean having to travel a lot farther to find a suitable spot, which causes many cyclists to give up and park outside of racks. Changing all of the unsuitable racks with parallel wheel holders to a standard, effective design like the classic Copenhagen style would allow the racks to securely hold nearly all types of bicycles. This is likely to spread out the distribution of bicycles and decrease the amount of inappropriately parked bicycles. This would be a fairly easy, low-cost project, with the only costs being the new racks and the removal and reinstallation process.

Along the same lines, parking needs to be created for bicycles that are not the standard size. Since cargo bicycles are very common in Copenhagen and they do not fit in the classic Copenhagen style racks, a special area should be set apart for oversized bicycle parking. This does not require a significant amount of area to be dedicated to it, but it should be adequate

enough to park a few oversized bicycles and be advertised to the cyclists so they know where they can park easily.

The best method of loading bicycles into the multi level racks is not obvious to first time users. Posting signs in the multi level parking area can explain how to effectively use the multi level racks. There are two similar styles of multi level racks in use, one of which is capable of fitting mountain bike tires. It is important to note which parking spaces have these wider wheel trays so that cyclist know where their bicycle will fit.

The atmosphere of this parking must also be changed in order to attract cyclists to it. Since their complaints about it are that it is filthy and smells, it would be effective to redesign the structure surrounding these racks. Allowing more natural light to flow into the area would open it up and alleviate the dingy atmosphere, possibly discouraging the public to use it as a place to urinate or throw their trash.

Another major improvement to the parking in Area 1 is replacing the current multi level parking with simpler single level parking. A typical rack, such as the classic Copenhagen, is simple to use, self-explanatory, and very accessible. On average only 44% of the multi level parking in this area is in use. If the cages and multi level racks were removed and replaced with classic Copenhagen style racks, around 210 spaces would be available. Given that on average only 165 spaces in the dual level racks are used, this could accommodate all the bicycles parked there daily and create a more open environment.

If the multi level racks were completely replaced with a standard single level design, they would be much more convenient to use and would not have problems with fit and ease of use. This would be especially useful if done in conjunction with reorganization of parking. The more convenient single level racks would help make this area short term parking and would push long term to other areas. Having quick, easy to use, covered parking right at the main area of the station would be especially desirable to cyclists.

6.1.4 Enhancing Underground Parking

The underground bicycle parking at Nørreport station has a lot of potential, but is currently underused. This parking is en route for cyclists going toward one of the major station entrance points, is not far from the station, and leads directly into the metro. Increasing awareness, offering incentives to use it, adding an access ramp, and creating additional

underground parking are all ways to improve underground parking so it can be used to its full potential. This could be an effective way of relocating many bicycles away from the station. It would also have beneficial implications for bicycle accessibility to the trains and metro. Since cyclists could ride down to the first underground level of the metro station, they would be past the only stairs and could ride escalators down to the metro or up to the S-trains.

Increasing awareness helps many cyclists realize that this underground parking option exists and may be suitable for their needs. If cyclists do not even know about it, there is no way they can be able to try it out or judge if it will suit them. Furthermore, some cyclists do not realize that the parking leads directly into the metro station, which is a major factor in the convenience of this parking area.

An effective solution for improving awareness is to add more signs advertising the underground parking. The first step is to place a large, visible sign at the entrance to the underground parking area. This is especially effective if it is visible from the road and indicates the presence of a direct path to the metro. The sign might read something like the Danish equivalent of “Underground Secure Bicycle Parking with Direct Path to Metro”. Signs could also be placed around the station, especially in major bicycle parking areas directing cyclists to the underground parking.

It is also helpful to mark the doors to and from the metro to increase awareness of the connection. The doors from the parking to the metro should be clearly labeled to ensure that cyclists know that the direct connection exists. Marking the other side would depend on if there are security concerns about making it too obvious to other station users that there are bicycles behind those doors. These markings would not be as necessary, as most cyclists enter through the other side rather than dragging their bicycle down into the metro station.

Since using the underground parking takes some extra time and effort on the part of the cyclists, it would be beneficial to offer some incentives to encourage cyclists to take advantage of the facilities. This could also be effective on a temporary basis to help with increasing awareness of the facilities. One option would be if cyclists used the underground parking, they would receive discounts on public transit tickets. This could be done by having someone working at the underground parking to distribute tickets as cyclists come and park their bicycles. A less involved system would be an automated machine that could distribute tickets to cyclists. However, people who do not park their bicycles underground could take advantage of the

discount system if it is not being monitored. It is important that any system is properly designed so that discounts or incentives are only given to cyclists who are actually parking in the underground area.

Creating a ramp down to the underground bicycle parking would allow cyclists to quickly and easily access the underground parking by riding directly to and from the parking area. This would be an immense convenience for cyclists since the difficulty of getting a bicycle down to the parking area is currently the biggest complaint about it. The ramp would obviously have to be very long in order to be at a shallow enough grade to ride both up and down, but there appears to be a lot of space to work with. The entrance to the underground parking is right in a large bicycle parking lot, so it would be fairly easy to remove some of the spaces in the lot to make a ramp. The parking in this lot is currently underused so removing one or two racks would not affect the parking situation there. The only hindrance would be if there are other things located underground in that area. If the ramp were long and gradual enough there could even be a bridge over it connecting to the existing parking lot, maintaining truck access to the lot for the outdoor markets located there.

Installing this ramp would be a fairly large construction project, but could easily be worthwhile, especially if there is space to install additional bicycle parking in the underground area. With better access and awareness, the underground parking area could become very popular, requiring more space. To what extent additional parking can be added depends on what else is located underground in that area. If there is available space, the parking area could expand outward to fit more bicycles. This is a fairly large, expensive project that involves major construction. However, if it is done at the same time as installing a ramp down to the parking area, it would not require such extensive work.

If there is no space available to expand the underground parking, there are many other places more racks could be placed to increase its capacity. The hallways underground are very wide to begin with, approximately 4 meters, and allow plenty of room for bicycles to be ridden or walked through. Racks could easily be added along the walls underground heading into the actual rack rooms. Bicycles parked at 45 degree angles would still leave enough room for pedestrians to walk by. Furthermore, only one additional security camera is needed to survey all parts of the underground parking area. New racks are a very inexpensive addition to the

underground parking. The area underground is already spacious enough to support additional racks along the sides of the corridors.

6.2 Removal of Abandoned Bicycles

The large number of long term and abandoned bicycles parked at the station cause problems with parking space and accessibility to bicycles. With these bicycles taking up many of the available parking spaces, there are far less spaces that can actually be used by cyclists on their daily commute. Some of these bicycles have been left in inconvenient places and impede the ability of cyclists to park or retrieve their bicycles, or even cause problems with access to elevators and walkways. These solutions involve programs to remove bicycles and redefinition of the acceptable time bicycles should be allowed to remain at the station.

Given the results from our duration counts, as well as general observations, it is clear that more has to be done on the removal of abandoned bicycles at the station. Traditionally, bicycle clean ups have not been performed often enough to maintain the clutter abandoned bicycles create. In order for the bicycle clean-ups to be able to keep the station in good order they need to be effective. This means that at least once a year every single bicycle needs to be tagged with tape, not just the ones that appear abandoned. This will ensure that all bicycles parked at the station are, at the least, being used. Even if they are not all abandoned it will get the cyclist to think about the inconvenience caused by parking his or her bicycle there for long durations. This type of a clean-up requires a lot of labor-intensive work and time, but would be very effective in the long run.

While the initial bicycle clean-ups are done to remove all abandoned bicycles, there needs to be a program put into place for cyclists to dispose of old bicycles instead of leaving them at train stations. There are many possibilities for this type of disposal. If bicycles were allowed in the large scrap garbage clean-up that is done four times a year, it would be a cheap easy way for cyclists to get rid of a bicycle. There could also be a central place in Copenhagen where the citizens could bring their bicycles. For liability reasons, there may need to be a supervisor to run the serial numbers and make sure they are not stolen. Finally, once every so many years, or as needed, there could be a massive bicycle clean-up similar to the Vulture Campaign. Cyclists would be given something to place on their bicycle to indicate they wanted it picked up. After a period of about a month, the city would come around and pick up any

bicycles that are tagged for pick-up. A massive clean-up of this kind would be very expensive for the city, but would effectively clean up unwanted bicycles.

6.3 Improving Bicycle Accessibility to the Station

Encouraging cyclists to take their bicycle onto public transit can reduce the need for parking at the station by allowing them to take their bicycle all the way to their destination. The primary difficulties with the current system are getting bicycles down to the platforms and the parking situation once the bicycles are on the train. These solutions propose ways to facilitate the movement of bicycles down to the platform and improve parking on the trains.

It is important to consider that there is a limit to the ability of the trains and metro to accommodate bicycle traffic, both in the trains and the stations. If it is too easy to take bicycles on the trains, problems will arise with space constraints on the trains and traffic in the stations. Therefore, this careful balance must be considered when planning improvements to station accessibility.

Currently, of the eleven stair cases at Nørreport, only the set leading to the underground parking has tracks to help cyclists get a bicycle up or down. One very inexpensive solution would be to add tracks, or ramps, to these stairs that are wide enough to fit all tires, including mountain bikes. As long as the stairways are not too steep, this is an easy and quick solution to making trains more accessible for commuters with bicycles.

The current bicycle parking situation for S-trains and metro trains is less than adequate. The metro allows bicycles but does not have any type of racks installed. The S-trains have bicycle cars with flexible rubber racks, but these are not especially effective at holding a bicycle upright. If left unattended, a bicycle in one of these racks is likely to fall over or hit against other bicycles or passengers. On the metro, any improvement will make a vast difference in bicycle travel. Because there are currently no racks, an addition of racks similar to how they have been installed on the trains will attract more cyclists to ride the metro. Improving bicycle parking on the train and metro will encourage many cyclists to bring their bicycles with them on their travels since it will make travel for both cyclists and non-cyclists progress. It is important that whatever is chosen is able to fit a wide range of bicycles and can firmly hold a bicycle in place without concern of it falling over.

6.4 Policy Changes and Modifying the Attitude of Cyclists

Most of the above solutions will be useless if they are not accepted and embraced by cyclists. Any solution that improves bicycle parking will involve some type of change in their everyday routine. Even if the change makes parking a bicycle significantly easier for a person, they must be convinced of this in order to actually want to make use of the improvements. Even more difficult changes are ones that might add time to a cyclist's commute. For example, even if racks are readily available everywhere, using one may still take a few seconds longer than tossing a bicycle into the nearest pile. For this reason, it will be necessary to inform cyclists of the benefits of using any new systems that are implemented.

The necessary attitude adjustment depends greatly on the type of solutions it goes along with. This can best occur in the form of education or advertising to make cyclists aware of changes and to emphasize the benefits. It is especially important to bring forth the benefits, while not drawing too much attention to the negative aspects. It can also be effective to explain to users why the positive aspects of the solution outweigh any negative consequences.

Some solutions will be so helpful to cyclists that their attitudes will change on their own once they become aware of the parking changes. In these cases, it would just be a matter of simple advertising and signs to make users aware. Other changes that have less obvious benefits for cyclists will require further information. Pamphlets may be a helpful means of conveying the information about these improvements. For large changes, a multi-media approach could be used, employing signs, flyers, television and newspaper advertisements, and pamphlets as necessary.

Many cyclists have a negative attitude about bicycle parking, especially at Nørreport Station. Many cyclists responded to our survey with negative remarks about bicycle parking, including complaints about a lack of space and their unwillingness to take their bicycle to Nørreport. Changing the attitude of cyclists is a process that will take a long time, and possibly many different approaches. Although it is one of the major issues that we are aiming to address, it will most likely come after many other solutions are implemented. In order for cyclists to have a more positive attitude toward bicycle parking, there needs to be some positive improvements. Once those are in place, through campaigns and publicity, the cyclists will progressively begin to see how accessible and easy the bicycle parking can be. Gradually this should change their

behaviors normally associated with bicycle parking. If there are good facilities to use, cyclists will take the extra effort to park a bicycle correctly.

It is also important to mention that the attitude of construction projects must also be changed. Several stakeholders have mentioned that during construction projects, bicycle parking is one of the last things that is thought about and often this leads to inadequate facilities. Bicycle parking should be planned for just as car parking or building placement or any other aspect of a construction project is planned for. Since the bicycle is such a widely used mode of transportation in Copenhagen it is very important that the facilities associated with it are not afterthoughts but carefully designed to meet the needs of the area. This is especially applicable to Nørreport station since there are plans that have been drawn up to completely redesign the station and its surrounding area. Since bicycles are such a large part of Nørreport station, they should be included in the designs from the earliest stages of planning.

Overall, if the attitude towards the design of bicycle parking changes, cyclists' attitudes and behaviors will begin to change. This leads to the improvement of other issues such as the availability of convenient parking which addresses the problem of parking at Nørreport Station.

6.5 Conclusion

These solutions represent what we have determined to be the most effective options for improving the parking situation at Nørreport station at a variety of price ranges. Based on available budget and what portions of the problem are being focused on, a complete solution can be compiled from a combination of these individual recommendations. Most of the bicycle parking problems that exist at Nørreport station are also occurring throughout Copenhagen at various other stations. The majority of the recommended solutions could effectively be applied to other stations and parking areas exhibiting similar general problems. Improvements to bicycle parking will help Copenhagen to continue the promotion of cycling. If cyclists know they will have a space to park wherever they go, they are likely to ride their bicycle more often.

Bibliography

- American Association of State Highway and Transportation Officials (AASTHO). Task Force on Geometric Design. Guide for the development of bicycle facilities. Washington, DC: American Association of State Highway and Transportation Officials, c1999.
- American Society of Civil Engineers (ASCE). Bicycle Transportation Committee. Bicycle transportation : a civil engineer's notebook for bicycle facilities. New York: American Society of Civil Engineers, 1980.
- Beautification plan for Nørreport station* (Online). The Copenhagen Post. 21 September 2004. Available World Wide Web: URL: <http://www.cphpost.dk/get/81858.html> (Accessed 13 February 2006).
- City of Copenhagen. Copenhagen City of Cyclists: City of Copenhagen, 4th Department. December 1997.
- Danish Road Directorate (2001). *Collection of Cycle Concepts*, Copenhagen, Denmark: Danish Road Directorate. DK-1059.
- Dero Bike Racks* (Online). Available World Wide Web: URL: <http://dero.com> (Accessed 26 February 2006).
- Dutch Ministry of Transport. (2002). *The Autumn of the Bicycle Master Plan: After the Plans, the Products*. Ministry of Transport, Public Works, and Water Management, The Hague, The Netherlands.
- Enchanted Learning (Online). Available World Wide Web: URL: <http://www.enchantedlearning.com/devices/bike/label/labelanswers.GIF> (Accessed 26 February 2006).
- European Cyclists' Federation. (1991). *The Bicycle and its Basic Facilities* (Online), Available World Wide Web: URL: <http://www.ecf.com> (Accessed 29 January 2006).
- Danmarks Statistik (Online). Available World Wide Web: URL: <http://www.statbank.dk> (Accessed 13 February 2006).
- DiDonato, M., Herbert, S., & Vachhani, D. (2002) *City-Bike Maintenance and Availability*. Unpublished Interactive Qualifying Project. Worcester Polytechnic Institute.
- DiMauro, Jill. *The Skinny on Tires* (Online). Available World Wide Web: URL: <http://www.artemisracing.org/skinnyontiresarticle.htm> (Accessed 5 February 2006).

- Forsting, Vibeke. København Kommune, Roads and Parks Division. Coordinator of Street Cleaning. See Appendix E.
- Glynn, K., Houle, K., & Schweers, J. (2005) *Bicycle Theft Prevention in Denmark*. Unpublished Interactive Qualifying Project. Worcester Polytechnic Institute.
- Guit, A. (1993). Facilities for bicycle parking. In, Michels, T. (ed) (1993). *Cycling in the city, pedalling in the polder: Recent developments in policy and research for bicycle facilities in the Netherlands*, CROW, the Netherlands, 177-194.
- Hossain, Quazi Sazzad, Hein Botma, Upali Vandebona, Masaru Kiyota. Accessible Distance to Bicycle Parking Facilities. Transportation Research Board - 82nd Annual Meeting. Washington, D.C.: Transportation Research Board, 2003.
- Kejser, Kristoffer. DSB S-tog, Traffic Analysis and Planning. See Appendix E
- Lowell, J., McKell, H.D., *The Stability of Bicycles*. American Journal of Physics. Volume 50, Issue 12, page 1106-1112. December 1982
- Neilsen, Sten. Urban Reflections, Cand.Arch/Industrial Designer MDD. See Appendix E.
- Ohio EPA. (2001). *Your Automobile and Pollution Prevention* (Online), Available World Wide Web: URL: <http://www.epa.state.oh.us/opp/consumer/carp2.html> (Accessed 13 February 2006).
- Pacione, Micheal. *Urban Geography: A Global Perspective*. Taylor & Francis Group, New York. 2005.
- Pucher, J; Lewis Dijkstra. Making Walking and Cycling Safer: Lessons from Europe. *Transportation Quarterly*. Summer 2000 (54) 3: 25-50.
- Pucher, J; Lewis Dijkstra. Promoting Safe Walking and Cycling to Improve Public Health: Lessons from The Netherlands and Germany. *American Journal of Public Health*. September 2003 (93) 9: 1509-1516.
- Pucher, J and J.L. Renne. Socioeconomics of Urban Travel: Evidence from the 2001 NHTS. *Transportation Quarterly*. Summer 2003 (57) 3: 49-77.
- Replogle, Micheal. Bicycle Access to Public Transportation: Learning from Abroad (Online). *Institute for Transportation Engineers Journal*. December 1992. *The Petite Series: For the lighter, leaner rider*. Air Friday. Available World Wide Web: URL: <http://www.bikefriday.com/main.cfm?fuseaction=specSheet.petite> (Accessed 5 February 2006).
- Sheldon Brown's Bicycle Glossary* (Online). Available World Wide Web: URL: <http://sheldonbrown.com/glossary.html> (Accessed 6 February 2006).

- Sloane, Eugene A. *The Complete Book of Bicycling*. Trident Press, New York. 1970.
- Streuli, Maria. København Kommune, Roads and Parks Division, Traffic and Planning. See Appendix E.
- Stutman, Mark. *Planning for the Bicycle: Parking Issues and Facilities Planning at the University of Waterloo*. Department of Geography, University of Waterloo. December 1997.
- Tolley, R. S. *Sustainable transport: Planning for walking and cycling in urban environment*. Woodhead Publishing Limited: Cambridge, England. 2003.
- UCSC Bicycle Subcommittee. *A Bicycle Plan for the University of California Santa Cruz*. May 1988.
- Vermeul, Martin G. *Management of Bicycle Parking at Dutch Railway Stations*. NS Fiets BV.
- Woodforde, John. *The Story of the Bicycle*. Universe Books, New York. 1970.
- Zuks, Renee. *The Stimulation of Bicycle Usage in European Cities*. Sustainable Cities Practicum and Field Trip to Europe Participant's Reports. 2002.

Appendix A: Survey

This appendix contains information on the survey given to the cyclists at Nørreport as well as the surrounding community. The survey exists in both a Danish and English version and each question is written specifically to identify certain points regarding the bicycle parking problem. The analysis is based on feedback from 73 participants.

Cykelparkerings Undersøgelse

Vi er en gruppe universitets studerende der i samarbejde med [Dansk Cyklist Forbund](#) undersøger cykelparkeringsforholdene ved Nørreport station. Vi sætter pris på din respons og håber at vores arbejde kan være med til at forbedre forholdene for cykelparkering på Nørreport station. Mange Tak!

1) Parkerer du din cykel på Nørreport station?

- Ja
- Nej

Hvis du ikke prakerer på Nørreport, hvilken station parkerer du da oftest din cykel ved?

Hvis ja besvar venligst følgende spørgsmål for Nørreport hvis nej besvar venligst følgende spørgsmål for den station du anførte ovenfor.

2) Vælg alle de svar der passer:

- Du burger din cykel fra hjemmet til s-tog/metro
- Du burger din cykel fra stationen til arbejde
- Du burger din cykel fra hjemmet til arbejde
- Andet:

3) Når du stiller din cykel ved en tog station, Hvor længe er den da normalt parkeret? (Antal timer)

4) Hvilket tidspunkt på dagen stiller du din cykel ved stationen? (vælg alle de svar der passer)

- Morgen

- Formiddag
- Eftermiddag
- Aften
- Nat

5) Bruger du cykelstativerne ved stationen?

- Ja
- Nej

Hvis nej, hvorfor ikke?

6) Oplever du tit problemer med at cykelstativerne ikke passer til din cykel?

