



# The Cycle Superhighway

Transport Corridor or Urban Design Tool?

Julie Pallesen Konda  
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*Written by:*

Julie Pallesen Konda, group no: 7

*Supervisors:*

Professor of Urban Theory Ole B. Jensen, Aalborg University.

With Technical Supervision from Associate Professor Niels Agerholm,  
Division of Transport Engineering, Aalborg University.

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*Julie Pallesen Konda*

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To E. and PK for making what seemed impossible – possible.

J.

## *Abstract*

Cycling as a mode of transport in Denmark is commonplace and widespread. The bicycle path typology, the cycle superhighway is a commuter targeted bicycle lane with specific design criteria making the paths appeal to the bicycle commuter. The cycle superhighway and what it can be in the context of urban design is investigated in this thesis. Through a case study of *Roskilderuten*, a superhighway currently being implemented along the arterial road no. 156 'Roskildevej' between Roskilde and Copenhagen, the cycling superhighways of the greater Copenhagen region are explored.

Cycling superhighways are transport corridors that quickly and efficiently gets the cyclist from suburbs to the center city and efficiently across the city. However, cycling superhighways are more than transport corridors. Implemented in the right context and with additional contextually appropriate interventions, they have the potential to be a tool to in urban design to shape the way the urban environment is meet and experienced. It is concluded that a cycle superhighway network that include transport corridors with strategically placed interventions to offer more than smooth transport, but also aesthetic and pleasurable rides, is one that include more typologies than the 'Highway' as indicated by the name. A way forward for an expanded network of high-quality cycling infrastructure, is one that include a multitude of typologies within the network and interventions in appropriate places along the route. And is one that considers not only efficiency and accessibility but also the sensed qualities of a ride. It is suggested that this type of cycling superhighway network is obtained by using a 'tool' developed in the thesis. The 'tool' is comprised of a set of design principles for a multi-typology path, a manual to guide a contextual mapping and analysis to identify appropriate typologies and places of intervention and thirdly a bank of ideas of potential interventions that may be implemented.

Offering good everyday cycling experiences and commutes for a multitude of riders and practices of cycling is a way forward towards a future of high-quality cycling environments.

## *Motivation*

During my high school years, I discovered that cycling can give a sense of freedom and independence. I was not a great cyclist. I did cycle every day, but not more than the short commute to and from school, as is common for most Danish students. One day, I decided to cycle the 30 km to Copenhagen. The first time I cycled from Roskilde to Copenhagen, it felt like I accomplished something new, I moved my boundaries. To have cycled 30 km in one day felt like a big thing at that time.

Throughout my years in high school, I continued to cycle between Roskilde and Copenhagen at least a couple of times a week. The route became very familiar. I had my personal landmarks, I had my favorite sections. I had days of good wind, mild summer-evening rides with wind on naked arms and legs, and mornings cycling with the sunrise. I also had many long slow trips with head-wind and rain. The route along Roskildevejen is not beautiful. Mostly it is a landscape of parking lots and warehouses, backsides and barriers towards a transport corridor for cars. Straight long roads. But for me, this felt like a space of freedom, my route, my own effort and power put through the bike to get me from one place to another.

Years later, the bike trips got longer. I toured most of Scotland, especially the north. One summer, I cycled from Stockholm to Budapest, later from France to Italy, then through northwestern Europe, northern Germany through Denmark. I cycled in north America, New York City, New Jersey and the suburbs of Philadelphia. Later I toured the Atlas Mountains in Morocco and went the long way down from Egypt to South Africa.

My cycling adventures started along *Roskilderuten*, and why this particular route initiated my inquiry into cycle superhighways. The mobility spaces of the cyclist are a significant part the urban realm (at least in a Danish context) making them part of spaces we spend a considerable amount of time every day.

As someone eager about cycling and good cycling experiences, I hope the thesis shows that cycling infrastructure and mobility spaces of the cyclist is an area where urban design can play an important role in developing and expanding the network of high-quality cycle ways. Thereby contribute to good, environmental and people friendly urban development and enhance cycling experiences for a wide range of people and practices.

*Julie 2019*



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## 1. *Introduction*

Urban design is about public space and concerned with designing good urban spaces to facilitate “life between buildings” (Gehl, 2017). But ‘life’ that takes place ‘between buildings’ is always an embodied experience happening in motion. We are mobile subjects and our lives and daily undertakings are lived in motion. Our urban areas are connected by roads and paths, by ‘transport corridors’ for technologies that move us; trains, busses, cars and bicycles. Especially roads are a steady and quite universal feature of the urban environment and they take up a majority of the space designated public realm, making it relevant to ask whether (and how) spaces for transit and ‘transport corridors’ can be a tool to be used in urban design when imagining urban environments, ‘cityscapes’ and the consequential urban experiences.

Cycling as a means of daily commute is a well-established practice in Denmark. Cycling is also a sustainable mode of transport, and in conjunction with public transport, the opportunity and infrastructure to commute by bicycle, as a means of every day mobility, is good. The municipalities in the capitol region are concerned with mobility. Mobility strategies are on the political agenda and how to tackle the region’s issues of automobile congestion and its related problems are a significant concern. One initiative towards lessening the issues of congestion and its related nuisances is to get more people cycling. To get more people cycling a well-connected, comprehensive and accessible cycling network needs to be in place. Additionally, if we intend to prioritize green and sustainable journeys then it matters to ensure the infrastructure, safety, affordance and aesthetics of the bicycle environment and the journey experience. The role of the bicycle’s mobility spaces, and what it has the potential to do in urban spaces will be explored in this thesis.

The (Copenhagen) capitol region already has a comprehensive and well connected bicycle network, with short commutes below 5 km as the most prevalent commuting distance. (Center for Transport Analytics, 2018). In comparison to Holland, which is one of the few countries where more cycling pr capita is seen, Danes are not cycling as long distances, and there is a potential in getting people to commute longer distances. (T. A. S. Nielsen, Skov-Petersen, & Agervig Carstensen, 2013)

The cycle superhighway is a relatively recent initiative with the first cycle superhighway (Albertslundruten) completed and operating in 2013. The cycle superhighways are intended to make commuting by bicycle accessible, efficient

and direct by upgrading existing paths, establishing new and giving the cyclist priority and smooth conditions along the route. Wide cycle lanes, priority to bicycles over cars, and a distinct ‘identity’ with recognizable (orange) signage to make it identifiable, easy to navigate and fast to cycle with as few interruptions to flow as possible. (Office for Cyclesuperhighways, 2018). However, the experience of the path depends significantly on the surrounding environment (whether it is open fields/landscape or dense urban areas). It is useful to understand what design principles are important in the different types of environment.

The thesis studies the ‘super bike lanes’ of the capitol region, the frame/system of daily mobility that they are part of and takes its case in *Roskilderuten* (a super bike path currently being developed). The study aims to devise a wider variety of cycling path typologies to be included and accounted for when designing/implementing future cycle superhighways by nuancing the typologies within the cycle superhighways and creating a number of design principles to consider when implementing new routes. Diverse and context specific cycling path typologies will be able to accommodate more types of cyclists, cycling- and mobility practices. The thesis findings are intended as a tool/inspiration for planners and designers (and policymakers) working to promote and improve cycling infrastructures and cycling experiences. It is the hope that cycling infrastructures, journey experiences of the cyclist, aesthetics and affordances of the bike paths will be accounted for and prioritized when planning and designing for bicycle mobility.

## ● 1.1. *Aim, Objective and Research Questions*

The aim of the thesis is to investigate in what way cycle superhighways can be a tool in urban design. By this is meant an instrument to shape urban spaces and form (mobile) experiences for the cyclist.

It is central to understand the context in which cycle superhighways are implemented, to understand what kind of public space bike lanes are and what role they play in mundane mobility. Thus, the mobilities ‘landscape’ and practices surrounding the cycle superhighways will be investigated by looking at recent research on cycling and the urban environment. The literature review part of the thesis will also define a theoretical framing that will be used to shape the analysis of the case study. The case study, the document and literature research will help devise what role cycle superhighways can play in urban design when shaping and imagining bicycle mobility spaces to come.

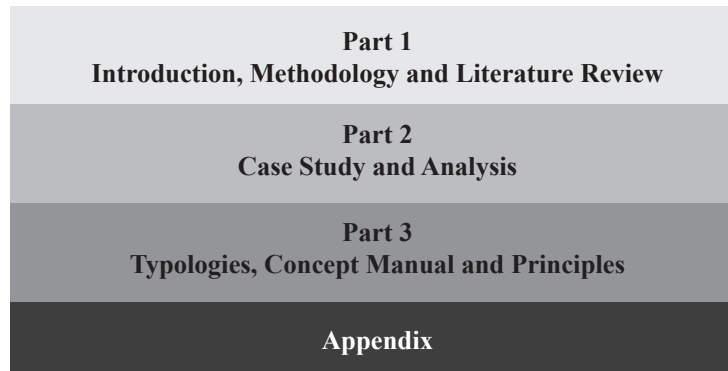
The title and research questions that will be addressed in this thesis are:

### **Cycle Superhighways – Transport corridor or urban design tool?**

- What are cycle superhighways, how do they work and what context of everyday mobility are they part of?  
– The case of *Roskilderuten*
- How could a cycle superhighway network that include different path typologies and design principles be a tool for urban designers -designing how we move through and experience urban areas from the bike?
- How could the cycle superhighways be used in urban design and what would the typologies, design principles and interventions shaping them be like, if applied in the case of *Roskilderuten*?

## ● 1.2. *Structure of the Thesis*

The thesis is structured in three parts and an appendix:



**Part 1** gives an introduction to current research on cycling and the urban environment, and defines a theoretical framing used to understand the cycle superhighways. It includes a literature review and a methodology chapter. **Part 2** presents the case study and analysis, ending with an analysis conclusion summing up principles and suggestions for the cycle superhighway ‘tool’ to be developed in part 3. The result, typologies and design principles as exemplified in the case of *Roskilderuten* is presented in **part 3**, which ends with a project conclusion and points to further perspectives. Finally, an appendix containing additional background and documentation from the analysis and thesis process is included.

The APA-6th edition referencing style is used throughout.

### *Short note on translation*

In Danish, the term ‘supercykelsti’ – super bicycle lane/path – is used. The translation cycle superhighway is used by the Sekretariat of ‘supercykesltier’ in Denmark (the Office for Cycle Superhighways) as the official English translation and it is a term used in many other countries. That is also why the translation cycle superhighway is used here.

In some ways the Danish term ‘supercykelsti’ better captures the potential of a differentiation of typologies that are (or may be) contained within the cycle superhighway. The notion cycle superhighway may denote only a highway and thereby be a narrower concept, and for the intention of what it will be argued a supercykelsti can contain - may be a bit misleading.



## 2. Literature Review

### 2.1. *A View From The Road*

For most urban inhabitants, landscapes and cities would be inaccessible and difficult to navigate without an infrastructure of roads. We live much of our lives ‘on the move’ getting from one place to another, structure our daily activities in different places and plan around transport time and how to get from place to place. Mostly this mobility in urban areas is via roads, sidewalks and bicycle lanes. This review looks at current scholarship on cycling research and the influence of the urban environment on cycling practices and behaviour, and what role design of the cycling environment plays. However, before getting to some of the current debates on cycling, a few relevant studies on roads from the outlook of the car are included as they offer perspectives and methods that are useful to all road uses and to the discussion of transport corridors.

Many areas, districts and stretches of land or urban city-scapes are known by the view from the road. Here the landscapes and cityscapes become the scene, places with meaning and points to navigate by; landmarks, edges, nodes, districts and paths as urban scholar Kevin Lynch defined the features (Lynch, 1960). This view and experience of landscapes and urban areas from the road has been studied at several occasions.

In the 1960’s, as automobile travel was greatly on the rise (in the US especially), urban planners and architects Appleyard, Lynch and Myer decided to study “*The view from the road*” (as they also called their book) (Appleyard, Lynch, & Myer, 1964) to find out what works to make a road interesting, beautiful and a good drive. They recognized the importance of what one sees and experiences on the move through the windscreen of the car. They emphasised that it matters how a view appears, how a road slopes, what landmarks one sees, what other infrastructure that one encounters; e.g. driving through a motorway tunnel. Through graphics and illustrations, their analysis revealed the nature and rhythm of the views from the chosen case studies, and suggested spaces that worked well and sections that were problematic. The notion of rhythm and intensity along a trajectory was important to show a pattern of the view experience from the road. The study recognized that transport corridors are more than getting from one destination to the next, and that the aesthetic and contextual course of a road is important to an enjoyable ride.

Moving to a context closer to this project’s scope, a study of the exchange and interplay between road, landscape/cityscape and experiencing it from the

road was done for selected sections of Danish motorway in a research project entitled ‘*Byen, vejen og landskabet*’ (T. A. S. ; Nielsen & Harder, 2004). It was recognized that an *aesthetic* coexistence between road-infrastructure and how it meets landscape and the build context matters and can create good rides, and in the most sensitive way possible disturb/disrupt nature and environment. The study puts forward suggestions to how this landscape of infrastructure and urban development could develop in the future.

The need to plan wisely and aesthetically when developing or creating new road infrastructure is being considered in current road development, and ‘the view from the road’ is an important aspect of good road design. A recent guideline for development of motorway structures in the UK acknowledges and takes on the challenge to make “*aesthetic roads*” (Highways England, 2017). In the mid-1990s the Danish Road Directory had a strategy for ‘road aesthetics’ (Vejdirektoratet, 1995) , and for a number of years an annual award was given to a road that was especially well designed or aesthetically interesting.

In the book *Beautiful Roads* (Engberg, Friis, Lützen, Tørsløv, & LeMarie Wandal, 2002) the term “*road architecture*” is used to describe an aspect of road design. By calling roads ‘architecture’, Engberg et al. places the road in a category of build structure with architectural qualities, and thus a different way of viewing a road than merely a ‘transport corridor’.

*“Road architecture is moreover distinctive in that much of its aesthetics is dictated by the surroundings themselves. Creating road architecture consists in seeing and understanding these qualities and incorporating them into our aesthetic experience of the road.”* (Engberg et al., 2002 p 6)

Engberg points out that the surroundings of a road is often what shapes them and their characteristics. To understand the bicycle ‘road’, it also seems straight-forward that the context and surroundings play a major role.

## ● 2.2. *The Transport Corridor Notion*

Within transport geography, the transport corridor is a complex notion. The term refers both to a physical structure designated for transport between major hubs and enclaves but is also a notion that encompasses a context of economic factors, global and local policies and technology. It is seen as a dynamic and changeable unit dependent on a political, economic and technological reality. The transport

corridor is often viewed as the ‘backbone’ of transportation networks, passageways connecting cities, affording flows of passengers and goods. (Rodrigue, Comtois and Slack, 2017). The notion of a corridor is also seen in planning, where the notion ‘growth corridor’ is used to describe an axis of growth along a trajectory -a way to plan development.

In a simpler definition, a transport corridor is the passageway connecting two nodes, either by one or more modes of transport (Rambøll, 2018). The transport corridor can also be seen as an ‘armature’ a system for distributing and arranging flow of movement through a city. (Jensen, 2013 p 27) The armature goes in hand with the notion of the ‘enclave’. The ‘armature’ and ‘enclave’ are concepts used by academic and urban designer D.G. Shane and originate in concepts from Kevin Lynch to articulate how an urban space is composed and connected.



*Fig 1. Transport Corridor through Beijing*

A transport corridor that connects two nodes, can also be a barrier. As exemplified in the image (fig. 1), the transport corridor runs like a flood through a dense part of Beijing and can be both a barrier and dividing feature in an urban environment. For vulnerable users especially, the road is not accessible, and it is difficult to cross. Only designated over-passes and pedestrian bridges allow passage from one side to the other.

A highway is a transport corridor for cars. Cyclists and slow-moving vehicles are not allowed along these ways, and strict regulations in terms of driving behavior, design norms for dimensions and materials of the road are defined. In the case of cycling lanes, the standards and norms for how the lane layout should be are less regulated and differ greatly from country to country and from urban to rural contexts, and also differs greatly within the same urban context. The layout and design of cycling infrastructure reflects an attitude towards cycling, whether it is regarded common practice, whether it is encouraged and cycling lanes are seen as a 'public service' or not, similarly to bus transport and train services. Cycling infrastructure and lanes fall within the category of transport corridor. It is a space designated for transport and for getting from A-B. A report by consulting firm Rambøll (Rambøll, 2018) for the (Copenhagen) Capitol Region in 2018, looks at the region's mobility, and suggests inputs to a traffic and mobility plan. In the report, the Cycling Superhighway is an example of what makes up or is part of a transport corridor. A transport corridor, in this context, is not limited to one mode of transport, one road or path, but is the collected trajectory between two nodes and an important 'armature' distributing movement through urban spaces. A node could be a train station, a hospital, an educational institution or a city center. (Rambøll, 2018)

Although roads and the experience of being mobile along a road share similarity between different modes of transport, they are undoubtedly very different experiences. The view from the saddle/bicycle is unique and a different sensitivity needs to be in place to the design of the cyclist's 'transport corridors'. This will be discussed later on. First, one perspective will be introduced that help understand and frame the mobile situation of cycling, and that urban designers of mobilities spaces could take on, namely that of 'mobilities design'.

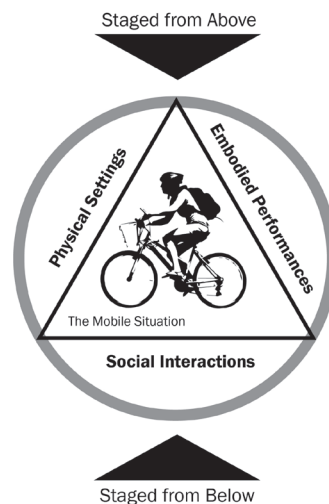
### 2.3. Mobilities Design

We are mobile subjects, our lives take place in interaction with other people, moving to and from places. A ‘mobilities turn’ (Sheller & Urry, 2006) was seen in the social sciences in work crossing several disciplines such as geography, anthropology, technology and sociology. A focus on how people, information and goods are on the move, the patterns and systems that they are part of, and this movement’s influence on our life conditions, both physically, socially and virtually is being studied in a cross-disciplinary manner in mobilities studies.

As a relatively new turn within mobilities studies, attention has been turned to the physical settings of the mobile situations, the way the surroundings are shaped, the ‘artefacts’ and their affordances and how they are setting stage to this mobility. One direction of the turn has resulted in the emergence of ‘mobilities design’ research (Jensen, 2014, 2016, 2018; Jensen & Lanng, 2017). Mobilities design is a field merging sensitivities and approaches from the fields of design and urban design with findings and understandings from mobilities research.

*“With a point of departure in the situational approach to mobilities, and with a strong interest in how people feel, sense, and experience actual mobilities, the research field of ‘mobilities design’ is now emerging.” (Jensen, 2017 p 8)*

To uncover the mobile situation and what factors influence it, the model of ‘staging mobilities’ (Jensen, 2013) is put forward. Jensen suggests that the mobile situation is staged both from ‘above’ and ‘below’, meaning that the mobile situation is influenced by several factors such as traffic regulations, planning and policies from ‘above’ and social interactions amongst people navigating traffic and the urban landscape, from ‘below’. Additionally, the model identifies three areas: ‘physical settings’, ‘social interactions’ and ‘embodied performances’ that together make up the conditions of “*mobilities in situ*” (Jensen 2013).



The model simplifies a complex situation. It recognizes that a mobile situation is influenced by many factors. The physical setting is one of the model's three parameters influencing the mobile situation, and one that will be looked closer at in the thesis. Mobilities design present a sensitivity to life on the move and how physical materiality sets the stage. People and their interactions are part of what make up the smells, sounds, atmospheres and life of cities. But so are the materials, designs, physical elements that make up the city. All-together, people, their interactions and doings playing against and with the physical materiality they inhabit, make our cities and the experiences of them.

## ● 2.4. *A Sense of an Urban 'Atmosphere'*

The stage metaphor that Jensen uses for his mobility model is also an appropriate image to describe urban spaces and what 'atmosphere' they evoke. The concept of atmosphere, and the aesthetics of atmosphere, is a theme that German philosopher and scholar Gernot Böhme has worked on extensively. In a seminal article: *Atmosphere as the Fundamental Concept of a New Aesthetics* (Böhme, 1993) from 1993, Böhme points at the importance of understanding the seemingly vague concept of atmosphere and what influential impact the creation of atmospheres has, from the sphere of art and design to the political. A 'new aesthetics' - where atmosphere is the central concept - is one of everyday life, of politics and of commodities according to Böhme. The most important task for theories of 'new aesthetics' is to make the wide range of aesthetics "*transparent and articulatable*". (Böhme, 1993, p 125) Here, being able to grasp and articulate atmospheres of an experienced situation (of art or a political situation and event) is part of this (Böhme, 1993).

Returning to the stage metaphor, Böhme looks at the 'art of the stage set' in a later article from 2013 (Böhme, 2013). In a similar way to how Jensen's staging mobility model recognizes that the mobile situation is a 'staged' one that is influenced from above and below, Böhme sees how staging (and staging of atmospheres) are present almost everywhere:

*"Staging has become a basic feature of our society: the staging of politics, of sporting events, of cities, of commodities, of personalities, of ourselves. The choice of the paradigm of the stage set for the art of generating atmospheres therefore mirrors the real theatricalisation of our life."* (Böhme, 2013 p. 6)

The image of the ‘stage set’ and ‘staging’ as what design, planning and politics does, can be a way to understand how we also may positively influence how that ‘stage set’ is arranged and what atmospheres it evokes to create spaces, urban environments and mobilities settings that are good and working well for people. What exactly that means is a matter of interests and convictions. But the concept of a new ‘public domain’ as described by Dutch scholars Hajer & Reijndorph (2001), as an inclusive and openminded public space where exchange of social and cultural behaviour and norms are taking place, is a view sympathized here. This notion of a ‘public domain’ in a cycling context will be elaborated later on.

## ● 2.5. *Cycling and the Urban Environment*

From ‘the view from the road’, notions of a transport corridor to the ‘atmosphere’ of a space, here comes the turn to cycling. Cycling as a mobility form takes effort and exposes the rider directly to the environment and its conditions. The following section looks at recent scholarship on cycling and the urban environment and how the conditions and urban environment influence cycling practices. Some of the main discussions included here are: What can encourage cycling, how cycling is experienced, how does aesthetics matter to the bicycle commuter, how does urban design influence cycling behavior and practices, what helps to diversify and encourage bicycle use, mobilities cultures and who has the right to use the streets.

Several studies have been made in a Danish context studying what makes people cycle. In a recent report (Vejdirektoratet, 2018) it is highlighted that cycling is a source of well-being and keeping or improving fitness is an important aspect of the practice. Cycling is also seen as a practice that people (in Denmark) would like to pass on to the next generation. And there is seen a generally positive attitude towards cyclists and cycling. (Bisgaard-Nøhr, Buch, & Busk, 2014; Vejdirektoratet, 2018).

There are many modes of being mobile, and each offer a different experience, each technology (i.e. bus, train, bicycle etc.) has its own characteristics, practices and cultures surrounding its use. On a bicycle one is directly exposed to the surrounding conditions. One feels the landscape through the bicycle, the sun, wind, rain all effect the experience of the ride. Mediated through the bicycle, one literally ‘feels’ the topography of the landscape and the affordance of the surface beneath, these are unique qualities to cycling.