- Ja
- Nej

Hvis ja hvorfor?

7) Hvis du tager din cykel med enten metro eller tog syntes du det er let/svært at tage cyklen med. 1 = meget let, 5= meget svært

8) Hvis det var lettere at tage cyklen med i toget eller metro ville du da vælge at tage cyklen med i stedet for at parkere den?

- Ja
- Nej

9) Hvor langt fra indgangen til stationen vil du være villig til at parkere din cykel om hhv dagen og natten?

Dag

Nat

10) Kender du til undergrundsparkeringen for cykler og de andre cykelparkerings arealer ved Nørreport station?

- Ja
- Nej

11) Hvis du ikke bekendt med cykelparkerings arealerne. Hvordan mener du man bedst kunne fremme kendskabet til dem?

- Skilte
- Annoncer
- Internet
- Aviser
- Andet:

12) Bruger eller har du brugt “dobbletlags cykelparkeringen” på Nørreport?

- Ja
- Nej

Hvis nej hvorfor ikke?

13) Hvad gør du ved gamle cykler du ikke ønsker at bruge længere?

14) Er du generelt tilfreds med cykelparkerings forholdene på Nørreport?

- Ja
- Nej

Hvorfor og hvorfor ikke?

15) Yderligere kommentarer:

Bicycle Parking Survey

We are a group of university students performing a study of bicycle parking at Nørreport Station with the [Dansk Cyklist Forbund](#). We appreciate your feedback and look forward to developing solutions to improve the parking situation at the station to make it more convenient for commuting cyclists. Mange Tak!

1) Do you park your bicycle at Nørreport station?

- Yes
 No

If you do not use Nørreport, what station do you park your bicycle at most frequently?

If yes, please answer all questions specifically to Nørreport station. If no, please answer all questions with regards to the station you identified above.

2) Choose all that apply:

- You ride your bicycle from home to the train/metro station
 You ride your bicycle from the station to work
 You ride your bicycle from home to work
 Other:

3) When parking your bicycle at a train station: How long is it usually parked there (number of hours) ?

4) What time of the day do you leave your bicycle parked there (select all that apply)?

- Morning
 Late Morning
 Afternoon
 Evening
 Overnight

5) Do you use the bicycle parking racks at the station?

- Yes

No

If no, why not?

6) Do you frequently experient problems fitting your bicycle into a rack, due to your bicycle's shape or size?

Yes

No

If so, why?

7) If you take your bike on the train or metro, how would you rate the difficulty of getting it from the street to the train? 1 being very easy, 5 being very difficult

8) If it was easier to take your bicycle on the train or metro with you, would you take it instead of parking it at the station?

Yes

No

9) How far away from the entrance to the station are you willing to park your bicycle during the day and at night?

Day

Night

10) Are you aware of underground bicycle parking at Nørreport and other parking lots in the area?

Yes

No

11) If you haven't heard of other parking areas, then what would be good means of making people aware of them?

Signs

Advertisements

- Internet
- Newspaper
- Other

12) Have you or do you use the upper level of the multilevel parking facility?

- Yes
- No

If no, why not?

13) What do you do with old bikes that you will no longer use?

14) Overall, are you pleased with the current parking situation?

- Yes
- No

Why or why not?

15) Additional Comments:

Design of Questions

Each question is specifically designed in order to gain important feedback from the community about the bicycle parking problem at Nørreport station. The survey circulates through the cycling public by utilizing the Danish Cyclist Federation's email contacts as well as small advertisement tags placed on bicycles at the station. It exists in the form of an online survey in both Danish and English.

The first question begins by asking whether or not the cyclist taking the survey parks their bicycle at Nørreport Station. Since this survey is circulated to the general community, it is important to distinguish between those using the station and those who know of the problem, but do not experience it at Nørreport on a daily basis. This way some feedback is gathered specific to the station while also getting a feel for the community's views. Also, by having the cyclists tell us the name of the station they use if it is not Nørreport, we are able to gauge their responses with our knowledge of the other stations.

Responses to the second, third, and fourth questions are crucial in determining why there are so many bicycles at Nørreport station. The second question indicates what parts of the commute to work cyclists use their bicycle on. This in turn indicates if many bicycles are stored at the station since riding from the station to the workplace would require the bicycle to already be at the station. The third question distinguishes the need for long term or short term parking. If a large volume of cyclists typically store their bicycles in racks at a station all day then solutions that are developed must account for this so that cyclists parking their bicycles short term also have a place to park upon arrival at the station. The fourth question expands on the third question by asking at which point during the day the bicycle is parked at the station. We anticipate that solutions for the parking problem will be very different depending on whether most bicycles are parked during the day while people are in and out of the station or overnight when there is less traffic.

Answers to the fifth question help to determine why there are so many bicycles parked outside of racks when many times there are plenty of open rack spaces in the area. If the cyclist answers that they do not park their bicycle in racks, then responses expected in the second section would be that the empty racks are too far away from the entrance to the station, the tires of the cyclist's bicycle do not fit in the provided racks, or they do not have time to find a space to rack their bicycle when they park at the station. All these answers indicate a need for a different type of solution.

The sixth question helps us to determine if the racks at the station are not adequate for the variety of bicycles that cyclists most commonly ride. If the cyclist responds that his or her bicycle does not fit into racks because of its size or shape, then this shows a need for more diverse bicycle racks. Knowing what part of a bicycle most cyclists need special accommodations for aids in determining potential solutions.

The seventh and eighth questions are meant to investigate why more cyclists do not take their bicycle with them to their final destination. Based on some initial feedback from contacts at the DCF, it is fairly difficult to maneuver a bicycle up and down the stairs to the train or metro. These two questions aim to explore cyclists' reaction to improvements on the bicycle friendliness of the station and whether or not that would cause them to change their daily routine. If this would be the case then perhaps the solution would not focus so heavily on the actual parking situation, but instead on rethinking the feasibility of traveling with a bicycle so that more commuters would bring their bicycle with them instead of leaving it at the station.

The next four questions inquire about different aspects of bicycle parking. In the area of the station there are many empty rack spaces but they tend to be farther away from the entrances to the train or metro. It is important to understand how far away cyclists are willing to park their bicycle so that solutions can account for this. Simply adding more racks in places farther away will not help the problem at all if cyclists are only willing to walk a short distance. Also, it is important to understand if the distance cyclists are willing to park their bicycle from the station changes from day to night. This exposes any safety issues that can easily be addressed by minor changes. The next two questions aim to investigate why cyclists do not use the underground bicycle parking spaces that have entrances directly into the metro. This parking area seems very convenient, so it has been suggested that many people are simply not aware of it. We anticipate that the responses to these questions will clearly indicate this and if they are not aware of these parking opportunities then a direct solution would be creating awareness so that the available space is utilized to its full potential. The last question in this section aims to gain an understanding as to why cyclists do not use the upper levels on the many multilevel racking systems at Nørreport and other stations. In initial observations, most of the upper levels of these multi level racks are empty while the bottom levels are full. If cyclists do not use the upper level because it is too difficult or their bicycles do not fit there then perhaps another design would be a better choice in order to use the available space.

In the thirteenth question cyclists are asked how they dispose of their old bicycles when they are no longer able to use them. This is useful because we are not aware of how cyclists get rid of unwanted bicycles, and they could very well be leaving the bicycles at train stations. It helps us gauge whether there is a problem with abandoned bicycles at Nørreport station that needs to be addressed.

Finally, the last two questions are intended to be open ended in order to gauge any thoughts that the community has in general about the bicycle parking problem. This will allow other viewpoints of the situation to be made clear and assist in the development of possible solutions. This is also a place where survey participants can express any additional concerns or bring up issues that we may not have considered.

Results

Of the approximately 430 cyclists that were given the link to the survey, 73 responded, 42.5% indicating that they parked their bicycle at Nørreport station. The following outline shows the summary of the results that are analyzed. The first section details the results overall, the second section details the results specific to Nørreport Station.

Overall

1) Do you park your bicycle at Nørreport station?

Yes: 31 (42.5 %)

No: 40 (54.8%)

If you do not use Nørreport, what station do you park you bicycle at most frequently?

- vanløse
- Vesterport
- Hovedbanegården
- Skovlunde
- København H
- Om nogensinde Hvidovre eller Rødovre
- Vanløse Station
- jeg parkerer ikke ved stationer (*I don't park at stations*)
- har tidligere parkeret ved Nørreport som pendler, men det er mange år siden - en gang imellem parkerer jeg ved København H eller Østerport (*I used to park at nørreport as a commuter but that's years ago these days i sometimes park at the main station*)
- albertslund
- Taarnby station
- Normally, I don't park at stations. If really necessary, I use Østerport or the Central Station.
- Københavns Hovedbanegård
- Brøndbyøster
- rødovre station
- Parkerer højst en gang eller to om året ved stationer. De få gange det er sket har det været Nørreport. (*I only park at stations once or twice a year, when I do it's at nørreport*)
- Flintholm
- Ingen

- Hvidovre station, Friheden station, Åmøse station.
- friheden st.
- Vanløse
- Vanløse
- Jeg parkerer aldrig ved en station (*I never park at a station*)
- Frihedens S-station, Hvidovre.
- Friheden Station
- Ballerup
- Amagerbro
- Trekroner
- Avedøre
- Det varierer meget, da jeg bor på Frd.berg og cykler til og fra jobbet i Ballerup (*It varies a lot because I live in frd.berg and ride to and from job in Ballerup*)
- Østerport
- jeg parkerer ikke ved stationer i kbh, , da jeg cykler direkte til mit arbejde (*I don't park at any stations in copenhagen because I ride directly to my work.*)
- amagerbro
- Østerport station
- ingen
- Hovedbanen
- Hellerup
- hvidovre
- chr.havn
- Kgs. Nytorv

2) Choose all that apply:

You ride your bicycle from home to the train/metro station: 41 (56.2%)

You ride your bicycle from the station to work: 10 (13.7%)

You ride your bicycle from home to work: 27 (37%)

Other: 8 (11%)

- rejse til Jylland (*travel to Jylland*)
- Længere rejser (*longer journey*)
- Errands outside the city centre
- cykler altid (*always cycle*)
- CYKELTURE (*bicycle tour*)
- Almindelige cykelture (*normal bicycle tour*)
- Jeg har som regel min cykel med i toget. (*I usually take my bicycle along with me on the train*)
- Pensionist (*retired*)
- between home to school

- bykørsel (*city riding*)
- fra hjemmet til regionaltogetsstation (*from home to the regional bus station*)
- fra hjemmet til bus (*from home to the bus*)

3) When parking your bicycle at a train station: How long is it usually parked there (number of hours) ?

6 to 8 hours: 13 (17.8%)

8 to 10 hours: 26 (35.6%)

10 to 12 hours: 3 (4.1%)

12 to 14 hours: 2 (2.7%)

14 to 16 hours: 4 (5.5%)

16 to 18 hours: 0

18 to 20 hours: 0

20 to 22 hours: 0

22 + hours: 2 (2.7%)

4) What time of the day do you leave your bicycle parked there (select all that apply)?

Morning: 39 (53.4%)

Late Morning: 19 (26.0%)

Afternoon: 24 (32.9%)

Evening: 18 (24.7%)

Overnight: 3 (4.1%)

5) Do you use the bicycle parking racks at the station?

Yes: 48 (65.8%)

No: 21 (28.8%)

If no, why not?

- Hvis der er plads, ja, ellers må jeg parkere andetsteds (*if there is space, yes, otherwise I park elsewhere*)
- I use the racks, when available, and not broken - That's almost never.
- I lock my bike to some post or something in order to minimize the risk of theft
- Der er sjældent plads i dem (*there is seldom space in them*)
- Parkerer aldrig ved en station (*never park at the station*)
- for få og for overfyldte (*too few and too overfilled*)
- der er ikke plads (*there isn't space*)

- Det er ikke altid der er plads i stativerne, eller de er uhensigtsmæssige til min cykel (*There are always no places at stations, or they are inexpedient to my bicycle*)
- De er næsten aldrig ledige (*They are almost never available*)
- Det tager for lang tid, der er næsten altid fyldt og der lugter af pis (*They take too long of time, they are almost always filled and it smells like pis!!*)
- bruger dem sjældent, men har ofte for travlt og der er for mange cykler - det er besværligt! (*Make use of them seldom, but frequently too busy and there are too many bicycles – it is difficult*)
- de er fyldte og de står ikke lige der hvor jeg skal bruge dem (*they are full and not level so I can't use them*)
- der er ofte ikke plads ved de normale stativer, og det tager for lang tid at bakse cyklen op på "2. etage" i cykelparkeringshusene (*there's often no place in the normal ones and it takes too long of time to park the bicycle on the second level of the multi level racks*)
- der er ikke nogen lige der hvor jeg ankommer til stationen (*there are none empty at the point I arrive at the station*)
- husker ikke at der er nogen, ellers er de i hvert fald ALT FOR FÅ (*I never remember that there are any or there are too few way too few.*)
- der er ikke plads! (*there isn't space!*)
- Der er ikke plads i cykelstativerne (*there isn't room in the bicycle racks*)
- Der er sjældent plads (*there is seldom a place*)
- Bruger dem af og til, men der er sjældent plads udenfor. Min cykel er for høj til at stå i den nederste etage indenfor. Det er for besværligt at bruge øverste etage. Der er desuden meget uhensigtsmæssigt indenfor. (*Use them once in a while, but there is seldom place. My bicycle is too tall/big to stand in the lowest floor inside. It is too difficult using the top floor. It is flimsy inside*)
- Forsøger så vidt muligt, men der er meget sjældent plads, så svaret bliver nej (*Attempt to use them if it is possible, but there are very seldom places, thus the answer happens to be no*)
- der er ikke plads (*there isn't space*)
- Der er ikke plads (*there isn't space*)

6) Do you frequently experience problems fitting your bicycle into a rack, due to your bicycle's shape or size?

Yes: 24 (32.9%)

No: 43 (58.9%)

If so, why?

- stativet er for smalt (*racks are too narrow*)
- mine dæk er for smalle (*my tires are too narrow*)
- passer ikke til cykel med cykelkurv (*the bicycle doesn't fit with the bicycle basket*)
- Cyklerne er ikke ens, nogen har cykelkurv på mm. (*The bikes are different, some have baskets ect*)

- Mit styr passer ikke til grebene, som skulle støtte (*My handlebars don't fit into the fittings that should support*)
- styret støder sammen med de andre styr (*handlebars bang into other handlebars*)
- for samle (*too narrow*)
- dækkene er for brede, for lidt plads i stativet (*tires are too wide, too little place in the racks*)
- cykelstyret er for bredt (*handlebars are too wide*)
- Specialcykel (*Special bicycle*)
- er ikke indrettet til mountainbikes (*aren't organized for mountain bikes*)
- FOR SMALLE HOLDERE (*Too narrow holders*)
- cyklen står og svinger i stativet (*bicycle stands and sways in the rack*)
- Har en ældre cykel med brede dæk (*Have an older bicycle with wider tires*)
- der er ikke plads eller de er gået i stykker (for små så man ikke kan sætte hjulet i) (*there isn't place or they are broke or too small*)
- Der er ofte ikke plads til styret hvis man skal parkerer mellem to andre cykler. (*There is often no space for the handlebar if paking between other bicycles*)
- i den overdækkede cykelparkering er stativerne skiftevis halvt oppe og halvt nede. Jeg kan kun bruge den ene variant til min cykel (*in the covered bicycle parking the racks alternate half up and half down. I can only use the ones compatible with my bicycle*)
- når jeg endelig bruger stativer (ved andre st.), er mine mountainbikehjul ofte for brede (*when I use racks (usually at other stations) my tires are often too wide*)
- ekser hjulet (*bend the wheel*)
- Se ovenfor. Min cykel er for høj. Dem udenfor er fine. (*Too high, my bicycle is too tall. The ones outside are fine*)
- for smalle (*too narrow*)

7) If you take your bike on the train or metro, how would you rate the difficulty of getting it from the street to the train? 1 being very easy, 5 being very difficult

Average Difficulty: 2.49

8) If it was easier to take your bicycle on the train or metro with you, would you take it instead of parking it at the station?

Yes: 24 (32.9%)

No: 42 (57.7%)

9) How far away from the entrance to the station are you willing to park your bicycle during the day and at night?

Day

0 to 10 meters: 10 (13.7%)

10 to 20 meters: 22 (30.1%)

20 to 50 meters: 22 (30.1%)

50 to 100 meters: 11 (15.1%)

>100 meters: 58 (79.5%)

Night

0 to 10 meters: 13 (17.8%)

10 to 20 meters: 21 (28.8%)

20 to 50 meters: 17 (23.3%)

50 to 100 meters: 10 (13.7%)

>100 meters: 54 (74.0%)

10) Are you aware of underground bicycle parking at Nørreport and other parking lots in the area?

Yes: 31 (42.5%)

No: 40 (54.8%)

11) If you haven't heard of other parking areas, then what would be good means of making people aware of them?

Signs: 54 (74.0%)

Advertisements: 12 (16.4%)

Internet: 4 (5.5%)

Newspaper: 7 (9.6%)

Other: 10 (13.7%)

- sætte kort på cyklerne (*put maps on bicycles*)
- Lav nedgangen om så man kan tage en almindelig cykel op og ned ad trappen uden en militær uddannelse. (*Improve the way down the stairs so I can take ordinary bicycles up and down by staircases without army training*)
- Der er cykelstativer til 40 cykler lige udfra Zahles Skole (*There are 40 racks straight in front of Zahles Skole*)
- Der cykelstativer til 40 cykler i midterrabbatten udefra Zahles Skole, som aldrig bruges, fordi adgang til cykelstativerne er ikke god. (*There are 40 racks in front of Zahles Skole, never used because the way out to these racks is not good*)
- DSB har i forvejen annoncer i Metro m.v. (*DSB make an announcement in Metro*)
- TV Rekalme eller på DR1 i OBS. MEn.. det koster selvfølgelig (*TV and on DRI, but this costs obviously*)
- DIREKTE OP AD STATIONEN (*Directly against the station*)
- nem og sikker adgang (*easy and safe access*)
- personer der gik ved stationen og anviste folk (*personally walk at the station and show people*)
- foldere på stationerne (*folder at the station*)
- plakater v stationen om hvor nemt det er at parkere der ... (*poster at station of where it is easy to park*)
- brochurer (*brochure*)

12) Have you or do you use the upper level of the multilevel parking facility?

Yes: 22 (30.1%)

No: 48 (65.8%)

If no, why not?