One of the main things differentiating cycling (and walking and running) from driving a car or taking public transport is that cycling requires effort. Cycling is a self-powered mode of transport and demands a certain level of ability. Cycling researcher and scholar Jonas Larsen has investigated this aspect to cycling practices (Larsen, 2016). A cyclist himself, he has been undertaking ethnographic research on commuting by bicycle. Through a case of his own commute from home to work, a 30 km cycle from Copenhagen to Roskilde University, Larsen finds that long-distance cycle commuting is a transport mode that requires effort and through interviews and ride-alongs with colleagues and cyclists undertaking same commute, he finds that a long-distance commute is often chosen because of the benefits of health and well-being. For some riders, cycling is a way to combine fitness with the purpose of getting to work, or it offers a time to ‘meditate’ and enjoy the ride when smooth and without too many distractions. Cycling longer distances can be ‘learned’. As with any sport, it requires practice to be in shape to do it. Larsen suggests that these aspects of cycling longer distances could be highlighted and used in promotions and campaigns to get more people to choose to cycle longer distances. (Larsen, 2016)

Cycling is a well-established practice in Denmark. It is commonplace, in urban areas and larger cities in particular, to commute and get around by bicycle. Larger cities also have a bigger population of students and young people - relative to rural areas. This group of people are those who cycle the most. Denmark is recognized to be one of the most cycling nations. It is second to the Netherlands being Europe’s second most cycling nation. Denmark has potential to do even better by getting people to commute longer distances (more than 5 km) by bicycle, which is an area where we lack behind the Dutch. (van Goeverden, Nielsen, Harder, & van Nes, 2015)

As it is recognized in Larsen’s ethnographic study of long-distance commuting by bicycle, commuting 30 km is very uncommon (less than 1 % of all commutes by bicycle in Copenhagen are more than 15 km (Larsen, 2014a p 67)). The distance is too far and takes too long. But in combination with public transport, longer distances can be manageable. For travel-chains and a multimodal transport system to work well with the bicycle, the bicycle has to be integrated and considered in the transport system as a whole. A good example is how the S-trains in the capitol region accommodate cyclists with space to take the bicycle on board easily and for free. A holistic view should be taken on the integration of cycling into public transport and questions arise such as: Are there sufficient bicycle parking facilities supporting the demand at a train station or a bus station?

Does it feel safe to leave the bicycle parked at the station or bus stop and is there parking capacity where needed? How does one get the bicycle from the street or station (often) up or down to the platform? Bicycle infrastructure is more than just bicycle lanes, it is also parking and storage of the bicycle in public urban spaces, and how these spaces encourage and accommodate bicycle use. (Van der Spek and Scheltema, 2015)

Cycling infrastructures, bicycle lanes, parking and storage, should integrate well into the urban fabric. The spaces that the bicycle inhabit are largely part of public urban spaces. In the case of Copenhagen and its greater region, they take up a considerable amount of space and presence in the landscape. The bicycle parking facility is yet another important build typology and space to consider in relation to bicycle use and practice. In a comparative case study (Larsen, 2017) between parking facilities in New York City, Amsterdam and Copenhagen, it was found that cycling facilities are not adequate in Copenhagen – seen otherwise as a well-established cycling city (Larsen, 2017). The bicycle parking should be incorporated in the planning of new cycling infrastructure, and new parking typologies, specific to bike environment and path context could be explored (however not within the scope of this thesis).

## ● 2.6. *Views from the Saddle*

In cycling and mobilities research it has been studied what cycling is experienced - what it ‘feels like’-, an example is Jonas Larsen’s ethnographic study. For example, he points to physical environmental factors that matter to the cycling experience. He points to the importance of the road (cycling path) affordance. As an example, he includes a quote from a commuting cyclist of the route between Roskilde and Copenhagen, describing the how a badly-maintained cycling surface destroy ‘the good feeling of cycling’:

*“It’s simply uncomfortable. And you don’t get this feeling of flow. The good feeling of cycling is destroyed. You’ve to focus on steering and controlling when riding on a bumpy surface compared to some new asphalt ... On a racer bike you feel every little bump ... directly in your bum and hands.” (K, man, in his 40s) (Larsen, 2016)*



*Fig. 3 A well loaded bicycle, Tanzania 2013*

Looking at cycling practices and how they differ and matter to how cycling infrastructure is designed and planned also means attending to the range and use of different bicycles (the artefact) and the loads the cyclist carry with him on his body or bicycle. In a recent contribution to cycling research (Cochoy, Hagberg, Normark, & Ducourant, 2017) looks closer at the bicycle and its ‘loads’, meaning different types of bicycles; from racing bikes to rental bicycles, and how we carry things (‘loads’) with us when we cycle by wearing a backpack or putting panniers on our bicycle. The study suggests that attention to the details of the type of bicycle in use and the practice it affords matter. A racing bicycle (together with the bicycle’s rider – the ‘network-actor’) will behave differently than a cargo bicycle (and its rider) transporting children. Different cycling practices and uses should be accommodated in cycling infrastructure, and it is suggested that some contexts perhaps are not appropriate as ‘superhighways’, for example a dense urban retail environment may be inappropriate. (Cochoy et al., 2017)

A recently published literature review (Liu, Krishnamurthy, & Van Wesemael, 2018) looks at cycling experience and methods used to studying it in various fields such as transport geography, mobilities studies and urban design. The article suggests that the view from the bicycle has been rather neglected in urban design studies and they point to three aspects where they find an opportunity for research in urban design. The recommendations are based on a review of 20 selected articles and studies that by various methods have looked at cycling and how it is experienced. The first recommendation is to understand the link

between qualitative and quantitative measures and how they may link across scales, linking methods such as ride-along that capture site-specific experiences, smells and views with larger quantitative data such as GPS data and large surveys capturing data related to a transport system at city and regional scales. The second suggestion is to research the temporal aspect of cycling, and how this differ for the cyclist and for her experience of the environment. Third is the opportunities to use contemporary graphic and visualization tools to (computer) simulate, test and envision new urban designs. (Liu et al., 2018)

One of the articles reviewed in the study is *‘Retracing trajectories: the embodied experience of cycling urban sensescapes and the commute between ‘neighbourhood’ and ‘city’ in Utrecht, NL’* (Duppen & Spierings, 2013). The article looks at “*passing through different territories of the city*” (as they quote sociologist Sennett, 2006). And compares the planner’s perspective with that of the commuting cyclist’s embodied experience of the case city of Utrecht in the Netherlands. They intend to “*reveal sensescapes and their composition along entire trajectories between home and work*” (p 234). Their research methods are ride-alongs, video-ethnography (inspired by Justin Spinney, who developed and argued for video as a useful method and tool in mobilities research (Spinney, 2011)) coupled with GPS tracking. They also map and document ‘sensescapes’ such as a ‘*landscape of disorder and change*’ and a ‘*stressful and chaotic city gate*’. The article finds that ‘negotiation in motion’ (Jensen, 2010) with other traffic take place all the time, that cyclists know their ‘landscape’ and sometimes take risks - jumps a red light or take an illegal shortcut in order to maintain a good cycling flow. A cycling flow and rhythm is the second point that is highlighted. Thirdly, it is found that the respondents/participants share some images of the city; landmarks, smells and the impression of a busy and stressful junction. The study highlights that understanding a trajectory of a commute and the changing scenes and ‘sensescapes’ gives a useful insight to the “*act of passage*” (van Duppen & Spierings, 2013 p 242). For the thesis, identifying and getting a sense of some of the different sections and ‘sensescapes’ of the case route will be useful.

A study from 2014 (Hull & O’holleran, 2014) compares six cities in a case-study and ask, in the context of bicycle infrastructure, if good design can encourage cycling? It is found that the designed environment does matter and that good design such as: “*wide cycle lanes*”, “*clear signage*” and “*attractive settings, e.g greenery and placemaking*” (Hull & O’Holleran, 2014 p 385) make a difference. Through findings in cycling research literature and from the cycling research carried out by the researchers – by cycling - a “*cycle infrastructure scoring system*”

is developed. (Hull & O'holleran, 2014). The researchers define eight categories: "Coherence, Directness, Attractiveness, Traffic/Road safety, Comfort, Spatial integration, Experience and Socio-economic value" and the six case cities are scored and compared accordingly. The study concludes that – along with supporting policies and regulations – the design of good infrastructure can encourage more cycling. Especially the safety, comfort and continuity categories are seen to be important factors. About safety it is found that the rider's perception of how safe a cycling environment is -is a deciding factor for cycling or not. (Hull & O'holleran, 2014)

The perceived risk of the cyclist can be difficult to measure and quantify, as this perception can vary from person to person. This points to the significance of the cycling experience, and what measures can be put in place to increase the perceived sense of safety for the cyclist. How a mode of transport is perceived, has a great influence on our choice to cycle or not, or in choosing one route before another. (Hull & O'holleran, 2014; Manton, Rau, Fahy, Sheahan, & Clifford, 2016; Stefánsdóttir, 2014) In many cases, one of the main things that can increase the actual safety of the cyclist is for the cyclist to ensure that she is visible in traffic, for example by wearing a yellow vest and visible lights attached to the bicycle and herself. (Madsen & Agerholm, 2013)

## ● 2.7. *Bicycle Environments and Qualities of Cycling Experiences*

Bicycle environments and the cycling experience are intrinsically linked. As part of a large 'bikeability' study, infrastructure typologies and design elements that promote 'bikeability' were sought out. (Andrade, 2013; Sick et al., 2014) Three distinct cycle infrastructure typologies were studied to identify typologies that especially help 'promote cycling'. Here a typology refers to a specific and characteristic cycling infrastructure environment or feature i.e. a cycle bridge, a shared space street and an alteration to a street-layout prioritizing cyclists intended to make cycling safer when cars cross the cycle lane from a smaller side street. Through three case studies, it was found that the different typologies have their advantages and disadvantages and that context specificity and intention of the typology in the mobile trajectory are key to deciding whether a typology would be beneficial and increase 'bikeability'. (Andrade, 2013; Sick et al., 2014)

Another 'bikeability' study from 2018 (Sick Nielsen & Skov-Petersen, 2018) looks at factors across scales; local, urban and regional, and how each contribute with aspects that add or subtract to the likelihood of commuting by bicycle. Through an analysis of data capturing conditions of terrain, the urban structure,

density and accessibility, it is highlighted that ‘bikeability’ is indeed influenced from factors on all scales, which may not always be considered. (Sick Nielsen & Skov-Petersen, 2018)

Intrinsic qualities of cycling; a time to ‘unwind’, “*measuring the wind through your hair*” (Krizek, 2019) interacting and spending time with others while traveling, enjoying the scenery and feel of the environment like sun on one’s skin in the early spring, are qualities of cycling that are difficult to measure and quantify. Professor of environmental design and urban designer Kevin Krizek sets up a framework to attempt to capture some of these intrinsic qualities that he argues may be undervalued when not ‘visible’. He develops categories of intrinsic benefits of cycling that potentially can be ‘measured’ and valued. Especially the benefits of well-being that is documented for cyclists is an important aspect. (Krizek, 2019)

Beforementioned researcher Jonas Larsen calls for these kind of intrinsic qualities to be promoted when campaigning to get more people cycling, and he sees potentially that more people will discover those qualities, when they get a practice of cycling. (Larsen, 2016) Cycling takes up part of mobility patterns and practices of urban life. In the context of Copenhagen, some of these mobilities practices have been analysed via a qualitative method finding that mobilities practices of families is a large part of the every-day (Jensen, Sheller, & Wind, 2015). The time spend on daily mobility “*together or apart*” forms and structures families’ lives, and also provide valuable time for the families together, and for the individual. (Jensen et al., 2015). Cycling can be a shared experience, a time for ‘social interaction’ between people cycling together; parents cycling with children, friends cycling together. (McIlvenny, 2015)

## ● 2.8. *Aesthetics and New Bike Path Typologies*

In a context of three medium-sized Scandinavian cities, researcher and urban planner Harpa Stefánsdóttir looks at the connection between commuter’s choice of routes and aesthetics of the chosen route. She finds that aesthetics matters to the bicycle commuter and thus introduces the concept of aesthetics and aesthetic experience to the bicycle rider’s travels to cycling research (Stefánsdóttir, 2014). She has also developed a framework to determine the aesthetic experience and she points out that environments that otherwise demand much attention from the cyclist, like a busy junction, do not give time and space for aesthetic experience in contrast to low intensity stretches of cycling (Stefansdottir, 2014). This could

indicate that trajectories of road that are perceived to be safe and with low frequency of traffic distractions potentially are enjoyable and aesthetic rides. In a study of bicycle commuters' aesthetic experience, she concludes that:

*“In general, proximity to traffic seemed to be the most negative factor affecting cyclists' emotional well-being. The cyclists wished to move away from the uncomfortable experience caused by closeness to motorised traffic and into an environment characterised by vegetation and the opportunity to experience nature, fresh air, quietness and positive sounds.”* (Stefánsdóttir, 2014 p. 18)

Linking mobilities and aesthetics becomes relevant also when grasping the mobile subject, the body in motion and how we perceive (our surroundings differently) when in motion. And it becomes relevant to talk about the aesthetic properties of mobilities spaces and infrastructures. (Jensen, 2014)

Bikespaces in NYC is an interesting study as it introduces a new kind of bicycle path and *urban typology* (Marling & Jespersen, 2017). Identifying new typologies and working attentively to develop/applying location-specific path typologies (and bicycle environments) is seen relatively infrequently and offers a great potential as a using this type of urban typology as a tool for planners and designers. Through a “*case study with an explorative approach*” (Marling & Jespersen, 2017) of the Manhattan Waterfront Greenway, the researchers get an understanding of the new ‘bikescape’ that is unfolding here. A ‘*highway*’ type cycling lane links several neighbourhoods, the Waterfront Greenway being one, with a network of smaller ‘*by paths*’ crossing and connecting to the main way, allowing for small stops, explorative de-tours, views and encounters with landmarks and art installations. The researchers conclude their article by presenting the concept of an Urban Bikescape as a new urban architectural typology. Described as ‘an architecture for the body’, and a type of cycling path that is not a ‘transport corridor’ but a path that links different types of urban spaces. It is a space that “*merges and links spaces for mobility and spaces for urban life, recreation and social interaction.*” (Marling & Jespersen, 2017). The ‘bikescape’ is an example of cycling infrastructure used as a tool to create a specific kind of urban environment.

Additionally, it links historical and diverse urban spaces, tying together a narrative of the urban landscape as one cycles through it. Further, urban bikespaces are spaces linking different types of people and spaces where exchange of social and cultural nature happen, categorising the bikescape as a new type of ‘public

domain' as understood in the sense of Hajer & Reijndorp (Hajer & Reijndorp, 2001), as a "*new type of public domain, where social and cultural exchange is possible*" (Marling & Jespersen, 2017 p 130). Seeing the mobility spaces as forming part of the 'new public domain' of urban areas is an interesting way to view bicycle spaces. And in the case of the Manhattan Waterfront Greenway: "*It seems that the design is a consciously used tool for opening the city which is otherwise very lifestyle segregated*" (Marling and Jespersen, 2017 p 113). Making it also a tool in the quest to make a city able to embrace diversity and avoid what Hajer and Reijndorp deem a dangerous segregation, where people of resources tend to be able to avoid those people who are not like themselves. (Hajer & Reijndorp, 2001)

The 'bikescape' is a typology that could be (is) used as a tool in urban design. As argued in the article, the urban bikescape is seen as a tool to open up the city by giving access to a wider reach of places and network of parks and neighbourhoods. Cycling superhighways could, in a similar manner to the 'highway' interlacing with 'by-paths' on the Manhattan Greenway 'bikescape', become part of a strategy to prioritize cycling access to more places and more diverse cycling experiences.

The notions of sensescapescapes and aesthetics in cycling as introduced earlier can also be linked to the concept of atmosphere from Böhme (1993). 'Atmosphere' is used to describe the mood and feel of a space, an impression evoked in the meeting with a certain space (or an artwork), it is something that can seem hard to pinpoint and define. "*Atmospheres are evidently what are experienced in bodily presence in relation to persons and things or in spaces.*"(Böhme, 1993 p 119). The sensescapescapes, the aesthetics and the atmosphere all capture the experience and 'feel' of an (in this case) cycling environment and they will be a central parameter when looking at cycle superhighways and how to use them as a tool in urban design.

## ● 2.9. *A Right to the Use of Public Roads*

Cycling is prevalent and commonplace in Denmark because planning and policies have helped shape the cycling environment, attitudes and practices towards cyclists and cycling. Implementation of good quality cycling lanes and priority to the cyclist in traffic, along with campaigns and initiatives at schools are all factors that play part the cycling conditions of a region or a city. The urban environment

and urban design is a reflection of the political environment and attitudes to cycling.

In a UK and particularly London context researcher Rachel Alder has been engaged with campaigning and research on cycling for several years. She has looked at how to diversify and normalize practices of cycling, what measures to take to diversify and make cycling attractive and possible for a more diverse group of people. In a 2017 study she (and her co-author) finds that high-quality cycling infrastructure may contribute to encouraging a more diverse range of people to cycle and to perceive cycling as a safe and do-able means of daily commute. (Aldred & Dales, 2017)

In another study Aldred, Croft and Goodman (2018) look at the impact a specific ‘mini-Holland’ programme implemented in London’s outer boroughs has in getting people to cycle. The ‘mini-Holland’ programme is implemented in three outer-london boroughs that, in learning from Holland, has implemented a long list of measures to initiate a shift from car-use to active transports. Examples are alterations to street-layout to prioritize pedestrians and cyclists. The before and after (implementation of ‘mini’-Holland) study shows that the initiative and interventions to the urban fabric and street-layout has a positive effect on cycling and concludes that initiatives promoting and prioritizing cyclists work. (Aldred, Croft, & Goodman, 2018) It shows that large-scale and targeted initiatives with a recognizable overall strategy can help switch from car use to cycling in out-skirt-city and suburban areas.

Worldwide there are great variation in infrastructures/facilities, attitudes and practices of cycling (see appendix 10.4. p. 138, *Contrasts and curiosities* for a small sample). In a study of three cases in the USA, Jensen (2007) has looked at how mobilities cultures may clash. Jensen points to the important aspect that cycling in Europe, and Denmark in particular, which is his own context, takes cycling for granted. As is also the case for Aldred, cycling can be a political statement, highlighting and calling for more transport options and claiming a right to use the streets for more vulnerable mobility forms. Cycling in the US, as researched by Jensen, may in some contexts be seen as a statement and representing a particular culture. A great deal of cycling research is based in a US or northern European context. In northern Europe especially, bicycle commuting practices are common. But as seen in a Johannesburg, South Africa-context, (Morgan, 2018) establishing a cycling culture and encourage cycle commuting takes more than cycle highways and good cycling infrastructure. In some contexts, as in Johannesburg, social, economic and structural factors weigh greater than

good design intentions and facilities. The study calls for more studies in similar conditions as Johannesburg and suggests that encouraging bicycle commuting practices need a broader approach than that of infrastructure; social, economic and political aspects need to be addressed as well, and the author hypothesize that “*a holistic, coordinated bicycle STS [social-technical system] development approach that also attends to social, economic and political barriers might yield better results than an infrastructure-led one.*” (Morgan, 2018, p 13)

The right to the use of public roads and streets can also be linked to the concept of ‘new public domain’ that Hajer and Reijndorph calls for and as it was found in the ‘bikescape’ typology in New York City. A public domain as an open-minded space for all types of people, and where a mix of differences meet and intermingle is also what roads and streets have the capacity to be. Urban centres and areas that prioritize a mix of mobility use and prioritize vulnerable road users such as pedestrians and cyclists, are arguably also more diverse and equal spaces. Public roads - as part of the public realm - make up a great part of our urban areas. They should accommodate and facilitate a diverse group of people, representing the many types of people and (mobility) cultures that a city has. It is a planning and political matter what infrastructure and traffic initiatives are invested in, whether cycle superhighways are a priority or not, but movements from people and groups from the bottom up also have the capacity to influence development. Whether green transport modes and healthy transport choices are an option, is a political conviction and is reflected in cycling and mobility cultures. This is an interesting debate that is not quite within the scope of the thesis. But the debate of road use and access is important. If roads only accommodate cars, it excludes vulnerable and poor people who cannot afford a car. If poor neighbourhoods are badly connected with public transport and safe roads, it could mean exclusion and segregation, as may be the case some places in Johannesburg.

Road access, access to public transport services and to urban centres with its public services and facilities are arguably a democratic right. In contexts where possible and suitable, high quality bicycle infrastructure and promoting bicycle cultures – along with making car use less attractive – seems a good, sustainable direction for future mobility. More cycling and longer distances is one step in a healthy green direction. Cycle superhighways are not a stand-alone solution. But creating well designed, well connected cycle networks that afford smooth rides and aesthetic experiences along the way, is a right direction. Affordance and encouragement of cycling cultures are also key in getting more people to cycle as a daily practice.

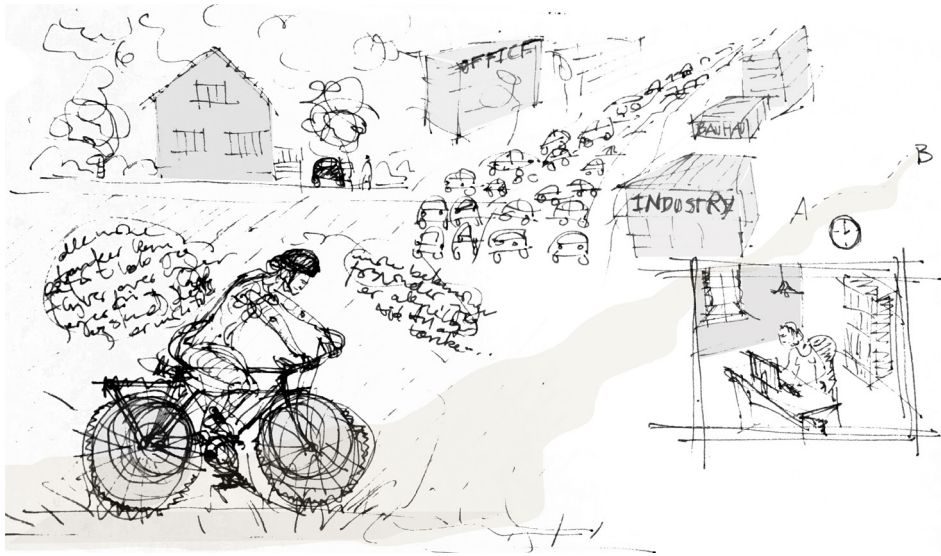


Fig. 4 Commuting to work by bicycle is time to think

## ● 2.10. Review Summary and Conclusion

Cycling research breaches a wide spectrum. This review has included studies that look at the cycling experience from what interventions, typologies and design interventions matter to ‘bikability’ to the role of aesthetic experience of the bicycle commuter and discussions of cycling practices and cultures.

The staging mobility model (Jensen, 2013) was found to be useful to frame a way of looking at the ‘mobilities in situ’, how it is staged from above and below, and influenced by the physical settings, social interactions and embodied performances. For this thesis, the physical settings in particular will be of interest.

Notions of sensescales, aesthetics and atmosphere are vital to a good cycling experience. Aesthetics matters. We prefer green roads away from heavy traffic and busy situations. (Stefansdottir, 2015) Some of the features that gives qualities to a bicycle ride are difficult to measure, they are intrinsic like ‘wind through one’s hair’ (Krizek, 2019) and a feeling of a smooth ride - with the mental well-being benefits it carries along (Larsen, 2014). These are qualities that can be helped along and ‘staged’ with urban design that afford good cycling environments and designs.

To get more people to choose cycling some factors need to be in place. A safe cycling environment, a well-connected infrastructure with a good flow are some of the top priorities. (Hull & O'holleran, 2014) A bikescape can be used intentionally to design mobility and transit spaces that are also open-minded public domains, creating a narrative through an urban landscape and connect diverse neighbourhoods. The build urban fabric and urban designs matter to the cycling experience, and well designed and planned cycling infrastructure is proven to increase the number of people who cycle and can incentivise people to switch from other modes of transport (ideally to switch from car-use) (Hull & O'holleran, 2014). Understanding the context of a cycling way will give a foundation for choosing appropriate typologies along a bicycle route as was seen in the 'Bikeability' study from Denmark (Andrade, 2013).

It is interesting to note where the bike is placed in the traffic hierarchy, what attitudes to cycling is reflected in the way spaces for the cyclist are designed (or not at all accommodated or designed for. Attitudes to cycling and cycling practices is also interesting and makes a remarkably difference in diversity of who cycles and for what purpose. It was seen in Aldred and Jensen (Aldred, 2010; Aldred & Dales, 2017; Jensen, 2007). It indicates that cycling means a lot more than a person on a bicycle and a strip of road to cycle on. Cycling can be a political act or statement, it shapes and expresses identity and it is an expression of status. According to context, cycling can be a sign of consciousness to health and environment or classify you as poor.

Design of mobilities spaces and transit sites calls for knowledge from a range of fields. Daily mobile practices are staged and played out against a backdrop of the urban environment, it is part of a network, or assemblage of mobilities practices and technologies. In the design, an understanding of these technologies and structures shaping the mobilities network must be understood but there must also be a sensibility to the sensed and embodied experience that the mobile practice of cycling is. This means attention to materialities, affordances and how the build urban environment affects these, and how it creates and stages atmospheres.