- findes ikke på vanløse (*not found at Vanløse*)
- det er for besværligt at løfte cyklen (*it is too difficult to lift the bicycle*)
- Kommer aldrig med cykel der (*Never came with bicycle there*)
- for besværlig (*too difficult*)
- Bruger det i Roskilde - meget stort problem når cyklerne har cykelkurve på (*Use the ones at roskilde, very big problem when bicycles have baskets on*)
- Hvis jeg er på cykel i området skal jeg ikke bruge stationen (*if I am on bicycle area ? I don't use stations*)
- Ingen dobbeltlagsparkering ved Vanløse Station (*No double level parking at vanlose*)
- der er ikke plads (*there isn't space*)
- dumme ikke smarte (*they are stupid not smart*)
- arkerer aldrig på nørreport station (*never park at norreport station*)
- har ikke cykel på Nørreport. (*Have no bicycles at norreport*)
- bruger cyklen når jeg er i byen (*use bicycle when I'm in town*)
- Se ovenfor + min cykel er en Brompton som dels nok ikke kan stå i dobbeltlagsparkeringen og som dels er bedre beskyttet i den underjordiske. (*see above and my bicycle is a Brompton which in part is sufficient and can not stand in the double level parking and so is better protected underground*)
- har aldrig været der (*have never been there*)
- Kender den ikke (*Don't know it*)
- Parkerer aldrig ved en station (*Never park at a station*)
- Jeg vil aldrig parkere min cykel v. Nørreport. (*I will never park my bicycle at norreport*)
- Jeg har sjældent brug for at parkere der. Jeg vælger at parkere længere væk (*I have seldom use for parking there. I choose to park farther away*)
- Jeg kommer ikke på Nørreport (*I don't come to Nørreport*)
- det er for besværligt, og de passer ikke til store cykler (høj sadde) /mountainbikes (*they are too difficult, and doesn't fit with big bicycles (high seats)/mountain bikes*)
- Jeg parkerer ikke min cykel ved Nørreport station (*I don't park my bicycle at norreport station*)
- det er besværligt, og metro-parkeringen under jorden er bedre. (*They are too difficult, and metro parking underground is better*)
- BRUGER IKKE NØRREPORT (*Don't use norreport*)
- cykler direkte til mit arbejde på rigshospitalet - det bliver ikke aktuelt (*ride directly to my job at the hospital, that doesn't become ?*)
- Kan ikke få cyklen derop, risiko for at blive beskidt ved løftet af cyklen (*Can't get the bike up there because of the risk of getting yourself dirty when lifting your bicycle up*)

- Ved ikke hvad det er (*Haven't been near them*)
- jf. ovenfor (spg. 5) (same as above)
- Sjældent - det er for omstændigt. tager for lang tid. (*Seldom – they are too cumbersome. takes too long time*)
- ved ik aldrey tænkt på det (*don't know never thought of it*)
- Vidste ikke at den eksisterede (*Didn't know it existed*)
- jeg kan ikke løfte min cykel så højt og der er i øvrigt sjældent plads (*I can not lift my bicycle since it is heavy and there seldom remains a place.*)
- Det tager alt for lang tid (*They take too long time*)
- det ser besværligt ud, at skulle hænge den helt derop - og skuret er låst, og der lugter af tis. (*It looks difficult to hang it that high and the shed is locked and it smels of urine.*)
- parkerer ikke ved nørreport station - og hvis jeg gjorde ville det være for svært for mig at få cyklen øverst. (*Don't park at norreport station – and if I ? be too hard for me to put the bike on top level*)
- jeg har en ting cykel og kan ikke bære den øverst i hvert fald (*I have a heavy bicycle and can't carry it to the uppermost level anyhow*)
- for svært (*too hard*)
- Der har altid været et ledigt stativ lige udenfor (*There are always an avaibel rack right outside*)
- Har brugt dem , men det er for besværligt og der er meget ulækkert (*Have used them, but they are too difficult and it is very repulsive there.*)
- Ved ikke hvordan det foregår med at løfte op - forestiller mig at det tager tid og er besværligt at gøre alene (*I don't know how to lift the bike up I imagine it is diffucult and time consuming*)
- fordi de ridser ens cykel når de skal have deres egne ned som står oven på ens cykel (*becasuse they scrach the bike when they retrive their own bikes parked on top of your own.*)
- svært at få cyklen ind og ud (*difficult to get the bicycle in and out*)
- Ved ikke hvordan jeg skal faa min cykel derop (*I don't know how to get my bike up there*)

13) What do you do with old bikes that you will no longer use?

- lader den stå på stationen (*leave at a station*)
- kører dem på lossen eller sælger dem (*take it to the dump or sell it*)
- giver dem videre (*pass them on*)
- stiller dem frem for afhæntning til genbrug (kommunal ordning) (*place them out for recycling (community system)*)
- Går til skrot (*Give to scrap*)
- Storskrald (*Bulky refuse -place them for recycling(public system)*)
- Har aldrig haft det problem (*Have never had that problem*)
- bruger dem som reservedele eller sætter dem til storskrald (*use them for spare parts or deposit them in bulky refuse*)

- Skiller dem ad for brugbare dele og stiller resterne på genbrugspladsen (*Partition them by useable shares and partition the rest to the recycling yard*)
- Genbrugsplads (*recycling place*)
- kommunens containerplads (*community container place*)
- Mine gamle cykler er tidligere blevet stjålet - og derfor måtte jeg have en ny. (*My old bicycle was stolen- and therefore I had to have a new one*)
- afleverer på genbrugsstationen (*deliver to recycling station*)
- Forærer dem bort til bekendte med behov (*give it as a gift to a friend who needs one*)
- skiller den ad. Nogle dele kan bruges, andet ryger til storskral. (*Partition it into parts that can be used, others go to bulky refuse*)
- sætter den (*place them*)
- På genbrugs stationen (*Recycling station*)
- Storskaldsordningen (*Bulky refuse*)
- Storskaldsordningen (*Bulky refuse*)
- Storskrald (*Bulky refuse*)
- Det kender jeg ikke, mine cykler bliver altid stjålet inden de bliver gamle - desværre. (*i am not an expert, my bicycle always gets stolen before it gets old – unfortunately*)
- Lader dem stå hjemme til der er afhentning - som regel er de stjålet inden de bliver gamle (*bulky refuse*)
- Genbrugsplads (*Recycling place*)
- Afleverer dem på affaldspladsen (*hand it over to scrap yard*)
- Skrotter (*scrap it*)
- Sætte dem ud til kommunens storskaldsafhentning (*leave them for community bulky waste collecting*)
- Til Stor skald.. de er færdige efter 10 år... tager deversedel der stadigvæks kan bruges... Bagasebager, Lås, Ringe klokke, reflekser... det vist det. (*Take spares and leave the rest for bulky refuse*)
- Sælger dem (*Sell them*)
- Genbrugsstation (*Recycling station*)
- viceværten hvor jeg bor fjerner dem (*janitor where I live removes them*)
- LOSSEREN (*yard*)
- forsøger at sælge dem (*try to sell them*)
- Lader dem stå i cykelkælderen (*leave them at a bicycle cellar at my home*)
- Smider den på genbrugsstationen (*Throw out at a recycling station*)
- Lossepladsen (*yard*)
- Afleverer dem (*Deliver them*)
- den sidste forærede jeg væk (*the last I made a gift of*)
- de når aldrig at blive gamle da bliver stjålet inden da, men ville nok forsøge at sælge den til en cykelhandler (*never stays old it gets stolen before that, but will attempt to sell it to a bicycle dealer*)
- smides på gaden (*throw it in the street*)
- Smider dem væk (*Throw them away*)

- Smider dem på lossepladsen (*Throw them in dump*)
- sælger dem eller får dem stjålet. Jeg har endnu ikke prøvet at skulle af med en gammel cykel! (*Sell them or get them stolen. I have still not tried to to have to get rid of an old bicycle*)
- har ingen (*have none*)
- hvis de er for små giver jeg dem til mine mindre søskende eller til et loppemarked (*give them to my siblings or sell at flea market*)
- prøver at sælge dem. Har en gang 'glemt' en gammel cykel på en station, da jeg holdt op med at bruge den station (*try and sell them. I have once forgotten a bike at a station when I stopped using that station*)
- stiller dem sirligt og ulåst til den næste cykelløse, der så får en gave - hvis de tør tage imod den (nogle gange hedder det jo tyveri..) (*leave them unlocked for the next "bicycleless" person*)
- storskrald (*bulky refuse*)
- de samles og afhentes i vores gård (*bulky refuse*)
- forærer dem væk (*give it away*)
- de blir som regel stjålet inden jeg når at tænke så langt! (*Always stolen before that becomes a problem*)
- Afleverer dem på genbrugsstationen (*Bring them to a recycling station*)
- kælderen indtil de kan smides ud ved fællesoprydning (*bulky refuse*)
- Sælger dem. (*Sell them*)
- Efterlader dem (*abandon them*)
- Der er nogen der stjæler dem fra mig (*Gets stolen*)
- Jeg efterlader dem ihvertfald (*I abandon them*)
- Lader dem stå i cykelskuret hvor jeg bor indtil der er cykeloprydning og de bliver fjernet (*Bulky refuse*)
- Har dem hjemme i kælderen som ekstracykler. (*Keep at home in the basement as spare bicycles*)
- Smider dem ud hvis den ikke kan bruges til ekstracykel (*Throw them out if they can't be used as spare bicycles*)
- jeg forærer den til røde kors (*i give them as a gift to the red cross*)
- sælger (*sell*)
- Smider dem ud (*Throw them out*)

14) Overall, are you pleased with the current parking situation?

Yes: 10 (13.7%)

No: 49 (67.1%)

Why or why not?

- Jeg bruger Amagerbro. Her er cykelparkeringskælderen god. Men adgangsforholdene er alt for besværlige. Trappen er lang og stejl og tager derfor alt for lang tid at benytte. (*I use Amagerbro. The bicycle parking situation is good. But restricted access is too difficult. Stairs are long and steep and that's why it takes too long time to use.*)

- for få pladser, særligt de overdækkede og de aflåste (*too few places, especially the covered and the locked*)
- Uoverskueligt på gadeniveau, vanskeligt at komme til undergrundsparkeringen (*Enormous at the street level, difficult to get to the underground parking*)
- Der er aldrig sjov at stille en cykel hvor der er stor risiko for at den bliver stjålet, eller mishandlet. (*It is never fun to put a bicycle where there is a large risk to have it stolen or mishandled*)
- der er ikke nok (*there are not enough*)
- jeg har aldrig brugt dem, derfor kan jeg ikke svare (*I never have used them so I can not answer*)
- hard to find a space,
- Ved Østerport er der for få overdækkede cykelparkeringspladser (*At Osterport there are too few covered parking places*)
- Ved ikke, bruger ikke Nørreport (*Don't know, don't use Nørreport*)
- Der er ikke nok steder at parkere. Kunne godt gøres bedre og mere tilgængeligt (*There are not enough places to park in. Could do a lot better and make it more accessible*)
- der er alt for lidt plads i forhold til hvor mange cykler og mennesker der kommer fordi på en dag (*there are too little places in relation to the number of bicyclers and people each day*)
- Der er for mange cykler hvilket er et generelt problem i København (*There are too many bicycles which is a general problem in Copenhagen*)
- allt for mange ubrugte cykler uden for stationen som tager plads og cykler kommer til skade. (*Too many unused bicycles around stations that take up places and bicycles become damaged*)
- Der er meget fyldt med cykler (*There are plenty full of bicycles*)
- Elendig parkeringsforhold, al for lidt plads, pladserne der er overdækket bliver bogstaveligt talt brug som toilet for hjemløse - jeg syntes de skal have opstillet et toilet, da det ikke er værdigt for dem og ulækkert for os andre. Af den grund bruger jeg sjældent den overdækkede parkering (*Miserable parking conditions, too few places, places are covered stay literally used as a toilet for the homeless – I guess you must put up a toilet seeing that there is not worthy for them and repulsive for us others.*)
- der er for lidt plads. man skulle prioritere mere plads og bedre forhold til cyklerne. det er sundt at cykle. lad bilen stå! (*There are too few places, they should prioritize more space and better conditions for cyclists. its healthy to bike. leave the car at home*)
- Der er ikke plads nok, og der er mange efterladte og væltede cykler (*There are not enough places, there are many abandoned and old bicycles*)
- Da jeg tager regional toget og derfor parkerer på Nørreport (dobbellags parkering) oplever jeg tit at der er for lidt plads til at parker da der ofte er for lidt plad mellem cyklerne (for brede styr) og fordi cykler tit ligger kastet rundt omkring og optager unødigt meget plads. (*Racks too narrow and not enough*)

- jeg bruger fast den overdækkede cykelparkering på Nørreport - fordi den er overdækket og rimelig tæt på udgangen. Men jeg er ikke 100% tilfreds fordi der som regel stinker af pis. Jeg ved godt at der er en aflåst afdeling, men har ikke undersøgt om der er ledige nøgler. Og stanken er vel næsten den samme der. (*Double level at Nørreport, smells*)
- min cykel står godt lige der mellem alle de andre. det er hurtigt og nemt at parkere den. (*My bicycle sits nicely between all the others. It is quickly and conveniently parked then.*)
- for få pladser (*too few places*)
- der er ret kaotisk og ikke plads (*it is chaotic and no spaces*)
- alt for mange gamle cykellig (*too many old bicycles*)
- der er ikke plads. enten finder man sin cykel i en bunke eller også er den blevet flyttet til den anden ende af hvor man havde parkeret. desuden er det nok ikke det smarteste sted at parkere, hvis man ønsker at beholde sin cykel, - men det er jo så ens eget problem! (*There are no places. Either find my bicycle in a pile or moved to another place than where I had parked. Moreover there is not the smartest place to park, if one wishes to keep his bicycle – but it is certainly one talked about problem.*)
- Pladsmangel (*Lack of space*)
- Det er et stort kaos (*It is large scale chaos*)
- For lidt plads, for rodet. (*Too little spaces, too badly organized*)
- Tæt på og som oftest ledige pladser - cyklerne fylder dog meget (*Close packed and often no free spaces – the bicycles take up a lot of space*)
- dobbeltlags cykelparkeringen kan ikke bruges, og er meget ulækker. Den indendørs parkering er fin, jeg har brugt den et par gange i vinters, men det nemmere at stille cyklen ved stationen når vejret er godt. Hvis min cykel skulle stå natten over ville jeg bruge den indendørs parkering. (*Can't use double level bicycle parking and it is very dirty. The indoor parking is fine, I have used it once or twice in the winter, it is easier to park closer to the station when the weather is good. If my bicycle stays there overnight I use the indoor parking.*)
- Der er ikke pladser nok, og der lugter fælt af tis ved dobbeltlagsparkeringen, hvor der ofte er plads (*There are not enough places, and the double level parking smells, there are often room enough.*)
- Der er altid fin plads, der hvor jeg gerne vil holde når jeg kommer kl 7. (*There are always places where I want to park, and I will usually get one if I arrive at 7am.*)
- Jeg foretrækker at få cyklen under tag, det kan jeg her. Jeg bruger dobbelt stativerne. Men, der er for mange gamle ubrugte cykler som tager plads. (*I prefer to put bicycles under cover, I can do that here. I use the double level racks. But they are too many old unused bicycles in the places.*)
- fordi der ligger cykler der i flere uger og man falder over dem som ligger og der er ik plads i stativerne (*because there are neglected bicycles left there for weeks and people can fall over them and there are no spaces in the racks.*)

- for få pladser, dobbeltlags parkering er næsten umulig med en ret bred cykel (*too few places, double level parking is nearly impossible with a rather wide bicycle.*)
- Der kunne godt være mere plads (*There can well be more places.*)

15) Additional Comments:

- Godt spørgeskema, der mangler et "er" i nedenstående sætning fra punkt 11: "Hvis du ikke bekendt med cykelparkerings arealerne. Hvordan mener du man bedst kunne fremme kendskabet til dem?" (*Good questionnaire, there needs to be an 'er' mentioned in the phrase in question 11.....*)
- Jeres spørgeskema er ikke særligt godt udformet - især når man ikke anvender Nørreport. (*Your questionnaire is not particularly good drawn up – in particular when one doesn't use Nørreport.*)
- Beklager at jeg kun kører til Vanløse. (*Sorry I can only go to Vanløse*)
- ovenstående kommentar gælder alle stationer (*the list above applies to all stations*)
- There is also a need for raket designs and locations allowing safe and handy parking of three wheel bikes, bikes with trailers, etc.
- jeg bruger den aflåste og overdækkede cykelparkering ved Rødovre, og kører videre med tog til Slagelse på arbejde. Det er jeg godt tilfreds med. I Kbh. byen bruger jeg cyklen i stedet for toget. (*I use the locked and covered parking at Rødovre, and continue farther on the train to Slagelse to work. It is satisfying to me. In Copenhagen I use the bike instead of the trains*)
- Mit svar er præget af at jeg aldrig har cykel med i tog som cykel. Under togtransport er min Brompton klappet sammen således at den ikke er en cykel men håndbagage. Efter ankomsten blive den klappet ud igen og bliver til en cykel. (*my answer is that I never have bicycle on train. Under train transport my Brompton collapses in a way that others can't. on my arrival I can unfold it and use the bicycle.*)
- Jeg pakerer meget sjældent ved Nørreport. (*I park very seldom at Nørreport*)
- Har jeg brug for cykelparkering i "byen" bruger jeg kælder med opsyn på Hovedbanegården. Vedr. sp.7: På nogle stationer er dør-trinet til cykelvognen urimeligt højt. Men tak til DSB fordi de har ophævet spærretiden, jeg har min cykel med toget næsten hver dag på arbejde. (*If I use bicycle parking I continuously use Hovedbanegårdens bicycle parking*)
- Lav ovedækket cykelparkering i gadeniveau og lav rigeligt af dem og ikke for langt fra nedgangene til metroen. Hvis det er opfyldt kan man se på om man evt. skal fjerne (give bøder til) cykler der flyder uden for stativerne. (*Low deck of bicycle parking is street level and too low and not enough of them. you should fine cyclists parking outside racks*)
- En Cykel kælder virke ikke særlig betrykkende... da der letter cykler letter vil kunne blive stjålet eller mishandlet, for der er mindre overvågning fra almindelig mennesker. Hvad med med et boxelås system hvor der indsættes 20 kr, de refunderes når man henter den... det fylder måske for meget koster en del... terror? eller vagt princippet hvor man betaler 5 kr. for at have den stående

i nøgle 10A som man låser om hjulet, når man kommer kan vagten låse op for nøglen når man kommer. Det vi også kost i løning til vagt + opsætning og vilige holdes at stedet. (*the bicycle basement doesn't work... easier for criminals to steal or mistreat bikes as there are less people to disturb a criminal. You should have lockers where you insert 20 kroner to get a locker (and more along same lines)*)

- Voksne cyklister med børn burde cykle sammen med deres børn indtil forældrene er sikre på at ungerne kan begå sig i trafikken og at de kender færdselsreglerne. (*Nonsense*)
- mine svar er desværre ikke særlig værdifulde, da jeg ikke bruger nørreport station til parkering, hvis jeg vælger at tage toget, lader jeg cyklen blive HELT hjemme (*my answer unfortunately is not of great value, I don't use Nørreport station to park, if I take the train, I leave my bike at home*)
- Bruger ALDRIG tog og cykel i kombination (*Never use train and bicycle combination*)
- Afstanden til stationen generelt og på Nørreport afhænger af skiltning, farbarhed og specielt om natten: belysningen. (*the distance to the station generally and at Nørreport it depends on sign posting, passable especially during the night: lighting is a problem*)
- Der er en udemærket cykelparkering på Israels plads, men man skulle lave direkte indgang fra cykelparkeringen til togstationen og man skulle lave en nedkørsel. Så kunne de mange der kommer fra Nørrebro let komme af med deres cykler og hurtigt komme videre til toget. Men når man har 4 min. til toget går, står man ikke lige af cyklen, slæber den ned i en kælder, går op af en masse trapper for at storme hen til stationen på fod og så løbe ned af en masse trapper. God fornøjelse med undersøgelsen (*There is good bicycle parking at Israels Plads, but must have direct entrance from the bicycle parking to the train station and must have a ramp. This can many come from Norrebro easy bring their bicycle and quickly come to the train. But when have four minutes until train leave can't easily park bicycle, tug it down into the basement, leave up in crowd by staircase too rush to the station on foot and run stairs.*)
- Generelt synes jeg det er ærligt at Nørreport Station skal rives ned og genopføres, men jeg håber da at man tilgængæld gør cykelparkeringsforholdene bedre. (*Generally i honestly feel that Nørreport station must tear down and rebuild, but I hope that bicycle parking problem better*)
- Cykel parkering udenfor stationen FORBUDT. Alle cykler icykelkælder som er lys og sikker og nem adgang. måske videoovervagt? (*Bicycle parking outside the station forbidden. All bicycles in the basement which is light safe and easy to use maybe video surveillance*)
- Parkeringsforholdene er så dårlige, at jeg nogle gange tager bussen, da jeg ikke orker at vikle min cykel ud og ind af de andre cykler. (*Bicycle parking is worse, I sometimes take the bus, I don't have the energy to get my bicycle entangled in another bicycle.*)

- jeg håber I kan være med til at forbedre parkeringsforholdene for cykler ved nørreport. god arbejdslyst!! (*I hope there can be an improved parking situation for bicycles at Nørreport*)
- Hvis man kunne gøre noget for at undgå at den overdækkede afdeling anvendes som pissoir, ville Nørreport være fin til parkering. Har ikke prøvet den underjordiske, men det ville kun være rigtig interessant hvis der var adgang nede fra perronnerne; det ved jeg ikke om der er. Det må ikke tage for lang tid når man er på vej til arbejde - eller gerne vil nå toget hjem. Det virker mærkeligt at den underjordiske slet ikke er skiltet på gadeplan. Jeg har i hvertfald ikke set nogen skilte. Det dur heller ikke hvis den er for langsom eller for lille - ventetid er det værste på den tid af dagen. (*Covered racks good if you could prevent them being used as urinal, haven't tried underground. (He goes on and on about the underground but hasn't been there!!)*)
- Selvom 'langsiden langs 5A' altid er overfyldt og i to-tre lag, så er der en særlig orden, og altid en 'ledig plads'. Det er rart, altid at finde en parkeringsplads kan man sige. (*Even though the long side along 5A always is overfilled and two to three layered, there is a particular order and always a 'free place'. Is it nice, always to find a parking place can be important.*)
- i helsingborg har jeg set en bemandet, døgnovervåget p-plads nær færgen, med mulighed for småservice på cyklen. hvorfor har man ikke noget lignende i dk? (*In helsingborg I see a manned, around the clock, parking place near ferry, with the possibility to maintain bicycles. Where haven't we got the same in denmark?*)
- Det er en rigtig god ide med en undersøgelse af cykelparkeringen og jeg vil opfordre andre til at deltage. Jeg kan ikke forstå hvorfor i ikke beder om respondenternes køn, alder og andre demografiske data, for at finde ud af hvor repræsentative besvarelsene er. Jeg syntes faktisk det er lidt fornærmende at der er en del stavfejl - det er mangel på respekt for os der skal hakke sig igennem teksten. Held og lykke med jeres undersøgelse! (*it is one good idea with study of bicycle parking and I will ask another to take part. I can not understand how not ask of sex, age, and other demographical data, to find how representative the responses are. I feel actually that little insults there are spelling mistakes – it is lack of respect to us to stammer through the titles. Luck with your study.*)

Nørreport

1) Do you park your bicycle at Nørreport station?

Yes: 31 (100%)

2) Choose all that apply:

You ride your bicycle from home to the train/metro station: 22 (71%)

You ride your bicycle from the station to work: 7 (22.6%)

You ride your bicycle from home to work: 10 (32.3%)

Other: 1 (3.2%)

- fra hejmmet til bus (*from home to bus*)

3) When parking your bicycle at a train station: How long is it usually parked there (number of hours) ?

6 to 8 hours: 8 (25.8%)
8 to 10 hours: 13 (41.9%)
10 to 12 hours: 2 (6.5%)
12 to 14 hours: 0
14 to 16 hours: 3 (9.7%)
16 to 18 hours: 0
18 to 20 hours: 0
20 to 22 hours: 0
22 + hours: 0

4) What time of the day do you leave your bicycle parked there (select all that apply)?

Morning: 24 (77.4%)
Late Morning: 7 (22.6%)
Afternoon: 10 (32.3%)
Evening: 5 (16.1%)
Overnight: 3 (9.7%)

5) Do you use the bicycle parking racks at the station?

Yes: 17 (54.8%)
No: 14 (45.2%)

If no, why not?

- for få og for overfyldte (*too few and too overfilled*)
- De er næsten aldrig ledige (*They are almost never available*)
- Det tager for lang tid, der er næsten altid fylde og der lugter af pis (*They take too long of time, they are almost always filled and it smells like pis!!*)
- bruger dem sjældent, men har ofte for travlt og der er for mange cykler - det er besværligt! (*Make use of them seldom, but frequently too busy and there are too many bicycles – it is difficult*)
- de er fyldte og de står ikke lige der hvor jeg skal bruge dem (*they are full and not level so I can't use them*)
- der er ofte ikke plads ved de normale stativer, og det tager for lang tid at bakke cyklen op på "2. etage" i cykelparkeringshusene (*there's often no place in the normal ones and it takes too long of time to park the bicycle on the second level of the multi level racks*)
- der er ikke nogen lige der hvor jeg ankommer til stationen (*there are none empty at the point I arrive at the station*)
- der er ikke plads! (*there isn't space!*)

- Der er ikke plads i cykelstativerne (*there isn't room in the bicycle racks*)
- Der er sjældent plads (*there is seldom a place*)
- Bruger dem af og til, men der er sjældent plads udenfor. Min cykel er for høj til at stå i den nederste etage indenfor. Det er for besværligt at bruge øverste etage. Der er desuden meget uhensigtsmæssigt indenfor. (*Use them once in a while, but there is seldom place. My bicycle is too tall/big to stand in the lowest floor inside. It is too difficult using the top floor. It is flimsy inside*)
- Forsøger så vidt muligt, men der er meget sjældent plads, så svaret bliver nej (*Attempt to use them if it is possible, but there are very seldom places, thus the answer happens to be no*)
- der er ikke plads (*there isn't space*)
- Der er ikke plads (*there isn't space*)

6) Do you frequently experience problems fitting your bicycle into a rack, due to your bicycle's shape or size?

Yes: 12 (38.7%)

No: 17 (54.8%)

If so, why?

- mine dæk er for smalle (*my tires are too narrow*)
- er ikke indrettet til mountainbikes (*aren't organized for mountain bikes*)
- Har en ældre cykel med brede dæk (*Have an older bicycle with wider tires*)
- Der er ofte ikke plads til styret hvis man skal parkerer mellem to andre cykler. (*There is often no space for the handlebar if parking between other bicycles*)
- i den overdækkede cykelparkering er stativerne skiftevis halvt oppe og halvt nede. Jeg kan kun bruge den ene variant til min cykel (*in the covered bicycle parking the racks alternate half up and half down. I can only use the ones compatible with my bicycle*)
- når jeg endelig bruger stativer (ved andre st.), er mine mountainbikehjul ofte for brede (*when I use racks (usually at other stations) my tires are often too wide*)
- ekser hjulet (*bend the wheel*)
- Se ovenfor. Min cykel er for høj. Dem udenfor er fine. (*Too high, my bicycle is too tall. The ones outside are fine*)
- for smalle (*too narrow*)

7) If you take your bike on the train or metro, how would you rate the difficulty of getting it from the street to the train? 1 being very easy, 5 being very difficult

Average Difficulty: 2.625

8) If it was easier to take your bicycle on the train or metro with you, would you take it instead of parking it at the station?

Yes: 11 (35.5%)

No: 19 (61.3%)

9) How far away from the entrance to the station are you willing to park your bicycle during the day and at night?

Day

0 to 10 meters: 4 (12.9%)
10 to 20 meters: 7 (22.6%)
20 to 50 meters: 14 (45.2%)
50 to 100 meters: 4 (12.9%)
>100 meters: 25 (80.6%)

Night

0 to 10 meters: 4 (16.1%)
10 to 20 meters: 8 (25.8%)
20 to 50 meters: 12 (38.7%)
50 to 100 meters: 4 (12.9%)
>100 meters: 24 (77.4%)

10) Are you aware of underground bicycle parking at Nørreport and other parking lots in the area?

Yes: 9 (29.0%)

No: 22 (71.0%)

11) If you haven't heard of other parking areas, then what would be good means of making people aware of them?

Signs: 24 (77.4%)

Advertisements: 8 (25.8%)

Internet: 0

Newspaper: 3 (9.7%)

Other: 5 (16.1%)

- personer der gik ved stationen og anviste folk (*personally walk at the station and show people*)
- foldere på stationerne (*folder at the station*)
- plakater v stationen om hvor nemt det er at parkere der ... (*poster at station of where it is easy to park*)
- brochurer (*brochure*)

12) Have you or do you use the upper level of the multilevel parking facility?

Yes: 14 (45.2%)

No: 17 (54.8%)

If no, why not?

- det er for besværligt at løfte cyklen (*it is too difficult to lift the bicycle*)
- det er for besværligt, og de passer ikke til store cykler (høj sadde) /mountainbikes (*they are too difficult, and doesn't fit with big bicycles (high seats)/mountain bikes*)
- det er besværligt, og metro-parkeringen under jorden er bedre. (*They are too difficult, and metro parking underground is better*)
- Ved ikke hvad det er (*Haven't been near them*)
- jf. ovenfor (spg. 5) (same as above)

- Sjældent - det er for omstændigt. tager for lang tid. (*Seldom – they are too cumbersome. takes too long time*)
- ved ik aldrey tænkt på det (*don't know never thought of it*)
- Vidste ikke at den eksisterede (*Didn't know it existed*)
- jeg kan ikke løfte min cykel så højt og der er i øvrigt sjældent plads (*I can not lift my bicycle since it is heavy and there seldom remains a place.*)
- Det tager alt for lang tid (*They take too long time*)
- det ser besværligt ud, at skulle hænge den helt derop - og skuret er låst, og der lugter af tis. (*It looks dificult to hang it that high and the shed is locked and it smels of urine.*)
- for svært (*too hard*)
- Der har altid været et ledigt stativ lige udenfor (*There are always an avaiabel rack right outside*)
- Har brugt dem , men det er for besværligt og der er meget ulækkert (*Have used them, but they are too difficult and it is very repulsive there.*)
- Ved ikke hvordan det foregår med at løfte op - forestiller mig at det tager tid og er besværligt at gøre alene (*I don't know how to lift the bike up I imagine it is diffucult and time consuming*)
- fordi de ridser ens cykel når de skal have deres egne ned som står oven på ens cykel (*becasuse they scrach the bike when they retrieve their own bikes parked on top of your own.*)
- svært at få cyklen ind og ud (*difficult to get the bicycle in and out*)
- Ved ikke hvordan jeg skal faa min cykel derop (*I don't know how to get my bike up there*)

13) What do you do with old bikes that you will no longer use?

- kører dem på lossen eller sælger dem (*take it to the dump or sell it*)
- Skrotter (*scrap it*)
- Til Stor skald.. de er færdige efter 10 år... tager deversedel der stadigvæks kan bruges... Bagasebager, Lås, Ringe klokke, reflekser... det vist det. (*Take spares and leave the rest for bulky refuse*)
- Genbrugsstation (*Recycling station*)
- Afleverer dem (*Deliver them*)
- den sidste forærede jeg væk (*the last I made a gift of*)
- de når aldrig at blive gamle da bliver stjålet inden da, men ville nok forsøge at sælge den til en cykelhandler (*never stays old it gets stolen before that, but will attempt to sell it to a bicycle dealer*)
- smides på gaden (*throw it in the street*)
- Smider dem væk (*Throw them away*)
- Smider dem på lossepladsen (*Throw them in dump*)
- sælger dem eller får dem stjålet. Jeg har endnu ikke prøvet at skulle af med en gammel cykel! (*Sell them or get them stolen. I have still not tried to to have to get rid of an old bicycle*)
- har ingen (*have none*)

- hvis de er for små giver jeg dem til mine mindre søskende eller til et loppemarked (*give them to my siblings or sell at flea market*)
- prøver at sælge dem. Har en gang 'glemt' en gammel cykel på en station, da jeg holdt op med at bruge den station (*try and sell them. I have once forgotten a bike at a station when I stopped using that station*)
- stiller dem sirligt og ulåste til den næste cykelløse, der så får en gave - hvis de tør tage imod den (nogle gange hedder det jo tyveri..) (*leave them unlocked for the next "bicycleless" person*)
- forærer dem væk (*give it away*)
- de blir som regel stjålet inden jeg når at tænke så langt! (*Always stolen before that becomes a problem*)
- Afleverer dem på genbrugsstationen (*Bring them to a recycling station*)
- kælderer indtil de kan smides ud ved fællesoprydning (*bulky refuse*)
- Sælger dem. (*Sell them*)
- Efterlader dem (*abandon them*)
- Der er nogen der stjæler dem fra mig (*Gets stolen*)
- Jeg efterlader dem ihvertfald (*I abandon them*)
- Lader dem stå i cykelskuret hvor jeg bor indtil der er cykeloprydning og de bliver fjernet (*Bulky refuse*)
- Har dem hjemme i kælderen som ekstracykler. (*Keep at home in the basement as spare bicycles*)
- Smider dem ud hvis den ikke kan bruges til ekstracykel (*Throw them out if they can't be used as spare bicycles*)
- jeg forærer den til røde kors (*i give them as a gift to the red cross*)
- sælger (*sell*)
- Smider dem ud (*Throw them out*)

14) Overall, are you pleased with the current parking situation?

Yes: 7 (22.6%)

No: 24 (77.4%)

Why or why not?

- for få pladser, særligt de overdækkede og de aflåste (*too few places, especially the covered and the locked*)
- Der er aldrig sjov at stille en cykel hvor der er stor risiko for at den bliver stjålet, eller mishandlet. (*It is never fun to put a bicycle where there is a large risk to have it stolen or mishandled*)
- Der er ikke nok steder at parkere. Kunne godt gøres bedre og mere tilgængeligt (*There are not enough places to park in. Could do a lot better and make it more accessible*)
- der er alt for lidt plads i forhold til hvor mange cykler og mennesker der kommer fordi på en dag (*there are too little places in relation to the number of bicyclers and people each day*)
- Der er for mange cykler hvilket er et generelt problem i København (*There are too many bicycles which is a general problem in Copenhagen*)

- allt for mange ubrugte cykler uden for stationen som tager plads og cykler kommer til skade. (*Too many unused bicycles around stations that take up places and bicycles become damaged*)
- Der er meget fyldt med cykler (*There are plenty full of bicycles*)
- Elendig parkeringsforhold, al for lidt plads, pladserne der er overdækket bliver bogstaveligt talt brug som toilet for hjemløse - jeg syntes de skal have opstillet et toilet, da det ikke er værdigt for dem og ulækkert for os andre. Af den grund bruger jeg sjældent den overdækkede parkering (*Miserable parking conditions, too few places, places are covered stay literally used as a toilet for the homeless – I guess you must put up a toilet seeing that there is not worthy for them and repulsive for us others.*)
- der er for lidt plads. man skulle prioritere mere plads og bedre forhold til cyklerne. det er sundt at cykle. lad bilen stå! (*There are too few places, they should prioritize more space and better conditions for cyclists. its healthy to bike. leave the car at home*)
- Der er ikke plads nok, og der er mange efterladte og væltede cykler (*There are not enough places, there are many abandoned and old bicycles*)
- Da jeg tager regional toget og derfor parkerer på Nørreport (dobbellags parkering) oplever jeg tit at der er for lidt plads til at parker da der ofte er for lidt plad mellem cyklerne (for brede styr) og fordi cykler tit ligger kastet rundt omkring og optager unødigt meget plads. (*Racks too narrow and not enough*)
- jeg bruger fast den overdækkede cykelparkering på Nørreport - fordi den er overdækket og rimelig tæt på udgangen. Men jeg er ikke 100% tilfreds fordi der som regel stinker af pis. Jeg ved godt at der er en aflåst afdeling, men har ikke undersøgt om der er ledige nøgler. Og stanken er vel næsten den samme der. (*Double level at Nørreport, smells*)
- min cykel står godt lige der mellem alle de andre. det er hurtigt og nemt at parkere den. (*My bicycle sits nicely between all the others. It is quickly and conveniently parked then.*)
- alt for mange gamle cykellig (*too many old bicycles*)
- der er ikke plads. enten finder man sin cykel i en bunke eller også er den blevet flyttet til den anden ende af hvor man havde parkeret. desuden er det nok ikke det smarteste sted at parkere, hvis man ønsker at beholde sin cykel,- men det er jo så ens eget problem! (*There are no places. Either find my bicycle in a pile or moved to another place than where I had parked. Moreover there is not the smartest place to park, if one wishes to keep his bicycle – but it is certainly one talked about problem.*)
- Pladsmangel (*Lack of space*)
- Det er et stort kaos (*It is large scale chaos*)
- For lidt plads, for rodet. (*Too little spaces, too badly organized*)
- Tæt på og som oftest ledige pladser - cyklerne fylder dog meget (*Close packed and often no free spaces – the bicycles take up a lot of space*)
- dobbeltlags cykelparkeringen kan ikke bruges, og er meget ulækker. Den indendørs parkering er fin, jeg har brugt den et par gange i vinters, men det nemmere at stille cyklen ved stationen når vejret er godt. Hvis min cykel skulle stå natten over ville jeg bruge den indendørs parkering. (*Can't use double level bicycle parking and it is very dirty. The indoor parking is fine, I have used it once or twice in the winter, it is easier to park closer to the station when the weather is good. If my bicycle stays there overnight I use the indoor parking.*)

- Der er ikke pladser nok, og der lugter fælt af tis ved dobbeltlagsparkeringen, hvor der ofte er plads (*There are not enough places, and the double level parking smells, there are often room enough.*)
- Der er altid fin plads, der hvor jeg gerne vil holde når jeg kommer kl 7. (*There are always places where I want to park, and I will usually get one if I arrive at 7am.*)
- Jeg foretrækker at få cyklen under tag, det kan jeg her. Jeg bruger dobbelt stativerne. Men, der er for mange gamle ubrugte cykler som tager plads. (*I prefer to put bicycles under cover, I can do that here. I use the double level racks. But they are too many old unused bicycles in the places.*)
- fordi der ligger cykler der i flere uger og man falder over dem som ligger og der er ik plads i stativerne (*because there are neglected bicycles left there for weeks and people can fall over them and there are no spaces in the racks.*)
- for få pladser, dobbeltlags parkering er næsten umulig med en ret bred cykel (*too few places, double level parking is nearly impossible with a rather wide bicycle.*)
- Der kunne godt vaare mere plads (*There can well be more places.*)

15) Additional Comments:

- Godt spørgeskema, der mangler et "er" i nedenstående sætning fra punkt 11: "Hvis du ikke bekendt med cykelparkerings arealerne. Hvordan mener du man bedst kunne fremme kendskabet til dem?" (*Good questionnaire, there needs to be an 'er' mentioned in the phrase in question 11.....*)
- En Cykel kælder virke ikke særlig betrykkende... da der letter cykler letter vil kunne blive stjålet eller mishandlet, for der er mindre overvågning fra almindelig mennesker. Hvad med med et boxelås system hvor der indsættes 20 kr, de refunderes når man henter den... det fylder måske for meget koster en del... terror? eller vagt princippet hvor man betaler 5 kr. for at have den stående i nøgle 10A som man låser om hjulet, når man kommer kan vagten låse op for nøglen når man kommer. Det vi også kost i løning til vagt + opsætning og vilige holdes at stedet. (*the bicycle basement doesn't work... easier for criminals to steal or mistreat bikes as there are less people to disturb a criminal. You should have lockers where you insert 20 kroner to get a locker (and more along same lines)*)
- Der er en udemærket cykelparkering på Israels plads, men man skulle lave direkte indgang fra cykelparkeringen til togstationen og man skulle lave en nedkørsel. Så kunne de mange der kommer fra Nørrebro let komme af med deres cykler og hurtigt komme videre til toget. Men når man har 4 min. til toget går, står man ikke lige af cyklen, slæber den ned i en kælder, går op af en masse trapper for at storme hen til stationen på fod og så løbe ned af en masse trapper. God fornøjelse med undersøgelsen (*There is good bicycle parking at Israels Plads, but must have direct entrance from the bicycle parking to the train station and must have a ramp. This can many come from Norrebro easy bring their bicycle and quickly come to the train. But when have four minutes until train leave can't easily park bicycle, tug it down into the basement, leave up in crowd by staircase too rush to the station on foot and run stairs.*)
- Generelt synes jeg det er ærligt at Nørreport Station skal rives ned og genopføres, men jeg håber da at man til gengæld gør cykelparkeringsforholdene bedre. (*Generally i honestly feel that Nørreport station must tear down and rebuild, but I hope that bicycle parking problem better*)

- Cykel parkering udenfor stationen FORBUDT. Alle cykler icykelkælder som er lys og sikker og nem adgang. måske videoovervagt? (*Bicycle parking outside the station forbidden. All bicycles in the basement which is light safe and easy to use maybe video surveillance*)
- Parkeringsforholdene er så dårlige, at jeg nogle gange tager bussen, da jeg ikke orker at vikle min cykel ud og ind af de andre cykler. (*Bicycle parking is worse, I sometimes take the bus, I don't have the energy to get my bicycle entangled in another bicycle.*)
- jeg håber I kan være med til at forbedre parkeringsforholdene for cykler ved Nørreport. god arbejdslyst!! (*I hope there can be an improved parking situation for bicycles at Nørreport*)
- Hvis man kunne gøre noget for at undgå at den overdækkede afdeling anvendes som pissoir, ville Nørreport være fin til parkering. Har ikke prøvet den underjordiske, men det ville kun være rigtig interessant hvis der var adgang nede fra perronnerne; det ved jeg ikke om der er. Det må ikke tage for lang tid når man er på vej til arbejde - eller gerne vil nå toget hjem. Det virker mærkeligt at den underjordiske slet ikke er skiltet på gadeplan. Jeg har i hvertfald ikke set nogen skilte. Det dur heller ikke hvis den er for langsom eller for lille - ventetid er det værste på den tid af dagen. (*Covered racks good if you could prevent them being used as urinal, haven't tried underground. (He goes on and on about the underground but hasn't been there!!)*)
- Selvom 'langsiden langs 5A' altid er overfyldt og i to-tre lag, så er der en særlig orden, og altid en 'ledig plads'. Det er rart, altid at finde en parkeringsplads kan man sige. (*Even though the long side along 5A always is overfilled and two to three layered, there is a particular order and always a 'free place'. Is it nice, always to find a parking place can be important.*)
- Det er en rigtig god ide med en undersøgelse af cykelparkeringen og jeg vil opfordre andre til at deltage. Jeg kan ikke forstå hvorfor i ikke beder om respondenternes køn, alder og andre demografiske data, for at finde ud af hvor repræsentative besvarelserne er. Jeg syntes faktisk det er lidt fornærmende at der er en del stavfejl - det er mangel på respekt for os der skal hakke sig igennem teksten. Held og lykke med jeres undersøgelse! (*it is one good idea with study of bicycle parking and I will ask another to take part. I can not understand how not ask of sex, age, and other demographical data, to find how representative the responses are. I feel actually that little insults there are spelling mistakes – it is lack of respect to us to stammer through the titles. Luck with your study.*)

Appendix B: Layout of Nørreport Station

This appendix contains maps detailing the layout of Nørreport Station, broken up into several different areas. On the map of each area, the placement of bicycle racks is indicated with a red solid line depicting a single sided bicycle rack and a red dotted line indicating a double sided bicycle rack.