Recognizing that cycling can be a diverse practice and encouraging diversity amongst the group of cyclists also opens up space for more people who cycle. Diverse cycling practices and groups of cyclists should also be accommodated in the cycling path layouts, route options and cycling experiences available.

## ● 2.11. Theoretical Framing

In conclusion, a model of the theoretical concepts that frame the research subject and case is drawn up. The diagram shows that ‘The physical and designed environment’, the ‘Sensescape, atmosphere and aesthetics’ and the notion of ‘Public domain’ are the three foundational perspectives that are used to frame and define the cycle superhighway in this thesis.

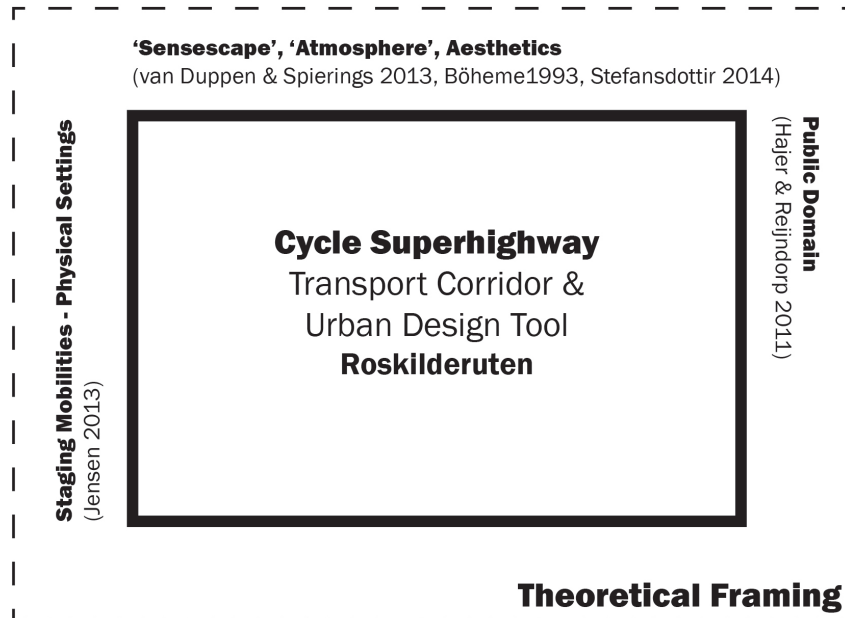


Fig. 5. Theoretical Framing



### 3. Methodology

The thesis looks at what cycle superhighways are and in what way they can be a tool in urban design. By this is meant an instrument to shape urban spaces and form (mobile) experiences for the cyclist.

Research practices in design fields are often based on experimental ways of working, on searching for design answers through ‘doing’, through an iterative process of attempt, sketch, restructuring, attempting again. To the inquiry done in this thesis, a collection of ways of getting to a solution/proposal/conclusion are used. The diagram at the end of the chapter attempts to illustrate this process.

As seen in the literature review, several research methods are applicable when looking at cycling and how the urban environment and design matters. Mobile methods such as cycle-along and embodied ethnography are seen; interviews and surveys, analysis based on traffic surveys and mobility behavioral reviews; observations and context mappings. Each method is able to capture certain aspects of a case, and selecting appropriate methods is important. For a study of the cycling superhighway and how it can be a tool in urban design one way to research the phenomenon is through a case study of a superhighway; to speak to relevant stakeholders, conduct field trips and cycle the route to understand the case and physical context, and to use mapping with its opportunity-uncovering potential.

The act of cycling, also for the researcher to undertake herself, is also a way to obtain important background and understanding of the cycling experience and the case-site or trajectory. Jonas Larsen who undertook ‘autoethnographic participation’ in the commute between Copenhagen and Roskilde argues that *“Given that cycling is tied up with bodily resources, or affective capacities, the researcher will get a richer understanding with autoethnographic participation.”* (Larsen, 2014) In this case, when the researcher cycles the route, and has her own knowledge of the cycling experience, this knowledge and background is useful.

As was seen in many studies, the context, built environment, landscape and urban characteristics are often what shape the cycling experience. It seems key to map and understand the physical environment. This can be done by desktop research, GPS tracking, Cycle-alongs, video-ethnography and serial visions. An analysis of cases of cycling infrastructure that has been key in shaping an urban environment may be a good base to find suggestions for best practice, intervention ideas and design principles.

The case study is chosen as a way to approach the question of what a cycle super highway is, what context it is part of and how it operates. The case study

is useful in investigating “*a contemporary phenomena within its real life context*” (Rowley, 2002 p. 18). In this case *Roskilderuten* will be the example of a cycle superhighway that is looked at closer to understand this ‘contemporary phenomenon’.

The proposed outcome of the study is to have formulated principles and typologies that can be included/used in the ‘cycle superhighway network’ so it becomes a useful tool to create efficient transport lanes for cyclists as well as create good cycling experiences along the way for a multitude of cyclists and cycling practices. Based on the literature review and methods used in mobilities and cycling research, a toolbox of relevant methods is prepared. Presented below, the methods as they are used in the study are described along with a reflection on the limit to the method and how it is applied here.

After the presentation of the toolbox, the phases of the thesis work are outlined, and finally a diagram illustrates how the thesis outcome was reached.

### ● 3.1. *Methods Toolbox*

Methods Toolbox contents	
<b>Desk-based literature review, document research and site mappings</b> (secondary data) (Qualitative method) (mappings are based on both quantitative and qualitative data)	<b>Off-site, desk-based data collection</b>
<b>Best practice cases</b> (secondary data) (Qualitative method)	
<b>Semi-structured interviews with relevant stakeholders</b> (primary data) (Qualitative method)	<b>Interviews and correspondence</b>
<b>Mappings of context and existing conditions along the route trajectory</b> based on data collection on-site (primary data) and map-based (secondary data, mentioned above) (Qualitative method) (mappings are based on both quantitative and qualitative data)	<b>Site-based data collection</b>
<b>A serial vision – Gordon Cullen (1971) inspired Drawings</b> (primary data) (Qualitative method)	
<b>Rider’s journal</b> (field notes) incl. one Cycle-along and one drive-through by car (primary data) (Qualitative method)	
<b>GPS Tracking</b> (while cycling the route) (primary data) (Quantitative method)	
<b>Contextual appraisal</b> – interpretative and concluding – sum-up mapping of findings and analysis (Qualitative method)	<b>Analysis and ‘Data processing’</b>

## Toolbox

### Desk-based (1) literature review, (2) document research and (3) site mappings

#### *Method Description*

(1) Document research and literature review gives access to a large knowledge base and helps place the thesis within its relevant research field and debates in cycling-research. Peer-reviewed journal articles, especially from the academic journals ‘Mobilities’, ‘Applied Mobilities’, ‘Journal of Urban Design’, ‘Nordic journal of Architectural Research’ and ‘Transport Geographies’ are used as sources. Relevant books are also included (see list of literature).

(2) Relevant guidelines and design manuals published by the Office for Cycle Superhighways, the Danish Cyclists’ Federation, by municipalities and by engineering consultancies are studied as well to have an overview of guidelines and practices of planning and implementing the cycle superhighways. Websites and documents from the Dutch cycling embassy and the London City ‘cycle superhighway’ manuals and the German Ruhr-region’s cycle network plans and publications have been looked at as well. To some degree the differences and similarities have been compared. Blogs from scholars and cycling enthusiasts have also been useful to give hints to interesting cases of good cycling design for example Steven Flemming’s ‘cycle space’.

(3) Site mappings done via Google maps and ‘Kortforsyningen’ (published by the Department of Dataforsyning og Effektivisering) to identify the typologies of urban fabric along the site trajectory, to count numbers of traffic intersections along the route, etc.

#### *Remark*

The field of cycling research is large and for the scope of the thesis, it is limited what can be included and accounted for. While I hope to have covered a relevant area of the field and included some of the most relevant researchers and studies relevant to the research question, not all relevant and interesting aspects can be covered.

## Best Practice Cases

### *Method Description*

To find examples of how cycling infrastructure can work to be more than ‘transport corridors’, already existing cases from around the world are sought out through news articles, news feed from cycling blogs online and cycling interest group’s news feeds and posts. For example from the website of the Danish Cyclists’ Federation, the site and blog ‘cycle space’ by researcher Steven Flemming, and from own experience. Best practice examples give inspiration and ideas to how improvements and interventions along a cycle trajectory can work and what might be relevant to consider when developing new typologies for the cycle superhighway. How the examples work is explained in the section with best practice examples included in appendix 10.1.p. 120.

### *Remark*

The selection of relevant cases could have looked differently, there are many good examples and cycle infrastructure ideas, many more than I have been able to find or include here.

## Semi-structured interviews with relevant stakeholders

### *Method Description*

Interviews, correspondence and conversations are used as sources to understand the context of the cycle superhighways, how they operate and are developed by looking at the work and role of relevant stakeholders. The interviews were conducted by email correspondence, over the phone and in person respectively. Questions and research were prepared beforehand to learn how the organization or department the interviewed is part of is structured, and to outline intended questions and agenda for the conversations. The interviews were recorded if done in person, recordings and correspondence is available in -or via link in appendix 10.1. p. 120. The relevant stakeholders are: (1) Planner and Urban designer in Roskilde Municipality, (2) Planner at the

Continue next page ↓

### *Remark*

It is intended that the three stakeholders selected and kindly willing to take part are a good base for understanding the different roles of the stakeholders and some of their concerns and work/involvement with cycling superhighways. I am aware that the conversations and comments from the participants are not necessarily representative for all aspects of the department or organizations they represent, and it has been my aim to carry forward the intention and meaning from their statements as closely to participant’s intention and meaning as

Continue next page ↓

## Semi-structured interviews with relevant stakeholders - continued

### *Method Description*

Office for Cycle Superhighways in the Capital Region of Denmark, (3) member of the Danish Cyclists' Federation's Roskilde department. The stakeholders are selected based on their respective roles and involvement with the cycle superhighways surrounding *Roskilderuten*. More detail about the stakeholders and interviews are found in the interview section part of the analysis chapter.

### *Remark*

possible in this thesis. Each interview/conversation was conducted differently and the material from each is not concerning the same aspects but shed light on different areas of the cycling superhighway. Other strategies and perhaps more systematic ways of collecting information through interviews could have been used.

## Mappings of context and existing conditions along the route trajectory

### *Method Description*

Mapping can be very useful tool in urban design. According to landscape architect James Corner (Corner, 1999) it is a an evocative tool to see potential in a site. Mappings can both be a literal noting-down of different functions and places on a map (what Corner calls tracings) but, as he finds more interesting, the act of mapping as an explorative and creative act and way of working and accessing a site and its potentials. Inherent to the act of mapping is the condition of subjectivity by part of the mapmaker(s).

*“[...] mapping is never neutral, passive or without consequence; on the contrary, mapping is perhaps the most formative and creative act of any design process, first disclosing and then staging the conditions of the emergence of new realities.” (Corner, 1999 p 212)*

For this study several types of mappings have been done. Mappings that are diagrammatically representing different features along the route have been made.

A functional and land-use based mapping along the trajectory is made, a mapping of selected routes, objects and other modes of mobility along the route, all are factors that affect the experience of the route and that are not only applicable to the case route, but could be mapped for any cycle superhighway route. The mappings are not comprehensive, according to context, more things could be relevant to map or some items may be taken out when applied for example to a different route.

The final map included in the analysis section is the one closest to a mapping that plots potentials and sum up ideas from the previous mapping analysis.



## Mappings of context and existing conditions - continued

### *Method Description*

List of items that are mapped/traced:

### **Mapping chart (not necessarily mapped on the same diagram):**

1. Landmarks
2. 'Flow-disruptors' – Frequency of intersections/traffic lights/roundabouts
3. Train stations (locations) and Transport hubs
4. Bus stops (networks)
5. Intersecting with other super cycling routes
6. Urban/rural zoning
7. Most prevalent wind conditions (yearly average most prevalent)\*(EMD International A/S, 2013) and slope gradient (recorded by GPS-tracking)
8. Land use
9. Types of 'urban fabric' i.e.: green and blue structures, Housing areas, Industrial area etc.
10. The experienced cycle path environment (here categories are developed in order to classify different sections)

### *Remark*

The items that are mapped hopefully give a good image of the route and its context, however, many more aspects could have been relevant and mapped and would have nuanced the understanding of the route. As Corner also is aware of, mapping is a process of pulling out potentials, of omittance and highlighting, this is powerful in finding potentials, but it is not a comprehensive method, things may be overlooked or the relevance of what is mapped and explored might turn out to be of less interest than expected.