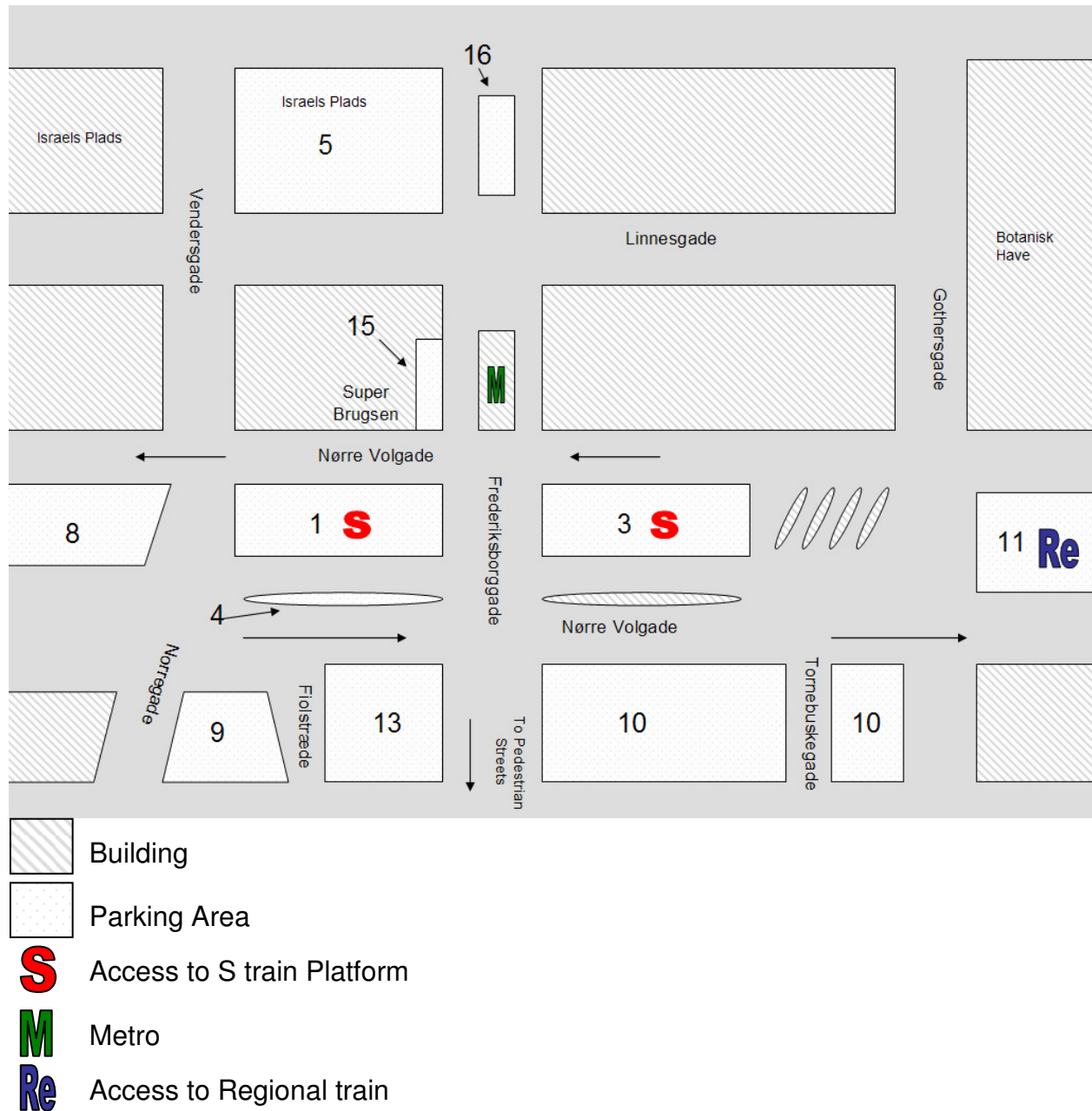


Figure 19: Overall Layout of Nørreport Station

Area 8

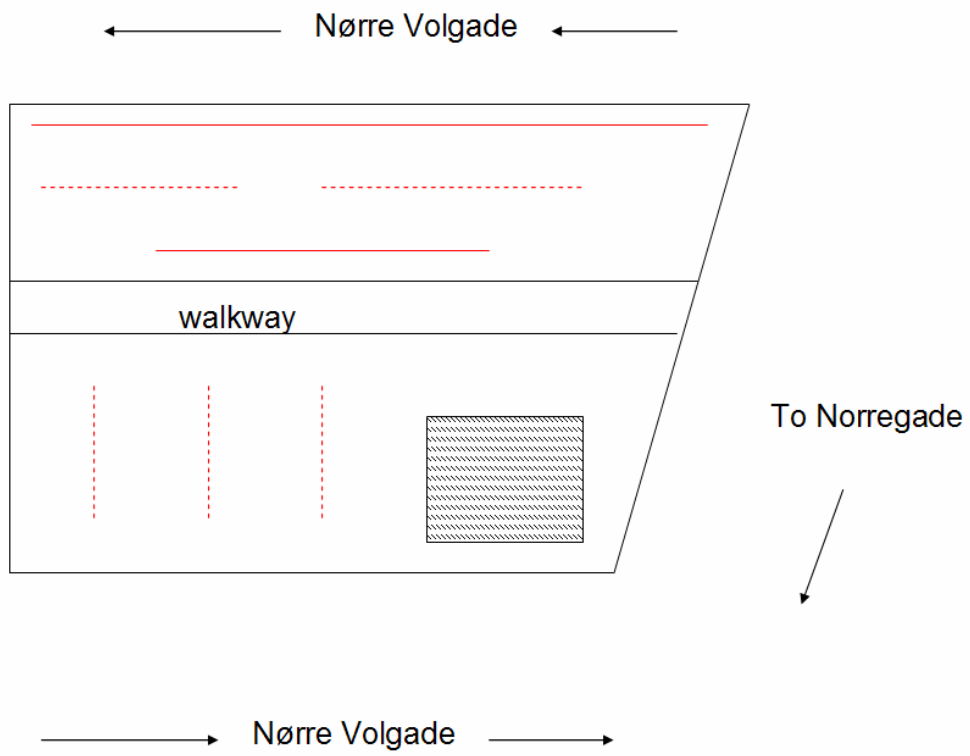


Figure 20: Nørreport Area 8

Area 1

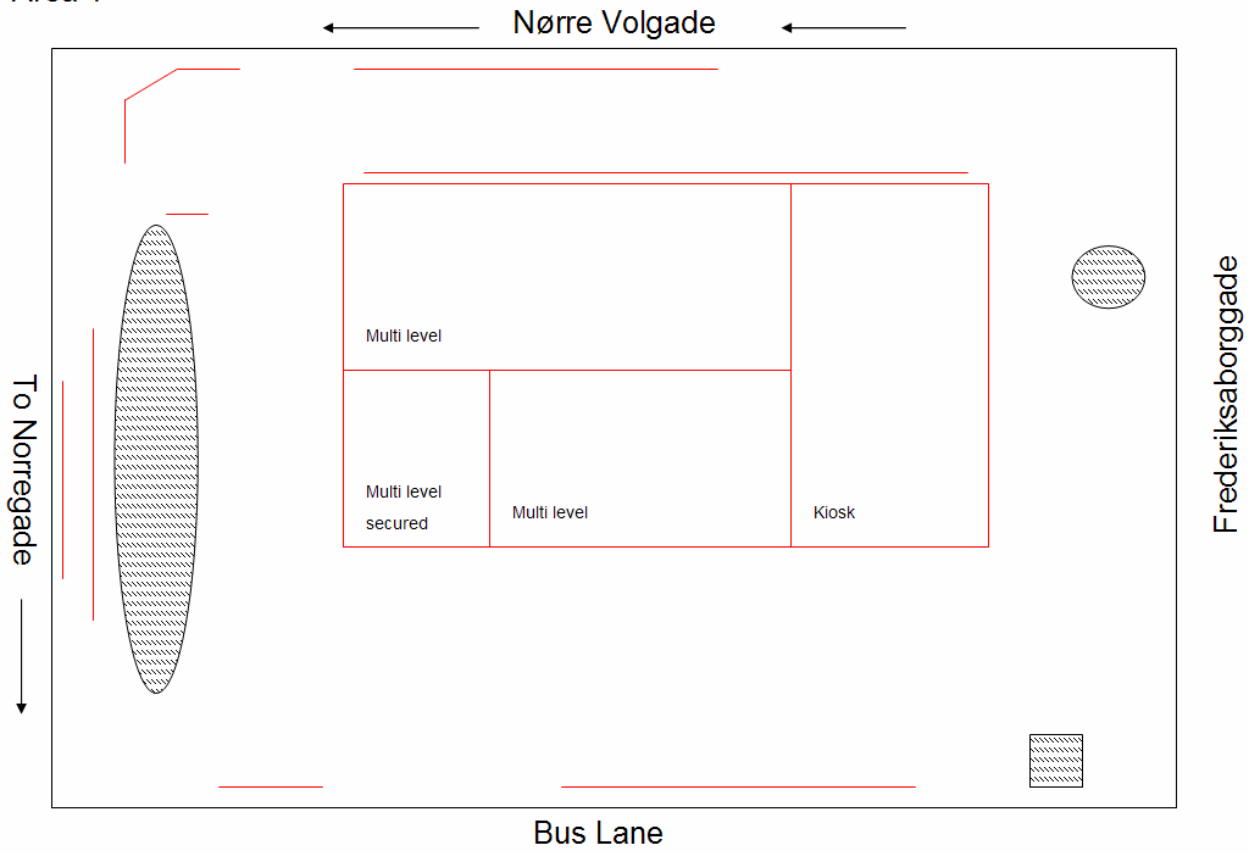


Figure 21: Nørreport Area 1

Area 4

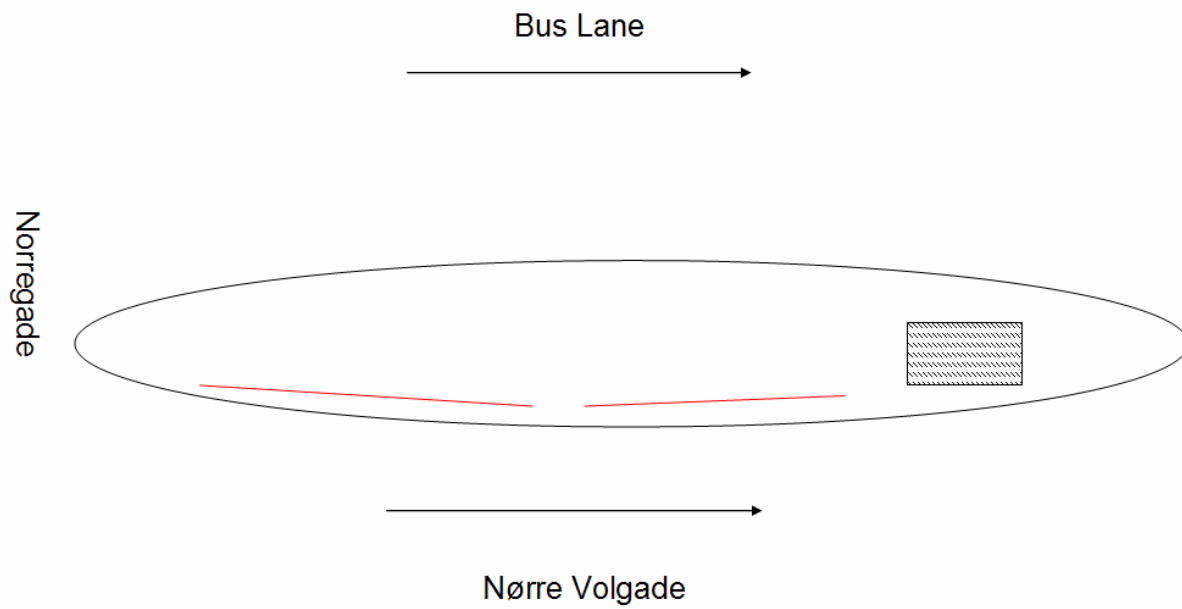


Figure 22: Nørreport Area 4

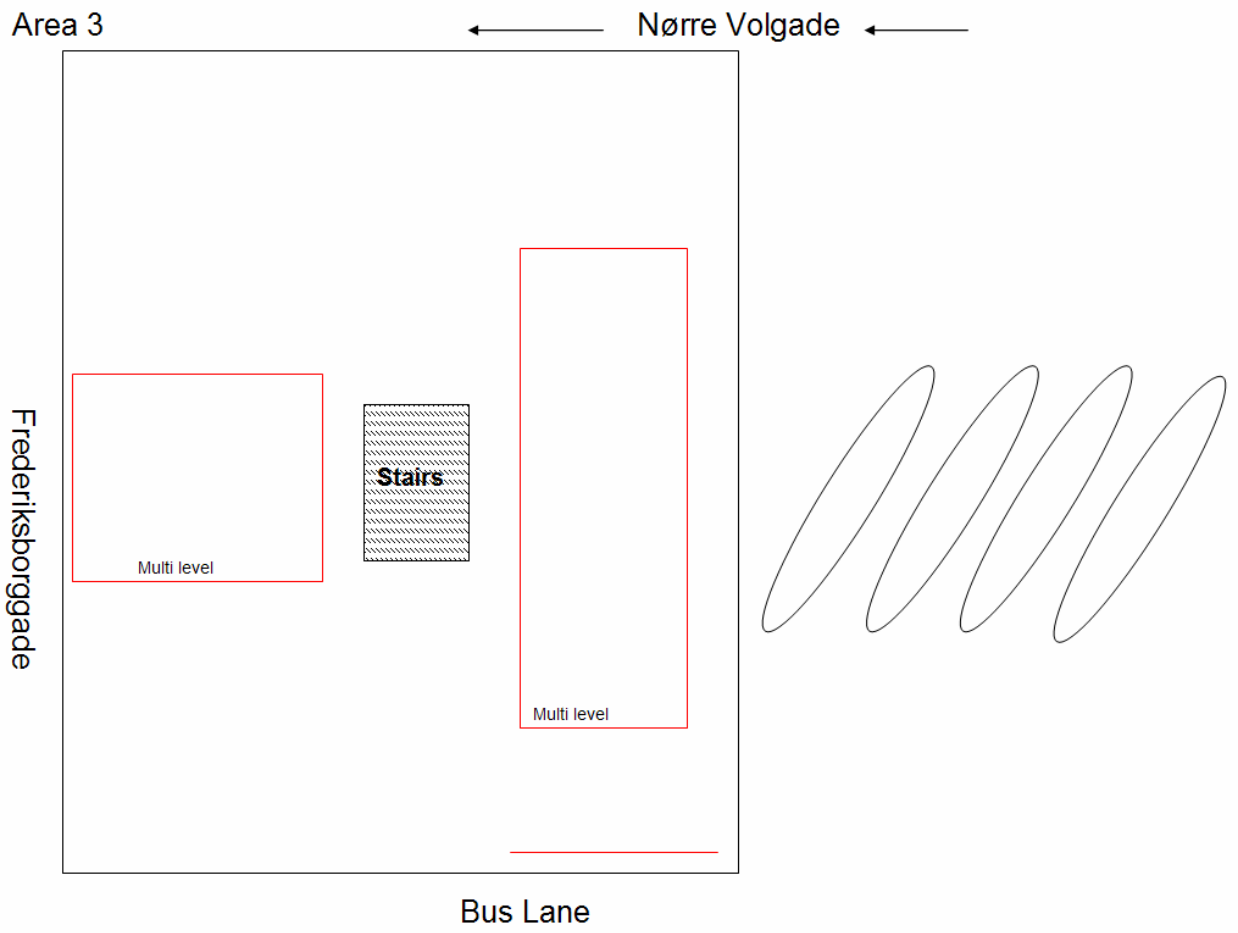


Figure 23: Nørreport Area 3

Area 11

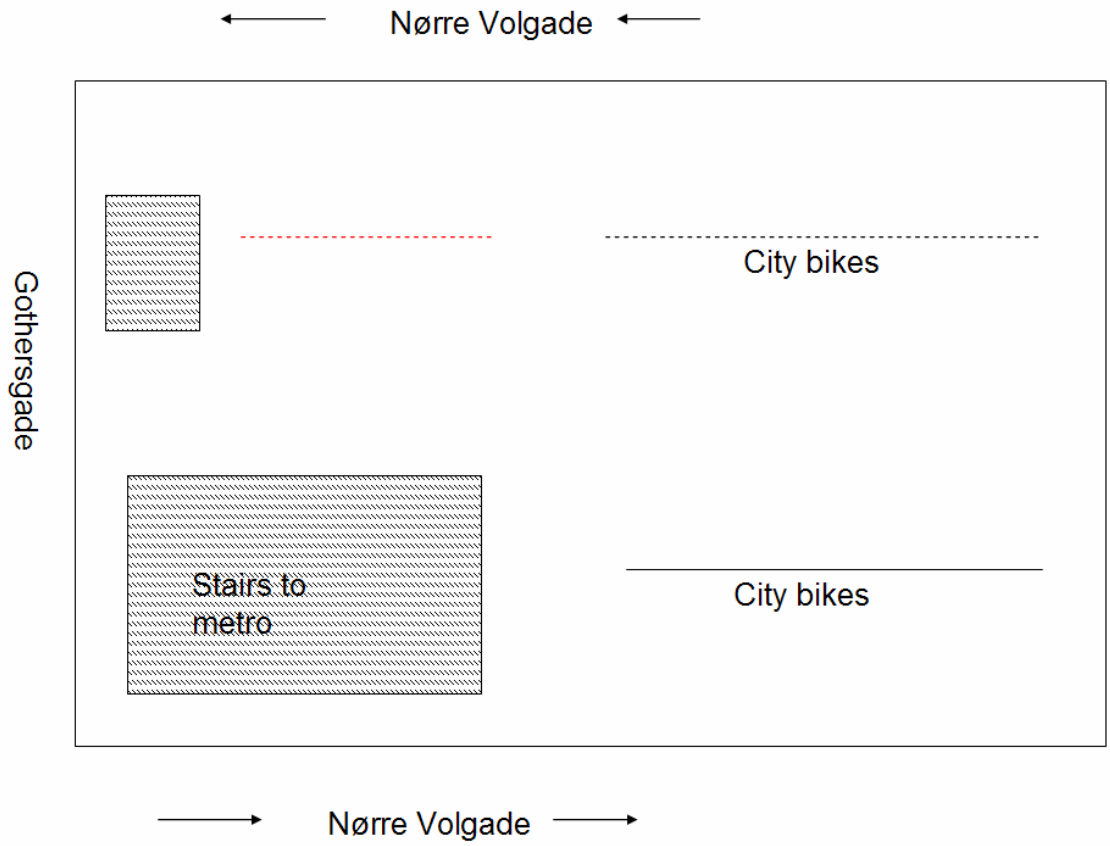


Figure 24: Nørreport Area 11

Area 9

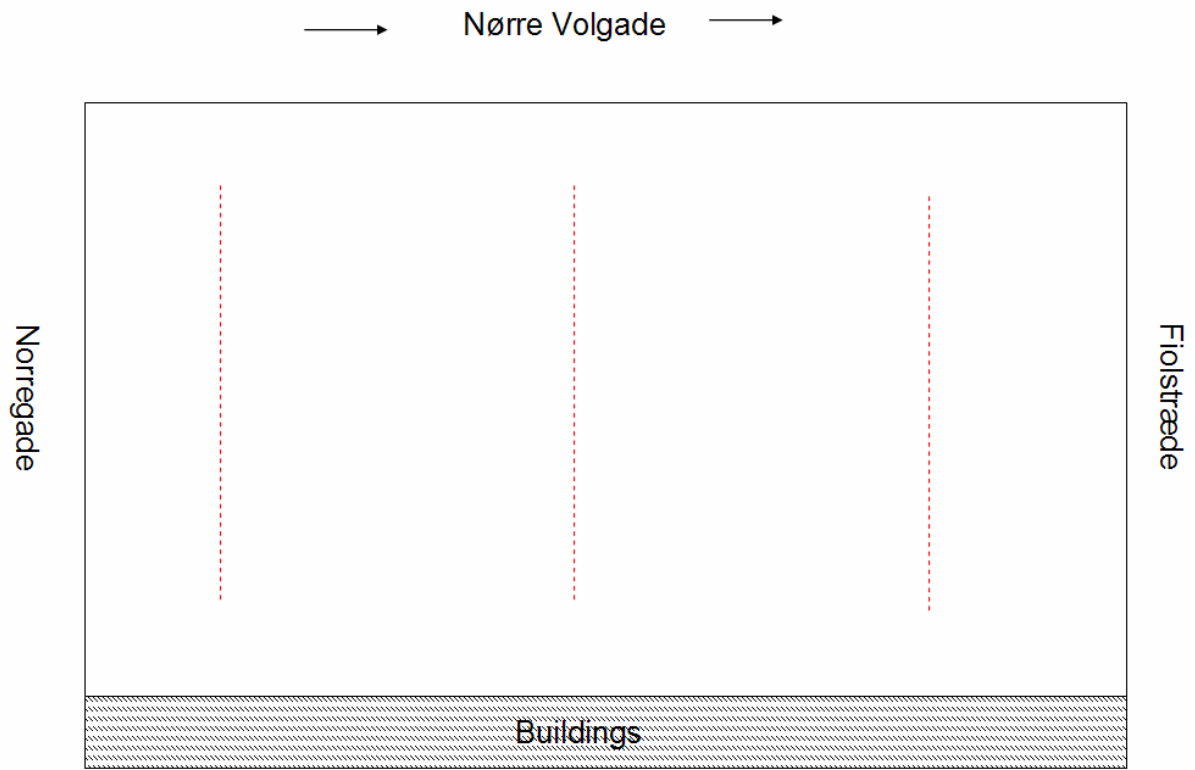


Figure 25: Nørreport Area 9

Area 13

Nørre Voldgade



Fiolstraede

Frederiksborggade

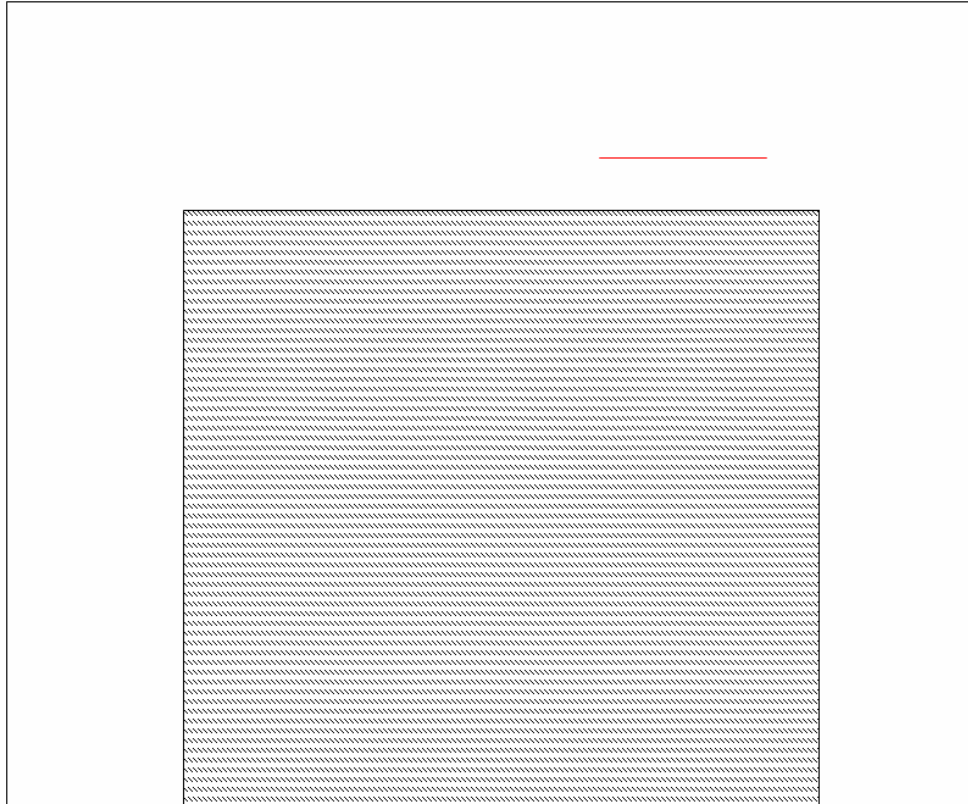
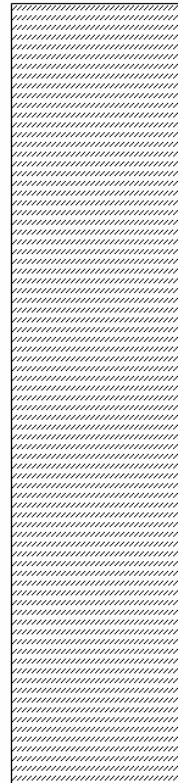


Figure 26: Nørreport Area 13

Area 14

Nørre Volgade



Frederiksborggade

Figure 27: Nørreport Area 14

Area 10

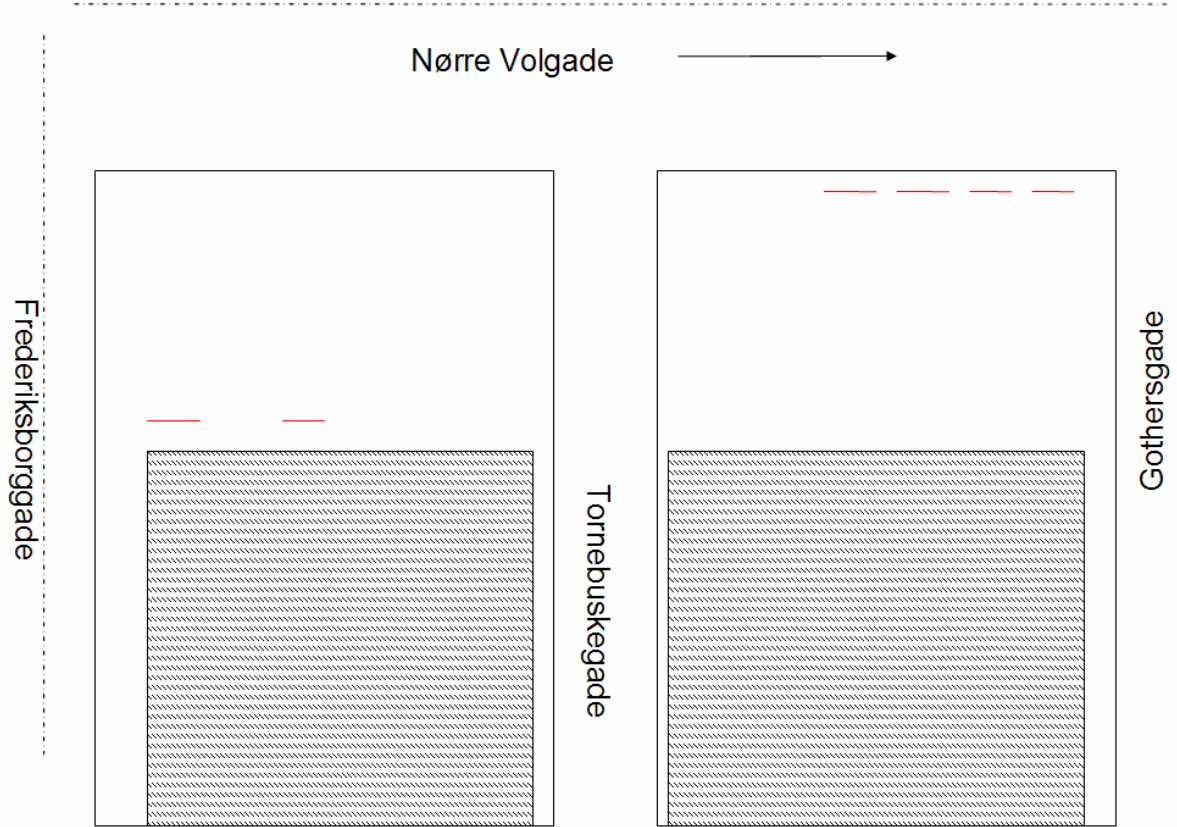


Figure 28: Nørrereport Area 10

Area 5

Romersgade

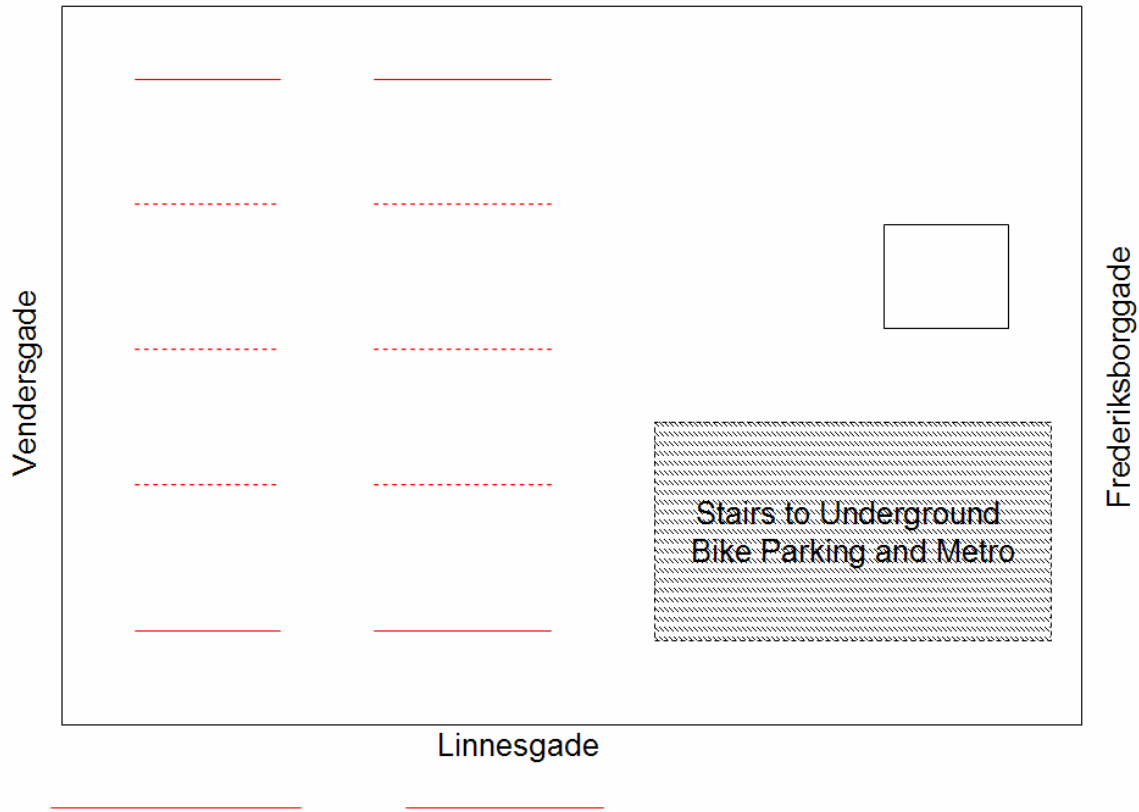
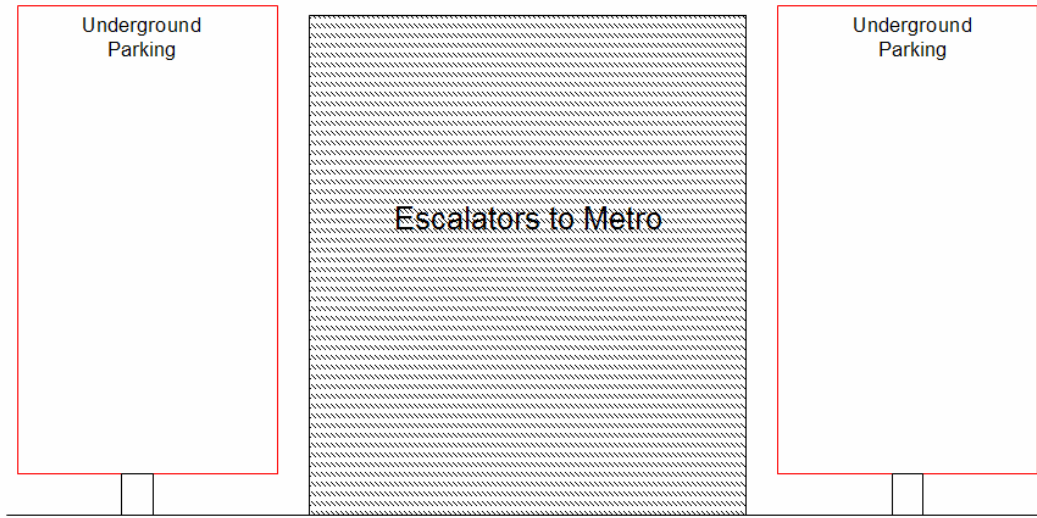


Figure 29: Nørreport Area 5

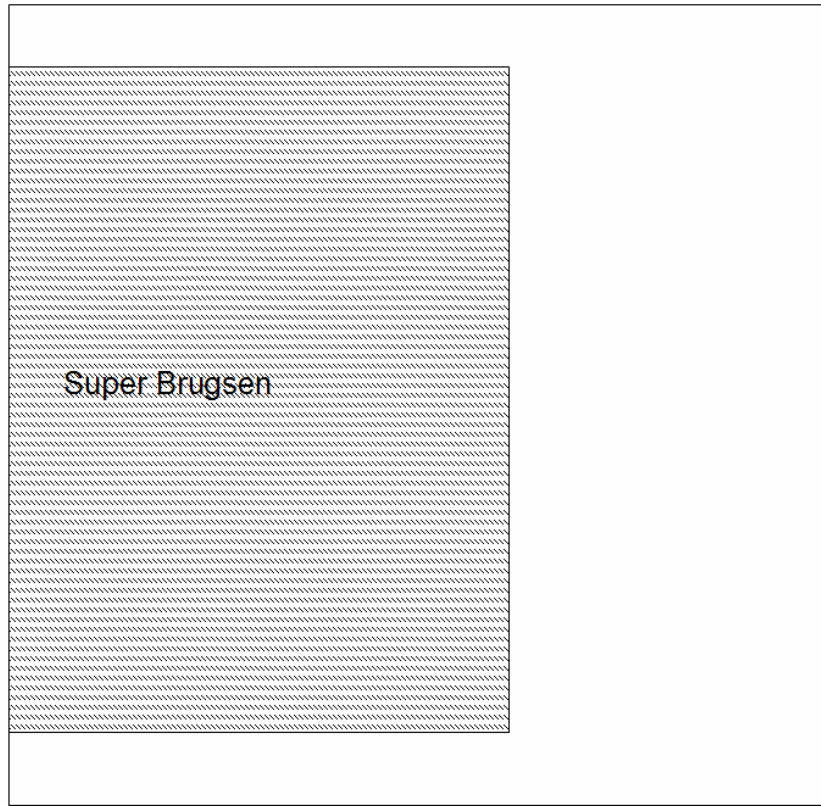
Area 12



Walkway in Underground Metro Area

Figure 30: Nørreport Area 12

Area 15



Super Brugsen

Frederiksborggade

Nørre Volgade



Figure 31: Nørreport Area 15

Area 16

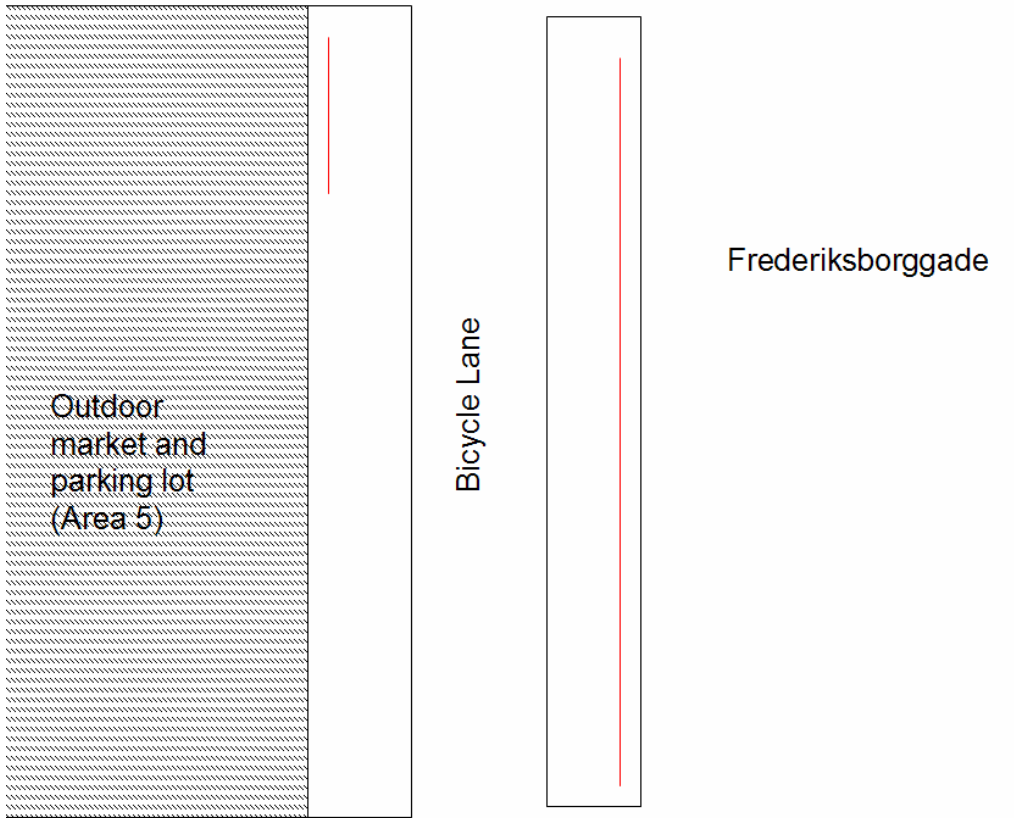


Figure 32: Nørreport Area 16

Appendix C: Bicycle Counting

This appendix contains all data and graphs relevant to the number of bicycles at Nørreport Station and the process of counting them.

Sunday	Monday	Tuesday March 21	Wednesday 22	Thursday 23 14:00	Friday 24 11:00	Saturday 25
26	27	28 14:30	29 12:30	30 22:00	31 15:00 18:00	April 1
2	3 15:00 18:00 22:00	4 6:30 9:00 11:00 13:00	5 6:30 9:00 10:00 12:00	6 13:00 15:00 18:00	7 10:00 14:00	8 Wknd
9 wknd	10 10:00 12:00	11 6:30 9:00 22:00	12 11:00 13:00	13	14	15
16	17	18	19	20	21	22 Wknd
23	24	25	26	27	28	29

Figure 33: Bicycle Counting Schedule

Figure 33 shows a calendar containing the schedule of bicycle counting at Nørreport Station. The times bicycles were counted are indicated in each day. The abbreviation wknd indicates that a weekend count was done that day at no set time.

Area	# Spaces (uncovered)	# Spaces (covered)	# Spaces Double Level Upper Level	# Spaces Double Level Lower Level	# Spaces Double Level Upper Level Locked	# Spaces Double Level Lower Level Locked	# Spaces City Bike	Total	Total *4/3 (Racks Added to Area 1)
#1 Building			141	141	44	44		370	370
#1 Perimeter	155	40						195	231
#3 Building			91	91				182	182
#3 Perimeter	20							20	20
#4	67							67	67
#5	213							213	213
#8	155							155	155
#9	70							70	70
#10	104							104	104
#11	30						70	30	30
#12		141						141	141
#13	13							13	13
#14	20							20	20
#15								0	0
#16	106							106	106
Total	847	181	232	232	44	44	70	1580	1722

Figure 34: Number of Available Bicycle Racks by Location

This chart shows the total number of available bicycle racks in the Nørreport Station area. The chart also shows the distribution of racks by area, as well as whether the racks are classified as covered or lockable parking.