## A Serial Vision

### *Method Description*

Drawing is used as one of the ways the route is understood from the perspective of the cyclist. A drawing can also be a type of mapping, it is an interpretation of what is seen or experienced. There are always aspects that are left out or drawn forward. But sometimes the essence of a drawing can be clearer to read than that of a photo. Aspects can be highlighted or easier discovered through drawing. Drawing as a method and a tool is used in this project to convey the experience and views of cycling the route. It is inspired by Gordon Cullen's 'Serial vision' where drawings were made along a selected route to show how a city opens and encloses views, and by some of the series of drawing in 'The view from the road' where the authors draw views as seen through the windscreen of the car along a highway (Appleyard et al., 1964). But the intention of the method was also inspired by Gernot Böhme (Böhme, 2017) as ways to capture and sense the 'atmosphere' of a space. From the earlier mentioned article by Böhme *The art of the stage set*, he writes that:

*"Finally, atmospheres are something entirely subjective: in order to say what they are or, better, to define their character, one must expose oneself to them, one must experience them in terms of one's own emotional state. Without the sentient subject, they are nothing."* (Böhme, 2013 p 3)

The drawings are based on photographs taken roughly every km along the route. A scene or image from a relatively evenly distributed distance along the route was selected and drawn by loosely tracing the image and from memory of what the cycling was like in that space.

### *Remark*

The drawings are only one person's interpretations and experience. They are never 'neutral' and comparing series of drawings and interpretations from a number of cyclists could have been very interesting and perhaps show patterns in what is noticed as 'atmospheric' along the route. Would also give a more reliable image of the atmosphere. Different times of year, fx summer winter would also be interesting.



**Rider's journal (field notes) incl. one Cycle-along and one drive-through by car**

*Method Description*

Selected journal notes from some of the cycle trips done along the route. Loosely based on 'embodied ethnography' as used by Jonas Larsen (Larsen, 2014) in his ethnographic study of the commute between Copenhagen and Roskilde, the Rider's journal contains notes from a selected number of cycles along the route, including one ride-along cycle and one ride by car. The ride-along method also originates in ethnography. The method was used in the study *Retracing trajectories: the embodied experience of cycling, urban sensescapes and the commute between 'neighbourhood' and 'city' in Utrecht, NL* (van Duppen & Spierings, 2013), where ride-alongs and interviews were conducted. Cycling researcher Justin Spinney (Spinney, 2009, 2011) as another source of inspiration in mobile methods, has adapted some of the 'go along' methods to cycling research by filming and following along cyclists adding interviews and follow-ups, arguing that video can capture some of the more ephemeral parts of cycling that language in an interview for example will not reveal.

For this thesis the method is not as extensive, notes of the cycle experience is written down after the ride. Figures such as time and date and conditions for cycling is recorded as well. In cycling research, the author's experience of cycling is sometimes used as a source and reference. By cycling the route, the researcher gets an authentic idea of the environment.

*Remark*

The notes and opinion is those of the writer. Surveys or interviews with a number of cyclists using the route could have been a relevant method and given a more nuanced and multifold image of the cycling experience. There are always factors that influence how a specific ride is experienced, and subjective impressions and knowledge of the route that influence as well.

The cycle was not done with the purpose of a daily commute, in that sense an aspect of understanding the cycle superhighway – aimed at the commuter – is not captured.

## GPS-Tracking

### *Method Description*

Gives data that reveals how the path is cycled in terms of speed, where the route is fast and where is it slow. And with the right amount of data, it might reveal interesting patterns in how the particular route is cycled. The tracking as a method rarely stands alone, often the method is followed up by interviews or surveys that are able to capture what may be causing the patterns seen in the tracking.

Only a limited number of trackings were for this in this thesis and mainly cycled by the author.

The mobile app 'Sportstracker' was used to record the bike rides. The app records the slope of the route, the speed and distance cycled. These data can show, for example, where and how frequently a cyclist stops for a red light.

### *Remark*

The limited number of trackings makes the data less reliable and gives an image of a few rides rather than a general image of how the route is cycled. Tracking a number of cyclists over a longer period of time would have been ideal. Trackings along with interviews of the participants and their experience of the cycled distance could give a more complete and nuanced picture of the cycling experience.

## Contextual appraisal – Synthesizing and mapping potentials

### *Method Description*

By mapping and analyzing the case-site, conditions for the relationship between the route and the urban and landscape qualities will be identified. Finally, principles and design typologies will be formulated. Mappings help to understand the context and the site it is – a way to unfold 're-design potentials' (Lanng, 2018), and this is how this contextual appraisal mapping is used here. The context appraisal mapping collects findings from the analysis mappings and point at potential sites and interventions along the cycle way. This mapping is inspired by the before-mentioned essay by landscape architect James Corner (and Lanng, 2018).

### *Remark*

This is an interpretation and analysis that in other contexts could have given other outcomes, and other findings could also have been relevant and useful.

### ● 3.2. Research Phases and Process

The thesis work is a process of information gathering, literature search, theoretical framing; drawing conclusions and synthesizing results. The process is iterative, and the phases below give a sense of a chronology, although process and phases did not happen entirely chronologically. The work is divided into three phases:

Phase 1. **Review of literature and theoretical framing**

Phase 2. **Collecting data, case study and Analysis**

Phase 3. **Conclusions, findings, recommendations and applications**

The following diagram illustrates how the work with the research questions and inquiry into the cycle superhighway was done. The four points; ‘Theory’, ‘Research Question’, ‘Methods Toolbox’ and ‘Data Work’ all point to the ‘Solution/Proposal/Outcome’ of the study. Between the ‘Methods Toolbox’ and the ‘Data work’, two extra ‘gears’ have been added: ‘data collection’ and ‘case study’ with ‘analyzing, mapping and conceptualization’ feeding back to the ‘Solution/Proposal/Outcome’.

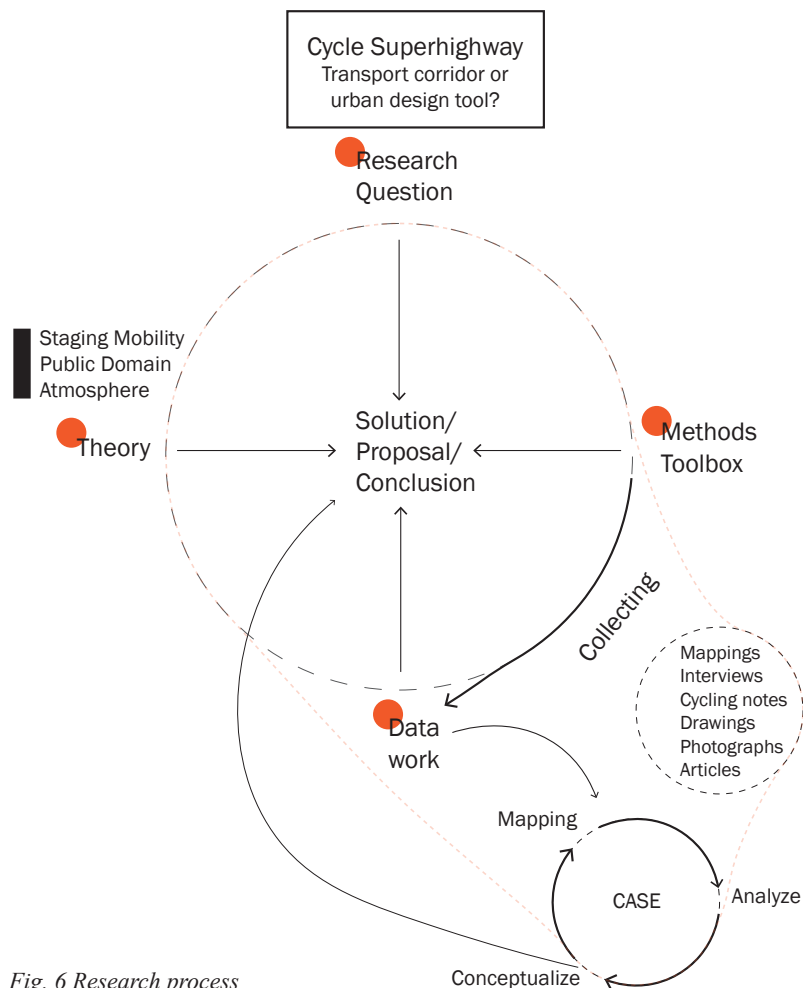


Fig. 6 Research process

## 4. The Case of Roskilderuten

### 4.1 The Cycle Superhighway

The cycle superhighway is especially aimed at accommodating the bicycle commuter. The goal is to create a well maintained and high-level cycle path network connecting the suburbs to the city centre, making cycling a serious alternative to other modes of transport, especially the car, and increasing cycling across municipal boundaries. The potential in new cyclists for this type of bicycle path is the commuter who travels more than 5 km to and from work or educational institution. (Sekretariatet for Supercykelstier, 2019)

The first cycle superhighway route to be implemented is Albertslundruten, established in 2013. At present eight cycle superhighways are established and another seven are under way. The vision for the cycle superhighway network of the capitol region is that by 2045 it will consist of 45 routes. This is estimated to have an implementation cost of 2.2 billion dkk. Financing the implementation of the super bicycle paths rests on the involved municipalities, however, designated funds are available, and up to 50% of the total costs so far have been financed by the state. (Sekretariatet for Supercykelstier, 2019)

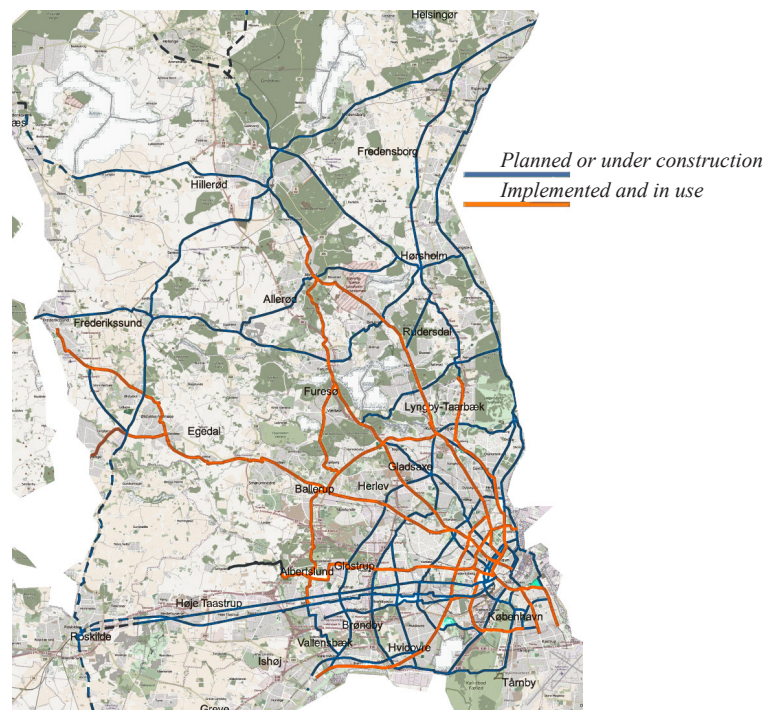


Fig. 7 Network of cycle superhighways.

The cycle superhighway as a concept is spreading to other major cities in Denmark: Aarhus, Odense and Aalborg, all have cycle superhighways. And cycle superhighways are seen in comparable cycling countries like The Netherlands, Belgium and Germany.