	Ave 6:00	Ave 9:00	Ave 10:00	Ave 11:00	Ave 12:00	Ave 13:00	Ave 14:00	Ave 15:00	Ave 18:00	Ave 22:00	Ave Wknd
#1: Building	185	186	177	183	190	182	183	204	206	198	203
#1: Perimeter	328	442	412	470	504	473	521	503	441	361	460
#3: Building	194	206	213	216	220	217	203	226	227	213	217
#3: Perimeter	38	44	43	49	46	46	50	50	48	37	32
#4	21	30	35	41	44	40	40	37	36	24	38
#5:	129	162	161	185	181	168	181	177	149	138	145
#8:	12	19	20	22	22	21	16	18	18	12	16
#9:	57	74	74	88	87	86	91	90	80	63	61
#10:	34	76	77	102	99	93	101	68	63	40	37
#11:	67	65	61	62	64	65	66	69	76	66	65
#12:	39	42	40	42	42	42	41	42	45	44	41
#13:	23	25	32	34	43	40	48	53	41	31	27
#14:	54	62	62	79	88	90	109	99	95	53	58
#15:	30	75	74	98	96	85	90	99	77	51	67
#16:	37	58	62	73	80	73	82	75	58	41	56
Total	1248	1566	1544	1745	1805	1722	1822	1810	1660	1371	1523

Figure 35: Average Number of Bicycles by Time and Area

The chart in Figure 35 shows the average number of bicycle in each area by the time of day. For each time frame we counted on three different days and averaged the numbers for each area of the station. All the results are displayed in this chart.

Average Daily Bike Counts

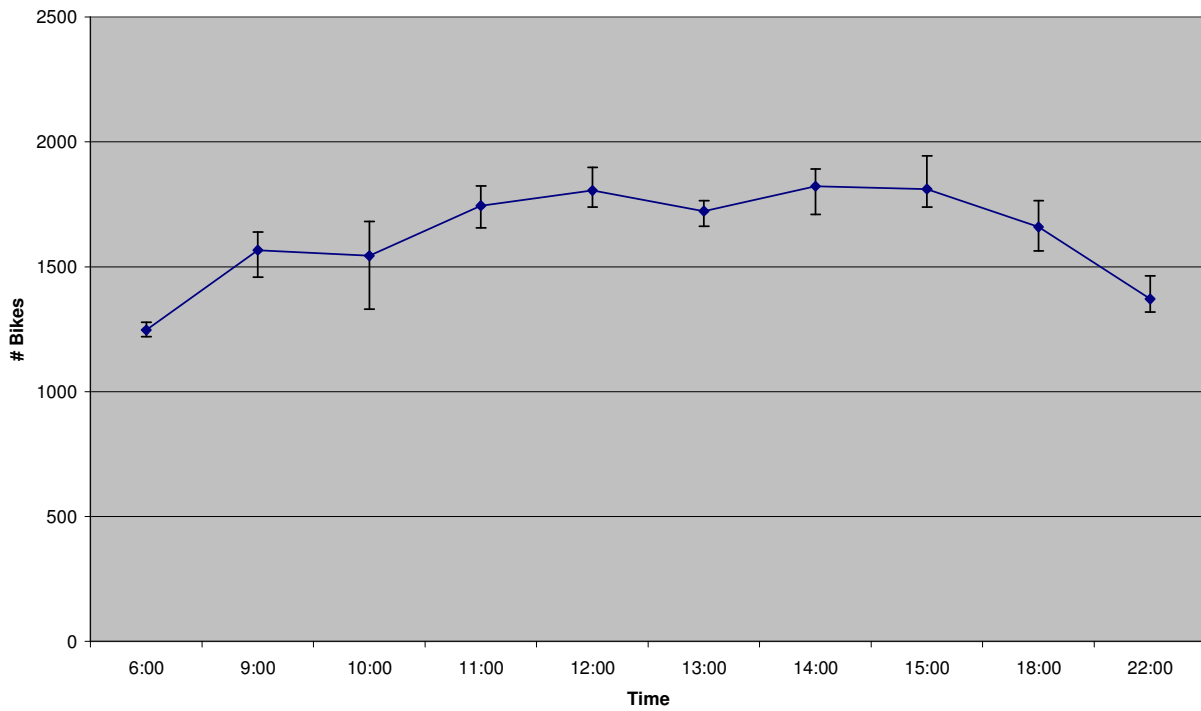


Figure 36: Average Number of Bicycles Total

This graph shows the average number of bicycles totaling the bicycle in and out of racks. The average is taken from each of the 33 bicycle counts completed. The error bars reflect the range of values we received for each time frame.

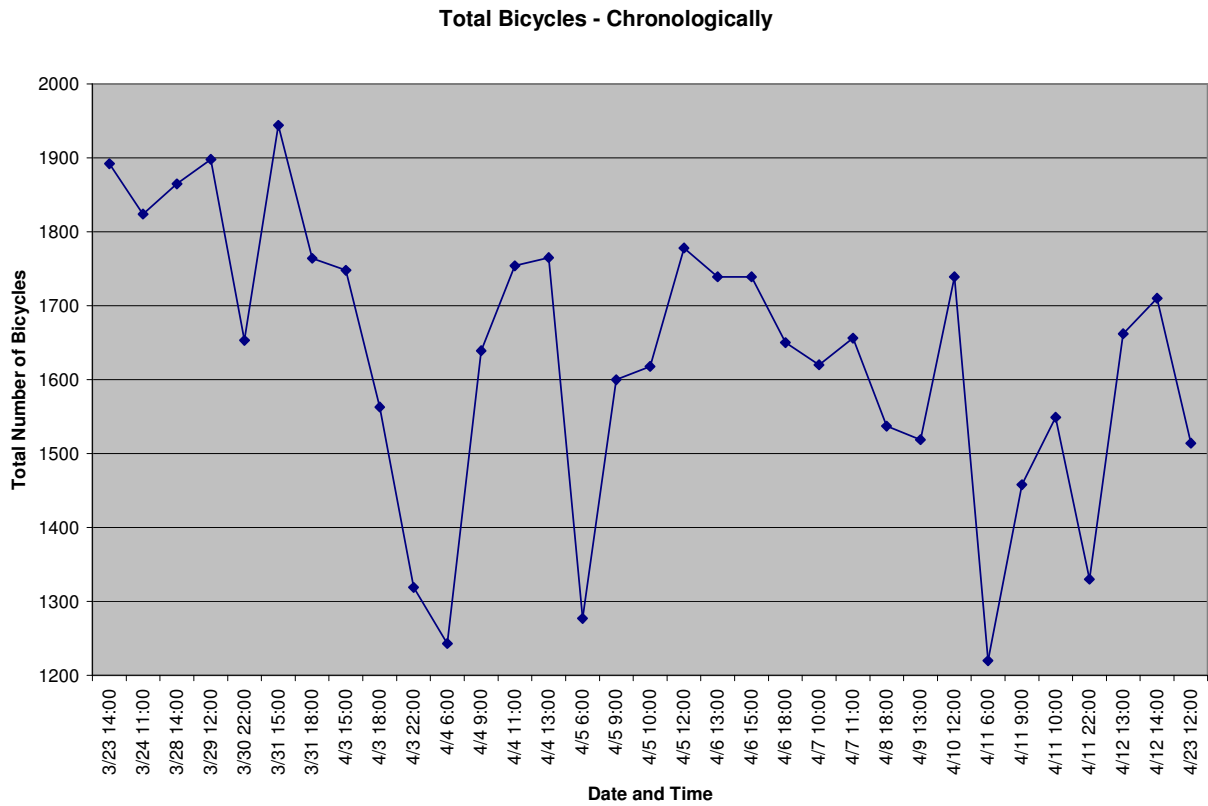


Figure 37: Total Number of Bicycles Chronologically

This line graph displays the total number of bicycles counted for each of the 33 counts we performed. All the counts are in chronological order, with the dates and times displayed at the bottom.

Bicycles Parked In and Out of Racks - Chronologically



Figure 38: Bicycles Parked In and Out of Racks Chronologically

This series of line graphs shows the total number of bicycles parked in racks versus out of racks. The blue line shows the number of bicycles parked in bicycle racks, while the pink line shows the number of bicycles parked outside of racks. All the dates and times are displayed at the bottom.

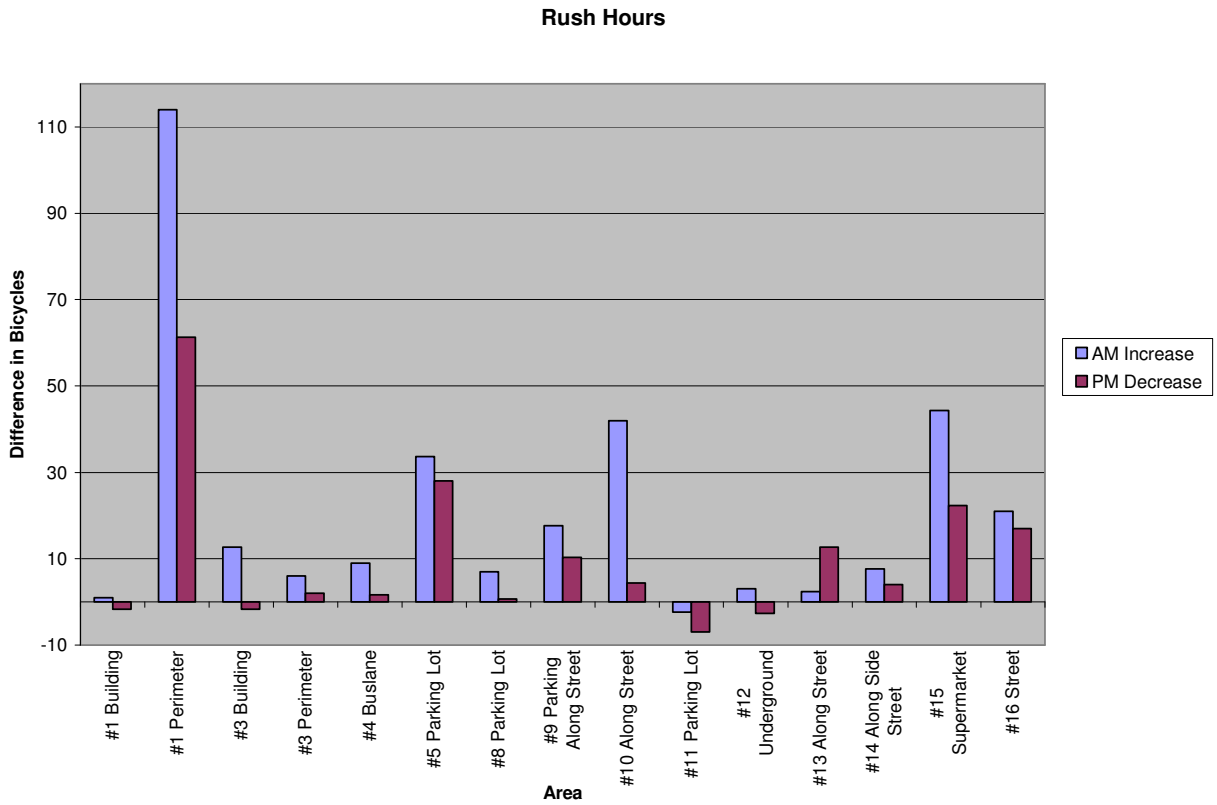


Figure 39: Differences in Bicycles during Rush Hours

In Figure 49 displays the differences in number of bicycles before and after rush hours. For the morning rush hour these numbers were found by subtracting the average number of bicycles at 6:00 from the number at 9:00, and show the increase of bicycles. For the evening rush hour this was found by subtracting the average number of bicycles at 18:00 from the number at 15:00, and show the decrease of bicycles at that time. The blue bars represent the morning rush hours, while the red indicated an evening rush hour.

Comparison of Available Racks and Number of Bicycles

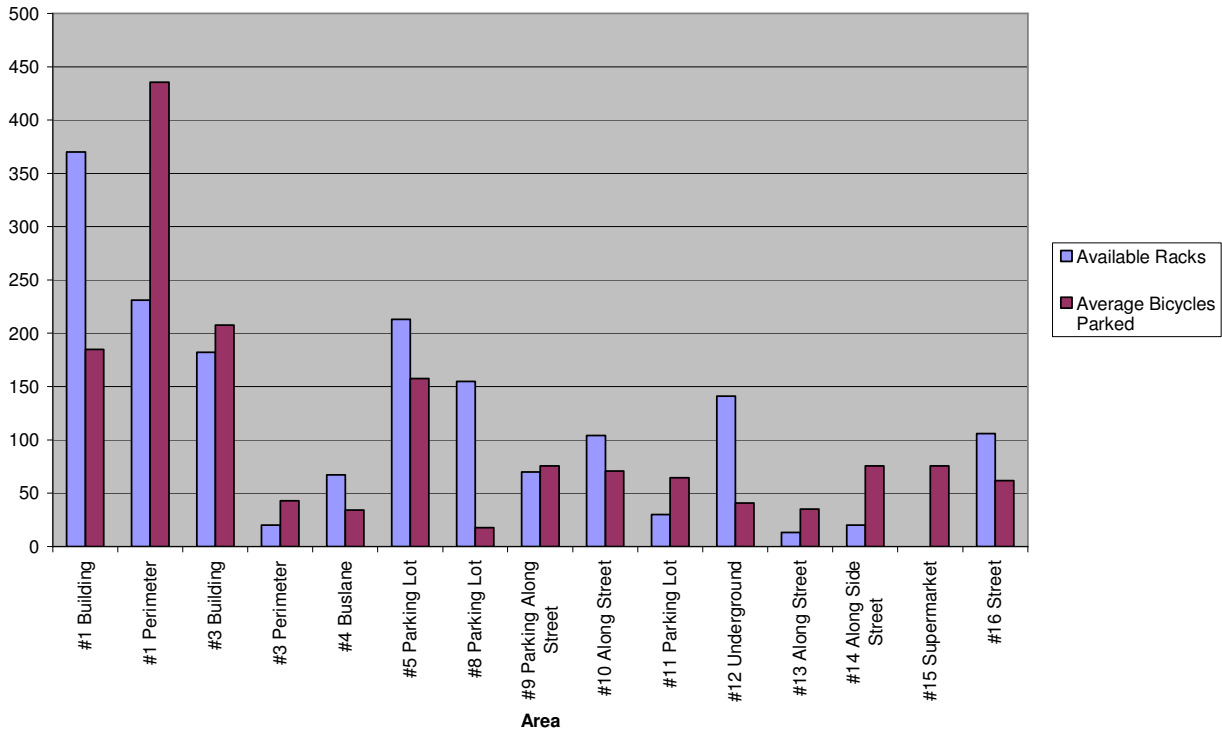


Figure 40: Comparison of Available Racks and Number of Bicycles

This graph has the number of available racks in each area in blue, and the average number of bicycles parked in each area in red. This graph shows which areas need more bicycle racks, and which ones have sufficient racks to cover the number of bicycles. For the areas that have sufficient racks that are not being used, we know it is a case of needing to make the racks more accessible or easier to use.

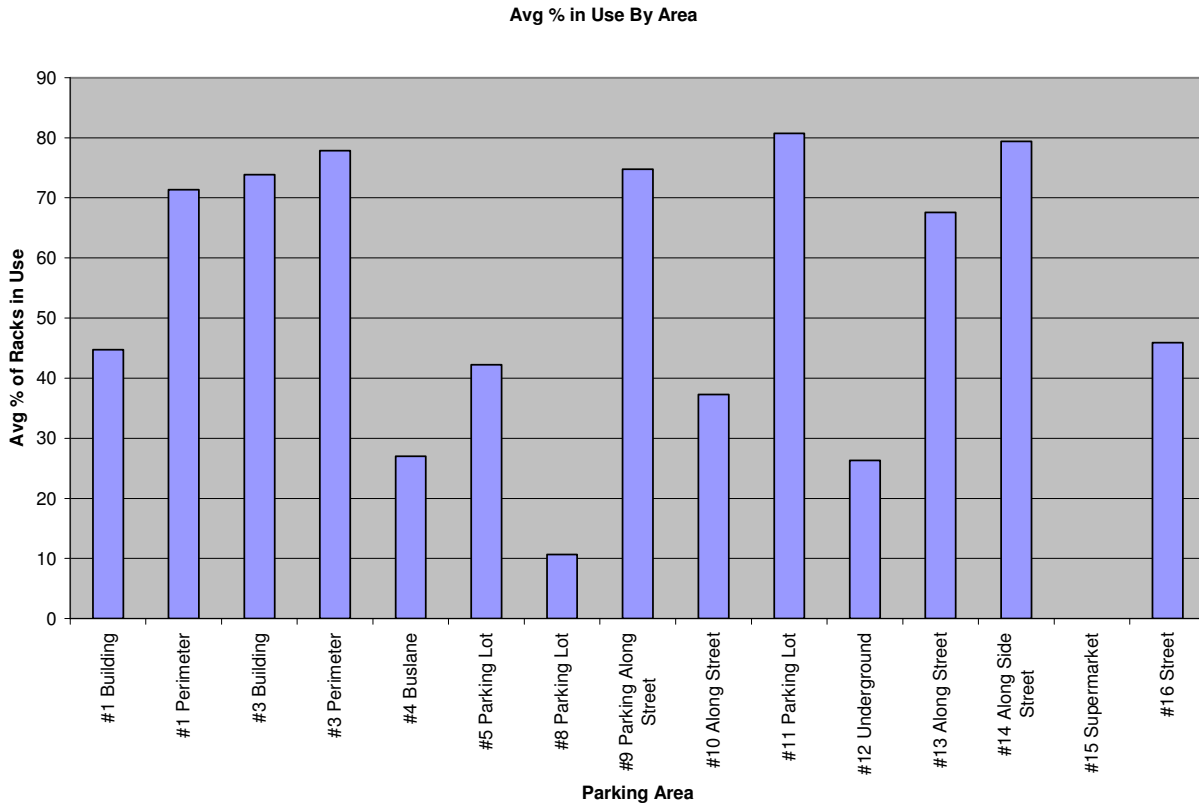


Figure 41: Average Percent of Racks in Use

This bar graph shows the average number of bicycle racks in use by each area. For every count that has been completed, a percentage of the number of bicycle racks in use is taken. This is taken by dividing the number of bicycles in racks by the number of available racks. This graph shows the average of all 33 counts.

Appendix D: Parking Duration

A random sample consisting of 20% of the bicycles for each parking area are tagged to determine parking duration. The bicycles to be observed are chosen by tagging every 5th bicycle to obtain a good random sample. This sample includes bicycles that are parked both in and out of available parking. Based on information from previous studies, the best method is placing a ring of easily broken tape around the seat stay and one of the spokes on the rear wheel. The tape breaks if the bicycle is moved, so any bicycles found with intact tape have not yet moved. The number of bicycles that are initially marked in each parking area are recorded in a table and used as the standard to which future observations are compared to over time.

Area	Initial	2 Hours	3 Hours	4 Hours	5 Hours	12 Hours	24 Hours
#1 Building	144	103	92	82	74	52	52
#3 Building	50	33	31	30	28	26	18
#4 Buslane	8	7	7	7	5	5	5
#5 Parking Lot	39	30	27	27	26	20	20
#8 Parking Lot	4	4	4	4	3	2	1
#9 Along Street	19	17	16	16	16	8	6
#10 Along Street	21	13	10	10	7	3	3
#11 Parking Lot	13	12	12	12	11	11	7
#12 Underground	8	8	8	8	8	6	6
#13 Along Street	9	6	6	6	6	5	5
#14 Side Street	19	12	10	7	5	5	4
#15 Supermarket	21	17	13	11	10	5	4
#16 Street	16	13	11	11	11	6	5
Total	371	275	247	231	210	154	136

Figure 42: Parking Duration Counts up to 24 Hours

This chart shows the number of bicycle tags remaining after intervals on the first day of our study. The initial is the total number of tags we originally placed on bicycles. It is followed by intervals throughout the first day up to 24 hours.

Area	2 Days	3 Days	4 Days	5 Days	2 Weeks	3 Weeks	4 Weeks
#1 Building	43	40	31	28	20	16	16
#3 Building	16	16	16	14	6	6	6
#4 Buslane	3	3	3	3	2	2	2
#5 Parking Lot	20	15	15	13	13	11	6
#8 Parking Lot	1	1	1	1	1	1	0
#9 Along Street	6	5	5	5	5	4	1
#10 Along Street	1	1	1	1	0	0	0
#11 Parking Lot	6	6	6	6	3	3	3
#12 Underground	6	6	6	5	5	5	4
#13 Along Street	3	2	2	1	0	0	0
#14 Side Street	3	3	3	3	3	3	1
#15 Supermarket	2	1	1	1	0	0	0
#16 Street	3	3	3	3	0	0	0
Total	113	102	93	84	58	51	39

Figure 43: Parking Duration Counts up to 4 Weeks

This chart shows the remaining counts of the parking duration study. The tags are checked each day for the first 5 days and then once a week through week 4.

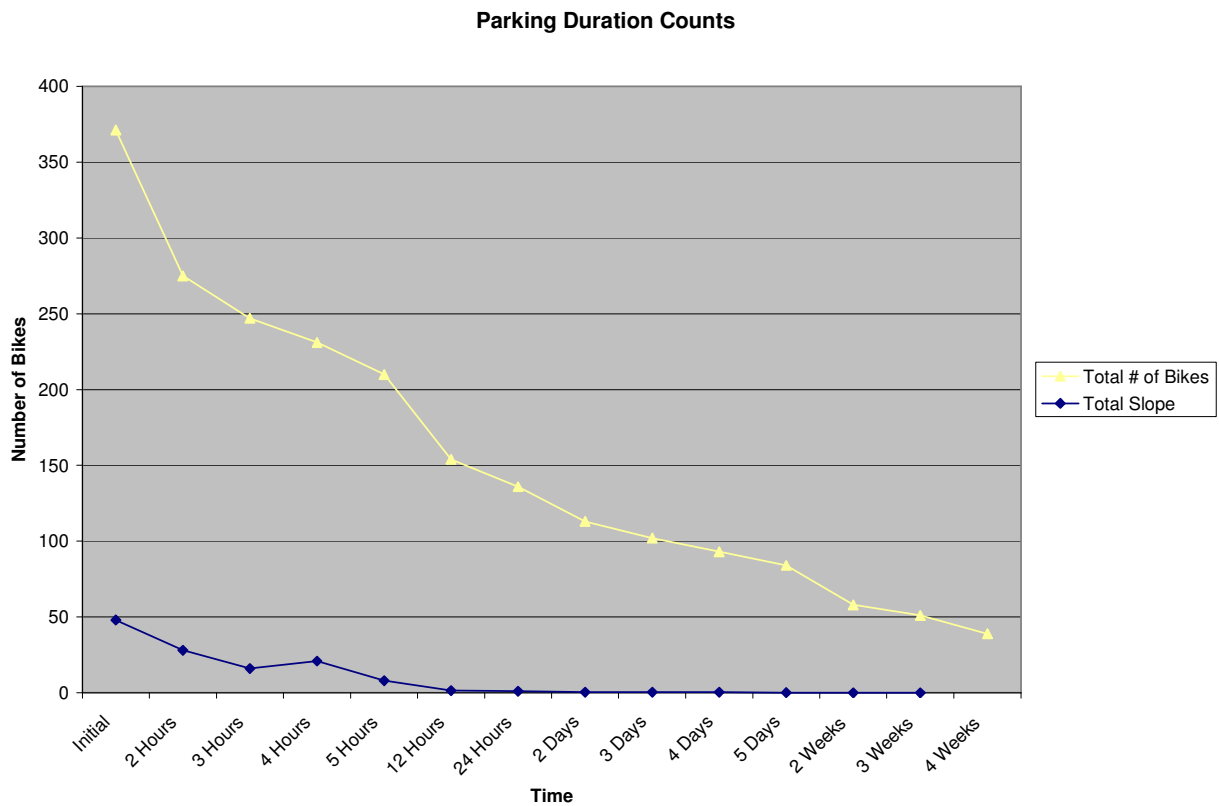


Figure 44: Parking Duration Totals

Figure 44 displays the total number of bicycles remaining tagged over the course of the first 5 days. The blue line at the bottom of the graph shows the slope of the yellow line to give an idea of how fast turnover actually was in between two points.

Bicycle Parking Duration - Percent Remaining														
Area	Initial	2 Hours	3 Hours	4 Hours	5 Hours	12 Hours	24 Hours	2 Days	3 Days	4 Days	5 Days	2 Weeks	3 Weeks	4 Weeks
#1	1.000	0.715	0.639	0.569	0.514	0.361	0.361	0.299	0.278	0.215	0.194	0.139	0.111	0.111
#3	1.000	0.660	0.620	0.600	0.560	0.520	0.360	0.320	0.320	0.320	0.280	0.120	0.120	0.120
#4	1.000	0.875	0.875	0.875	0.625	0.625	0.625	0.375	0.375	0.375	0.375	0.250	0.250	0.250
#5	1.000	0.769	0.692	0.692	0.667	0.513	0.513	0.513	0.385	0.385	0.333	0.333	0.282	0.154
#8	1.000	1.000	1.000	1.000	0.750	0.500	0.250	0.250	0.250	0.250	0.250	0.250	0.250	0.000
#9	1.000	0.895	0.842	0.842	0.842	0.421	0.316	0.316	0.263	0.263	0.263	0.263	0.211	0.053
#10	1.000	0.619	0.476	0.476	0.333	0.143	0.143	0.048	0.048	0.048	0.048	0.000	0.000	0.000
#11	1.000	0.923	0.923	0.923	0.846	0.846	0.538	0.462	0.462	0.462	0.462	0.231	0.231	0.231
#12	1.000	1.000	1.000	1.000	1.000	0.750	0.750	0.750	0.750	0.750	0.625	0.625	0.625	0.500
#13	1.000	0.667	0.667	0.667	0.667	0.556	0.556	0.333	0.222	0.222	0.111	0.000	0.000	0.000
#14	1.000	0.632	0.526	0.368	0.263	0.263	0.211	0.158	0.158	0.158	0.158	0.158	0.158	0.053
#15	1.000	0.810	0.619	0.524	0.476	0.238	0.190	0.095	0.048	0.048	0.048	0.000	0.000	0.000
#16	1.000	0.813	0.688	0.688	0.688	0.375	0.313	0.188	0.188	0.188	0.188	0.000	0.000	0.000
Average	1.000	0.798	0.736	0.710	0.633	0.470	0.394	0.316	0.288	0.283	0.256	0.182	0.172	0.113

Figure 45: Percent of Tagged Bicycles Remaining

Figure 45 shows the percent of tagged bicycles remaining after each time interval for the first 5 days. Each line represents a different area of the station, and shows the percent of bicycle left over time.

Original Distribution of Tags

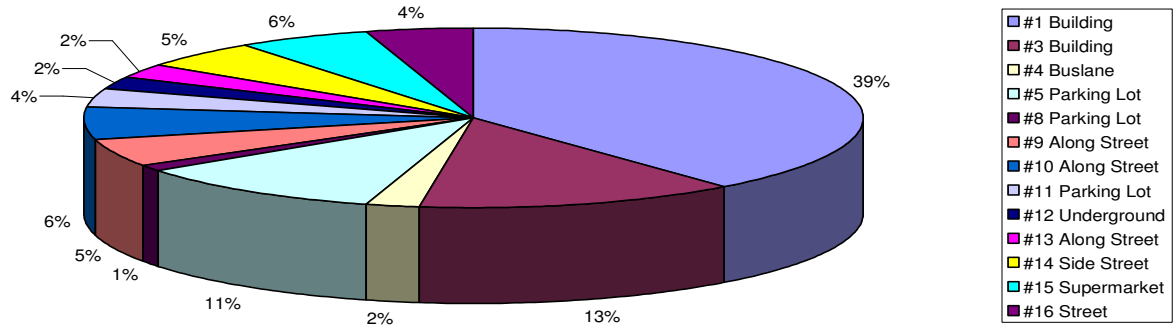


Figure 46: Original Distribution of Tagged Bicycles

Distribution of Remaining Bicycles

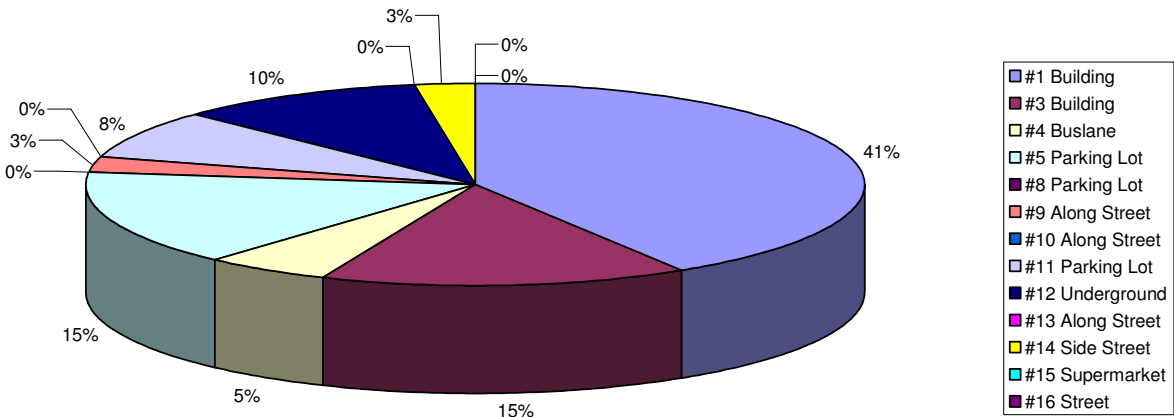


Figure 47: Distribution of Remaining Bicycles

Figures 46 and 47 show the distributions of the tagged bicycles before and after a 4 week time period.

Appendix E: Interviews

This appendix contains outlines from all interviews that were conducted with stakeholders.

Urban Reflections: Sten Neilsen

- What does your job entail?
 - Industrial designer/architect from school of fine art in Copenhagen
 - Company called urban reflections
 - Takes bicycle racks and incorporates different designs with them to make them fit into public space nicely
- What factors do you consider for picking or designing a bicycle rack for a certain situation?
 - What are the important things to consider in the aesthetics or convenience of bicycle rack?
 - Match to surrounding, situation, and price, modify the details of the rack to work well
- Usability of multilevel rack systems, are there some that are easier for cyclists? Saw one at Nørreport but it looks like you have to lift your bicycle up in order to get it on the second level.
 - Doesn't like them
 - With messy weather then you are lifting your bicycle up and getting yourself a mess
 - Raised and lowered system isn't very effective either
- Are there standard bicycle sizes in Denmark that bicycle racks are designed for?
 - 50cm tires
 - if you design for total width of 40cm then they will park in alternating spots and that doesn't utilize the rack well
 - 60cm in Sweden
 - How much space does each individual bicycle need? What about bicycles with attached carriers?
- Is there a most popular design of bicycle rack in Denmark?
 - Classic Copenhagen-use the same rack but change the overall design of it
- What types of locks do you typically accommodate for? Is this something that cyclists find as a need?
 - U locks are not as common
 - People generally use the tire lock and the wire
 - It depends really on how long the bicycle is going to sit there
 - *****find out how many are stolen each year (I think we have this)
- In general, in the area is there a demand for covered or secured bicycle parking?
 - Some interest in paying a little for secured parking, then you always have a spot
 - Generally people are willing to pay a little bit
- Contact information: for further questions as we research
 - sn@urban-reflection.com

- mobile: 20217667
- telephone: 35352100
- Comments
 - Look at insurance policies for bicycles
 - What happens when one is stolen, do they just pay for a new one
 - This would dictate how much people care about securing their bicycles
 - What happens to the stolen ones, how is it all managed
 - Keep him updated-inform him when final presentation is

København Kommune: Maria Strueli

Friday March 31, 2006 1:00pm

- 1) She's involved in traffic planning, specifically cycle planning for the city of Copenhagen
- 2) The regional government and the DSB both have involvements in bicycle parking plans and the main thing that switches it back and forth is money.
 - a) Nothing has been done at Nørreport station because there is no money to
- 3) Politicians very much want to improve facilities
 - a) They are making budgets now
- 4) She is working on a project to improve bike parking in city
 - a) Making a parking strategy
 - i) What functions well
 - ii) How much do you need
 - b) Clean up leftover bikes is a big thing
 - i) At vesterport
 - (1) Bikes leftover after 5 weeks tagged were taken away, that was 30-45% of the bicycles there
 - (2) That was with the yellow tape program: contact to talk about this program with is Vibeke Forsting (vifor@tmf.kk.dk) 33 66 37 53
 - ii) They are just at the beginning of the project now
 - iii) Results of survey
 - iv) Facilities better at concrete metro stations
 - v) Looking at making the movement of abandoned bikes routine
 - (1) Can't do so much now because of the number of bikes that the police hold (about 300 per month)
- 5) Survey at metro stations involved counting and questionnaires
 - a) Have copy of this printed out for us
- 6) People's main concerns are having space for their bicycle and having that space be near their destination
- 7) They are revising the Cycle Policy to make parking a higher, bigger objective
- 8) What needs to be done:
 - a) Make norms for the city plan
 - b) Get cyclists used to not parking just anywhere
 - c) Cars can't park on the corners, could this be used for bike parking
 - i) They have to talk to the police about that
 - ii) Putting bike parking on the street would be easiest and cheapest
 - d) At Nørreport the bikes need to be moved and cyclists behavior needs work in terms of where they park
- 9) Give her information on our final report and presentation

Danish State Railways: Kristoffer Kejser

Facts from Slideshow:

- 90 million commuters by train per year
 - 25 % of these travel to train stations by bicycle.
- Counts
 - 74,000 racks
 - Daytime: 54,000 bicycles
 - Nighttime 10-20% (5,400-10,800 bicycles)
- People are willing to walk a distance of 1200 m around the station, but cycle a distance of 5k around the station.
- Good Parking
 - On way to destination
 - Straight to platform – less than 50m
 - Enough racks in area
 - Space between handlebars (used to be 35-40cm now 60cm)
 - many baskets don't fit
 - protection against rain and theft
 - 5000 bikes, 200 kroner/year for lockable
 - clean-up and maintenance
 - 1100 bikes from central station removed
- Parking Projects completed at other stations:
 - Frederikssund (45km)
 - 4500 bikes
 - S-train every 10 mins
 - Sent survey out.. got 30 responses back
 - Need more parking on eastern side and lockable parking
 - After counting cyclists and finding out what directions they come from we able to turn abandoned buildings into a lockable parking garage and a bicycle repair shop
 - 45% of the cyclists will ride by the new facilities on way to train
 - Sydhavn
 - Bridge over tracks to more bicycle parking
 - No budget for this yet
 - Multiple bicycle parking sheds next to tracks
 - Used for commuter bicycles
 - Roskilde
 - 2,500 bicycles coming from three different directions around the station
 - several solutions
 - spiral parking garage
 - rooftop parking
 - parking on platforms since they are so wide
 - underground parking

Interview:

At Nørreport, there are no current plans for improvements. There have been proposed solutions, but none have been decided upon. With Nørreport, there needs to be a whole station solution, not just for bicycles. There are many underground problems with the trains themselves. On the regional train tracks, there is a problem with pollution being too high and many fire hazards. It has been considered putting in a new platform, but nothing concrete. The best solution proposed so far has been to concentrate all the car and bus traffic on one side of the station, and open up another platform for bike parking.

Taking a bicycle on a train can be done using the elevators, tracks on stairs, or escalators. Although it is difficult currently, there is concern that if it becomes too easy to take a bicycle on the train then there will be an excess of bicycles on trains.

The municipality of Copenhagen is responsible for data and counting of bicycles.

- Counting bicycles from different directions in the morning (where are the cyclists coming from)

In terms of future growth, the metro is working on adding a line to the airport, opening in 2007. We can expect a 10-15% passenger growth. (DSB 2006)

Underground parking

- “secret parking”
- Steep stairs
- No advertising

Problems that bicycles cause are access to elevator, and handicapped access. It also presents a messy impression of the station. However, they do not cause any fire code or evacuation problems.

Overall

- Effect of new facilities
- Measure satisfaction & use
- General impression – trace improvements

Tapping/Removing

- At Nørreport is done by municipality
- they're not allowed to actually remove the bicycles, the police have to do it
- they give the cyclists a month to remove the bicycle, and then another amount of time to claim your bicycle back
- the police have a set area to hold the bicycles, but they don't have the manpower to do it more often – get people involved from DSB
- they do a bicycle removal once a year, or every two years
- at Roskilde removed 70 out of 2500 bicycles

Data/Studies are available on the s-tog.dk website. Click tal, click Østillinger. This has each year's data for number of passengers on trains and where they get off and on at. S= S-train F= regional trains

Roads and Parks Administration: Vibeke Forsting

- What does your job entail?
 - She works in maintenance & cleaning, and part of the cleaning is removing bicycles. The Road & Park department, part of the København Kommune, works in cleaning and maintenance of bicycles in the general Copenhagen area.
- Can you tell us about the whole process of tagging and removing the bicycles?
 - Approximately once a year Roads & Park runs a bicycle clean-up, collaborating with the Police to remove all abandoned bicycles. The city is divided up into 5 districts, and the tagging and removal of bicycles are done within each of these districts. Each time the tagging is done around 200-300 bicycles are tagged with tape. Only the bicycles that look to be possibly abandoned or scrapped are tagged with the tape. The tape is wrapped around the wheel and the fender so that as soon as the bicycle is ridden the tape breaks. After a period of at least four weeks, the bicycles with tape still intact are removed. The city is also allowed to remove any bicycle that is determined to be worth less than 250 kroner. The bicycles are then taken to the police where they are set up for auction. The police also wait a period of at least four weeks before actually auctioning the bicycles off. In that four week span, each bicycle's serial number is checked to make sure it was not reported as stolen. The police have enough space to hold approximately 5000 bicycles. However, København Kommune has an arrangement with the DSB where they can use an area beside the tracks to hold the excess bicycles in. In the past year, 5,200 bicycles are successfully removed from the 5 districts (Roads & Parks 2006).
 - In the fall of 2005, Roads & Parks completed the Vulture Campaign. The campaign intended to do a neighborhood wide bicycle clean-up while promoting appropriate bicycle parking. It was completed in a small area of district 2, covering many blocks. Picture cards of vultures were attached to every single bicycle in the area, totaling 4000 bicycles. The cards were intended to mean "don't let the vultures get your bicycle." In addition to the vulture cards, tape displaying the vulture picture was attached to the bicycles around the wheel and frame, as is done in traditional clean-ups. The cyclists were encouraged to leave a vulture on their bicycle if they did, in fact, want to get rid of it. After a period of four weeks, more than 2000 of the bicycles were able to be removed. As a finale to the program 300 additional bicycle racks were placed in the area. This program worked as an exceptional solution to the parking problem in one specific neighborhood. Given the number of bicycles removed was over 50% of the total bicycles tagged, this form of removal could be very effective all over the city.
- What are the reasons people would abandon a bike?
 - Currently there is no program in place for cyclists to dispose of old bicycles. Four times a year people can leave big scrap not picked up by weekly trash outside to be picked up, but bicycles are not allowed. This results in many people leaving scrapped bicycles at train stations or around the city.

Focus Group

- Participants
 - Mike Bosworth
 - Worked with DCF branch
 - Currently retired and working on bicycle parking projects all over the world
 - Niels Tanggaard
 - Ballerup
 - Interesting, thinks it's difficult to park
- Problems
 - Using space between
 - Planning parking for bicycle last in construction projects
 - Nørreport: stairs are a huge barrier
 - Ramps makes transporting bikes easier
- Commuting
 - Don't like riding into Copenhagen because too many people
 - Too difficult to pay for parking-people want it to be very easy
 - Lockers that you put everything in take up too much space
 - Laws on parking
 - Take bicycle and shop after work
 - Would take trailer for bicycle if need to move a lot of stuff
- Nørreport
 - Look at it and see all the bicycles then don't want to park there at all
 - 45 degree angled racks work well in crowded areas
 - handlebars get caught in other bikes when parking too close together, have to lift out
 - car parking is always made big enough, why isn't bicycle parking?
 - Walking
 - Will walk a lot if the right parking is there
 - Night, doesn't change much although typical person just throws bicycle by the door
- Metro
 - Underground: access is terrible from the street, should be near the station
 - Sign: tell direct access to trains but don't want people from station to go into the bicycle parking (drunks doing damage)
- General
 - Parking is too far away from ticket station
 - Have multiple places for tickets then spread things out a little bit
 - Norreport concentrates everything in one spot
 - Don't want to cross the street after parking their bicycle
 - Make more entrances to the platforms
 - Cover area 8 then would attract people there
 - Would work even more with a platform entrance that didn't require street crossing
 - Tell people how to use the double level racks, many don't know how
 - People have baskets on the fronts of their bicycles

- Simplest – 2 ring- easy to fit mountain bikes, needs to widen out a little instead of being parallel
- If anything, need to explain how to use the racks, advertisements up front
- Disposing of bicycles
 - Outskirts of city: trash will take them on big trash days
 - In Copenhagen the trash won't because of liability of stolen bicycles
 - Abandoned: don't remove enough
 - How many they remove at a time would make a huge difference
- Covered
 - If available then people will use it
 - Somewhat willing to pay for supervision
- More expensive bike then would have a u lock
- Overall
 - Space allocation: need to re think whole area at Nørreport
 - Old station, built around 1950
 - Cars vs bikes: there are nice ramps to underground car parking
 - Most important aspects:
 - Cover
 - Convenience
 - Lots of places
 - Visible security
 - Closer to destination and cycle tracks