The (Copenhagen) capitol region already has a good bicycle network, and for short commutes below 5 km, the bicycle is a preferred mode of transport. The cycle superhighway is intended to make commuting by bicycle easily accessible, efficient and to accommodate commuting longer distances by upgrading bicycle infrastructure that meet a defined standard, to make the commute as pleasant and smooth as possible. Key to the cycle superhighways are four “Quality measures” (*Kvalitetsmål*):

- Accessibility (*Tilgængelighed*)
- Passability (*Fremkommelighed*)
- Comfort (*Komfort*)
- Safety and security (*Sikkerhed og tryghed*)

The measures are key in evaluating and assessing what needs to be done to a path so it can be acceptable as a cycle superhighway and in selecting routes that are suitable. Wide cycle lanes, priority to bicycles over cars, and a distinct ‘identity’ to the path with distinct signage to make it identifiable, easy to navigate with as few interruptions to flow as possible, are some of the criteria. (Sekretariatet for supercykelstier, 2018)



*Fig. 8 An orange circle with a white arrow as the recognizable sign painted on to the surface of a cycle superhighway in Copenhagen*

Some of the initiatives to make the cycle superhighways safe and secure are by making wide cycle lanes and keeping them separated from motorized traffic when possible. The ‘cyclist railings’ (cykelgelænder) at intersections is another intervention that has been shown to make more cyclists place themselves correctly when stopped for a red light, and also may cause fewer cyclists jumping a red light. (Leegaard, Lundgaard, & Agerholm, 2016)



Fig. 9 Intersection with a cyclist railing

In many regards, the cycle superhighway can be compared to a highway, to use typologies known from the car-infrastructure and road layout. However, the cycle superhighway should be able to accommodate both the fast and the slow cyclist, the cyclist on a racing bike or the family cargo-bike. Likewise, they are also routes that are used recreationally and for shorter local trips:

*“Cycle Superhighways is infrastructure that in many places accommodate local cycling and recreational trips.” (Sekretariatet for supercykelstier, 2018 p 11 own translation)*

### ***Seasonality and Cycling***

An aspect to cycling that is especially relevant in Nordic countries is seasonality. From own experience, cycling 30 km in winter can be an uncomfortable experience. When temperatures are around 3 to 5 degrees and below, perhaps

even icy, cycling is not attractive. Feet and hands especially get very cold, and it feels less safe to cycle if it is wet or icy. And both mornings and afternoons are dark. Researcher Jonas Larsen documented these arguments in his ethnographic research of cycling between Roskilde and Copenhagen and summed up that: *“long-distance bike commuting (at least in countries with cold winters) is a seasonal practice”* (Larsen, 2016). The temporarily and seasonality to cycling is an important aspect to some of the challenges and opportunities in designing cycling infrastructure. During winter, public transport, and combined public transport with cycling may be a good alternative on bad-weather days during winter.

### ***Reasons for being***

A recent study; Mobility for the Future made for the Ministry of Transport, Building and Housing in Denmark revised the mobilities trends and needs of the ‘future’ (the future being within the next 5-10-20 years forward). Cycling and good quality cycling infrastructure was highlighted as a solution and important mode of transport:

*“High class public transport and bicycling will in the future be even more important for mobility in cities, as traffic, congestion, and scarcity of urban land generally are expected to increase substantially.”* (Kristensen et al., 2018)

There are also many substantial arguments stating that cycling is a smart choice of transport, being sustainable, taking up less space than cars and being non-polluting. Cycling is also shown to be good for health (fitness) and mental well-being of the cyclist (Krizek, 2019). These are all aspects that are highlighted in many municipalities’ strategies and visions for mobility. (As an example, Roskilde Municipality (Roskilde Kommune, 2016)) In many municipalities a good cycling environment is also a political priority, reflected in spending and investments.

Cycle superhighways have been studied to see what impact they have had on cycling behavior. It is shown if they are built according to intention and if investments are put in at the right places in order to make the environment easy and safe to cycle, cycle superhighways do have a positive effect on getting more people to cycle, and potentially the ‘branding’ and knowledge of the concept may also draw more people onto the bike (Bradtberg & Larsen, 2013). However there has also been criticism of the cycle superhighways, stating that investments and designs do not live up to the intentions and statements of the cycle superhighway criteria. (Bradtberg & Larsen, 2013)

According to the website of the Office for Cycle Superhighways in the Capital Region of Denmark, the super cyclehighways have increased the numbers of cyclist on *Farumruten* and *Albertslundruten* significantly compared to counts of cyclists before the implementation (61 % increase for *Farumruten* year 2016 counts compared to 2013, and 34 % for *Albertslundruten* year 2016 compared to 2012) (Sekretariatet for Supercykelstier, 2019). Further an economic analysis done by Incentive for the Office of cycle superhighways, assessing the socio-economic return of investments in cycling superhighways, conclude that they are rentable investments. The routes get more people cycling, get car commuters to switch to cycling and thus reduce CO2 omissions, and has health benefits for the commutes resulting in fewer days of sick-leave. (A. Nielsen, Larsen, Kolstrup, & Thomsen-Hviid, 2018)

### Organization

Choosing and establishing new cycle superhighway routes in the capitol region is a process of collaboration between municipalities with help from a cycling superhighway secretariat (Office of Cycle superhighways). The secretariat is assembled to facilitate communication between the involved municipalities and to other institutions such as the road directory and interests groups like the Danish Cyclist's Federation. They also help establish funding and campaigns. (Technical and Environmental Administration City of Copenhagen, 2018) It is the responsibility of the involved municipalities to maintain and implement the cycle superhighway in the parts that are within their boundaries. The diagram below illustrates the organization.

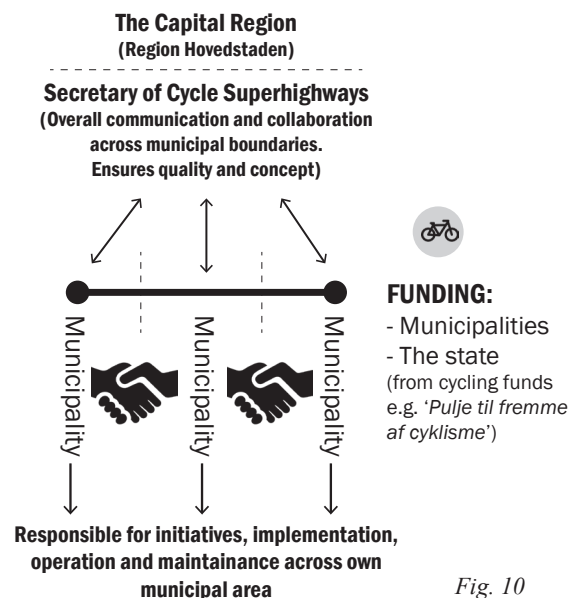


Fig. 10

### *Cycling superhighways in comparable countries*

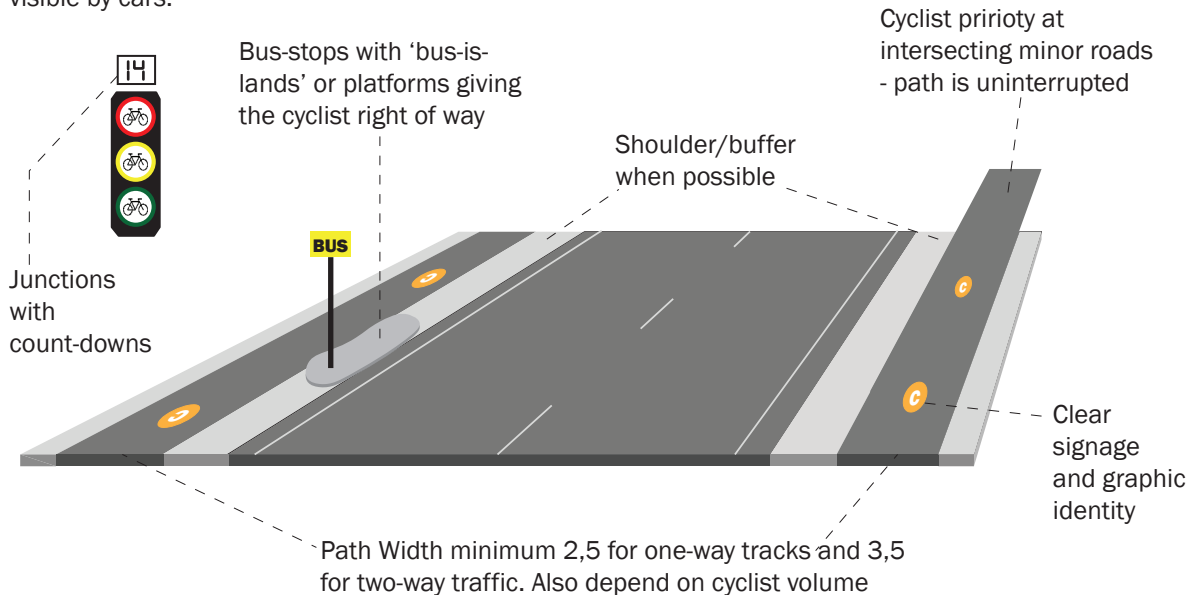
In cycling countries comparable to Denmark, like the Netherlands, Belgium and Germany variations of cycle superhighways are implemented as part of mobility and cycling structures. Definitions of cycle superhighways similarly to Denmark are guided by quality measures. The measures are similar to the Danish ones, and so are many of the design principles. In the Netherlands, *Coherence*, *Directness*, *Attractiveness*, *Safety* and *Comfort* are the five ‘cyclist-needs’ that are aimed to be fulfilled (London Cycling Campaign, 2011). Interestingly, the Netherlands operate with a fifth quality measure: “Attractiveness” which is not included in the Danish quality measures. (See also interview 2 Anna Garrett at min:5:22 sec, appendix 10.3. p. 134) It may be difficult to measure and to quantify what “Attractiveness” is, however, as found by Stefansdottir, there are qualities that make a difference: closeness to greenery and green views, and distance to heavy traffic to mention a couple (Stefansdottir, 2014). Attractiveness may include some of the ephemeral qualities that researcher Krizek attempted to quantify. (Krizek, 2019)

The Netherlands especially is an inspiration in terms of how to make an attractive cycling environment. In many aspects, the scale and investments in cycling infrastructures and interventions in the Netherlands are much bigger and serious than seen in Denmark. (Andersen, 2018)

# Anatomy of a cycle superhighway

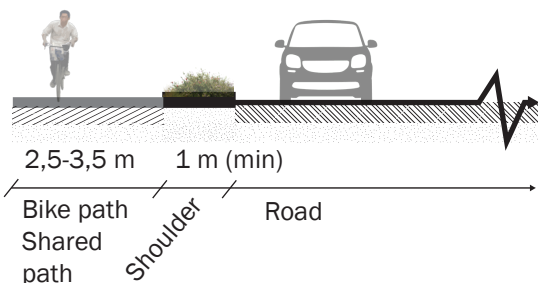
There are no legally defined standards for cycle superhighways, but there are a set of recommended dimensions for path width and surface roughness, that depend on the context in which the path is implemented.

The cycle path is brought forward in junctions, better visible by cars.



## Bike path in open-land

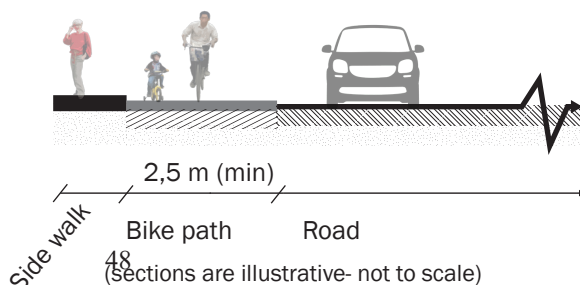
One-lane bike and walking path with a shoulder/buffer of at least 1 m to the road



2,5 m is estimated two tracks of cyclist next to eachother. 3-3,5 m for a triple track. For *Roskilderuten*, the two illustrated examples are relevant

## Bike path in urban areas

One-lane bike path in own tracé with raised curb and separate side walk



(sections are illustrative- not to scale)

Source: Supercykelsti 2.0, 2017  
Håndbog Supercykelstier, 2016

Fig. 11

## ● 4.2. Roskilderuten

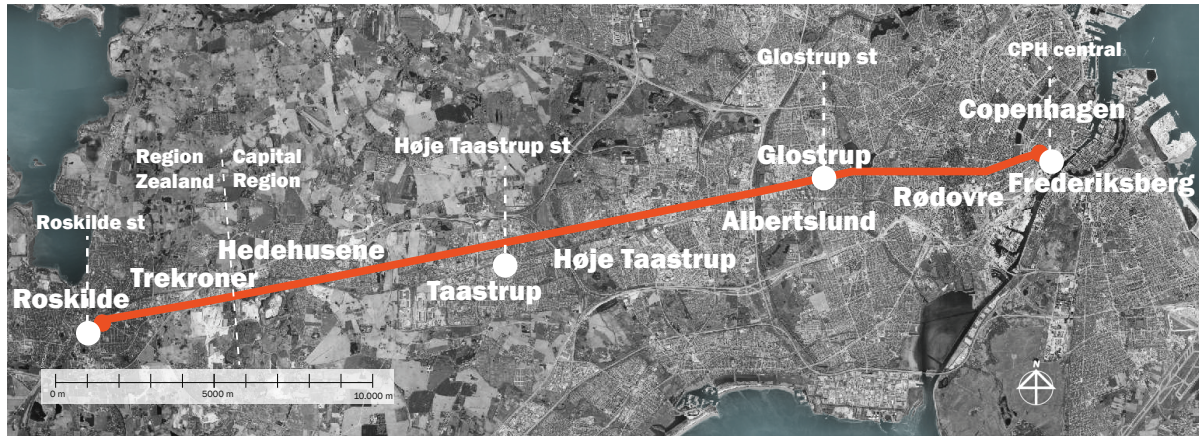


Fig. 12 Roskilderuten

The network of ‘Cycle Superhighways’ in the Copenhagen capital region is expanding. By 2045 the goal is to have 746 km of cycle superhighway, distributed among 45 routes, offering a coherent network of commuting cycling lanes throughout the region.

One of the cycle superhighways currently being developed and to be completed in 2020 is the route between Roskilde and Copenhagen. *Roskilderuten* follows the old main route, and most direct route, between Copenhagen and Roskilde along Roskildevej. Today Roskildevej functions as an important arterial road (‘indfaldsvej’ in Danish) in both directions, as a road that leads traffic through the suburbs to the city center. It is also a road that collects traffic from the ring roads and highways and channels it to the city center.

The route connects two regions, Region of Sjælland and the Capital Region. The route is 31 km long from the City Hall of Copenhagen to Roskilde station. Roskildevej was a main road from Copenhagen towards Jylland before the widespread use of cars and in the early automobile years. In the late 1970’s highways were completed from Copenhagen to Esbjerg, as part of a ‘H’- shaped traffic strategy connecting the country. As part of this strategy, the motorway between Copenhagen and Holbæk was implemented, connecting to ferry routes to Aarhus and Ålbøft in Jylland, making Roskildevej a secondary route. (Greby, Andersen, & Milner, 1976)

In the catchment area to *Roskilderuten*, commutes ranging 4-30 km are done every day by 35.000 commuters. It is estimated that 10.000 of those commutes are done by bicycle today, and that the number will increase by 2-5000 daily commuting trips as a consequence of implementing the cycle superhighway. (Technical and Environmental Administration, City of Copenhagen, 2018, own paraphrasing and translation)

The route passes through 8 municipalities and connects two regions. The estimated budget for the implementation of the route is 8,3 mio kr. For the municipality of Copenhagen. The 2017 governmental financing ”*Pulje til fremme af cyklisme*” will cover around 40% of the costs, the rest will be covered by the municipalities involved. (Technical and Environmental Administration City of Copenhagen, 2018 p 20).

The network of cycle superhighways consists of north-south bound routes similarly to the ring roads, and of ‘finger connections’. *Roskilderuten* is part of the ‘finger-structure’ shaped by the Copenhagen ‘Finger plan’(first proposed in 1947, defining a handprint-shaped development plan of the capitol region) (Erhvervsstyrelsen, 2019) reaching from city center to the suburbs of main development corridors separated by ‘green wedges’. (Erhvervsstyrelsen, 2019)

The route passes nearby large companies, educational institutions and several work places. But what will a cycle superhighway mean in the context of *Roskilderuten*? What kind of cycling experience is it to cycle here? What are important principles to consider for this particular route when implementing a cycling superhighway? What are particularly interesting places on the route with a potential to be and do more than a ‘transport corridor’? And what kind of path typologies does the route include? How can the lens of ‘mobilities design’ help to see the route not only as a transport infrastructure, an ‘armature’, but also as a place that is sensed and experienced by cyclists every day?

To explore these questions and to understand the particular case of *Roskilderuten*, and in what way typologies and principles of design of cycling superhighways can be used, a case study of the route is done. As explained in the methodology section, several methods are used within the case study to map and understand the route.

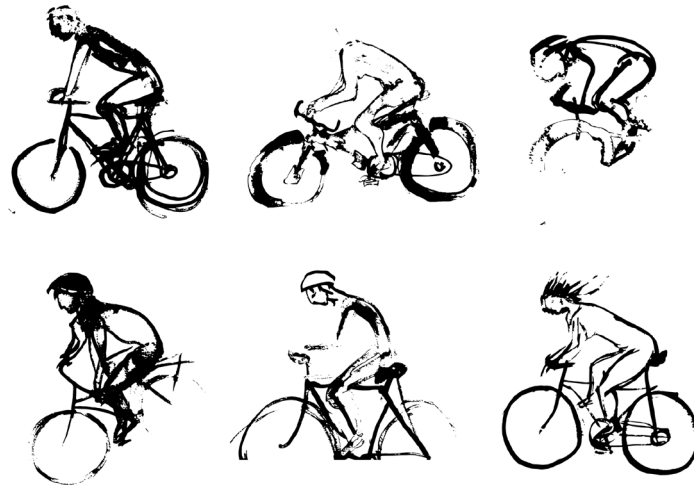
According to a study of mobility in the capitol region, Høje Taastrup and Glostrup Stations are highlighted as mobility nodes. This means they are important links within the mobility network, and that the stations are important transport nodes. (Rambøll, 2018) *Roskilderuten* passes both nodes (very close to Glostrup St. and within 900 m from Høje Taastrup st.). The transition and link from the cycle superhighway to the transport nodes is an opportunity to work on, however it will not be elaborated in this thesis.

### ***Parallel lines***

Parallel to *Roskilderuten* is *Vestbaneruten* projected to run. It is proposed to follow along the rail way track between Roskilde and Copenhagen. This path has in a paper from 2015 (Rasmussen & Kallesen, 2015) been shown to have a greater socio-economic effect than *Roskilderuten*, suggesting investments in *Vestbaneruten* are better paid out (although initial costs of *Vestbaneruten* are very high compared to *Roskilderuten*). *Vestbaneruten* is further removed from other traffic, being experienced safer and expected to have less accidents. It is expected that 40-50% of commuting cyclists using *Roskilderuten* would use *Vestbaenruten* instead. The cycle superhighway *Roskilderuten* between Roskilde and Copenhagen will be implemented on already existing bicycle paths, which means that the route is already in use by commuting cyclists (as studied by Jonas Larsen (Larsen, 2014, 2016).

\*\*\*

The previous pages presented The cycle superhighways in general and the case of *Roskilderuten*. Next spread illustrates some *Facts and figures* about cycling in the Copenhagen region, before presenting the outcome of the conversations and interviews had with stakeholders working with the implementation of *Roskilderuten*.



*Fig. 13 Cyclists*

## Facts and figures, Cycling in the Capital Region

For commutes in the Capital Region- below 5 km, **58 %** of the trips are done by bicycle. For commutes between 5-20 km, the bicycle accounts for **24%** (additional **8%** are combined cycling with another other means of transport). Commuting to work accounts for the largest share, next to school and education. (A)

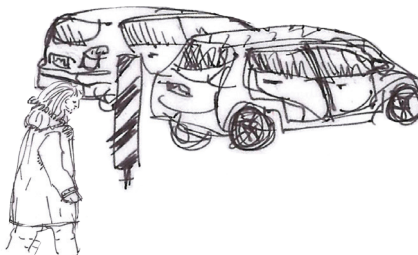


### Average cycling speed in

Copenhagen is **16 km/h.**

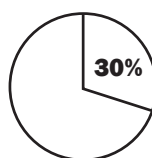
A distance of 30 km would take

**1 Hour and 52 min**

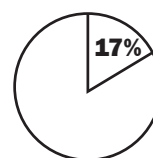


**Car ownership** is significantly higher in the suburbs and outer regions of the capital region. Car ownership is double as high in the outer suburb regions compared to central Copenhagen. Car ownership is shown to be one of the biggest factors reducing cycling km for households. (C)

**Household income** reflects a difference in transport behaviour: Household income below 200.000 kr/y in total travels by bicycle 30 % of all trips whereas an income above 1.200.000 kr/y only 17% of the collected transport in the household is by bicycle. (B)



Income below  
200.000



Income above  
1.200.000

### Sources:

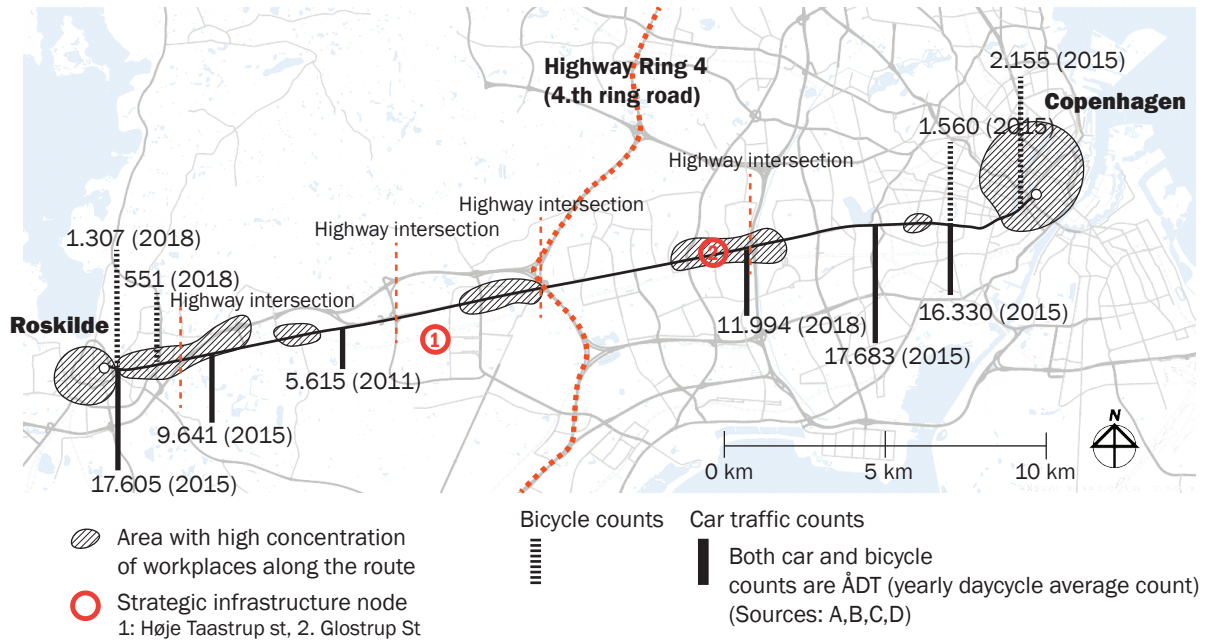
**A** Cykelregnskab, Region Hovedstaden, 2016

**B** Cykelregnskab, Region Hovedstaden, 2016

**C** Analysis for the Capital Region. Incentive, 2015

Fig. 14

# Traffic



## Crossing the 4th ring road

Only **4%** of trips from the outer suburbs of the capital region are done by bicycle. 13% by public transport and 83% by car. A potential to increase the number of cyclists. (D)



In the **catchment area** of the 'Roskilderuten', approx. **10.000 daily commutes** within a distance of 4-30 km are done by bicycle. **The cycle superhighway initiative is expected to increase this number by 2-5.000 additional trips** done by bicycle. (E)



'Roskilderuten' (orange) and the network of cycle superhighways. The map shows both completed and future routes. (Sekretariatet for supercykelstier, 2019)

## Traffic-count sources:

- A** Roskilde Municipality, 2015, 2019
- B** Høje Taastrup Municipality, n.a.
- C** Frederiksberg Municipality (bicycle counts)
- D** Glostrup Kommune, 2018
- E** Technical and Environmental Administration City of Copenhagen, 2018

### ● 4.3. *Interviews with Stakeholders*

#### ● *The Municipality*

The planning and implementation of cycle superhighways is coordinated by the Office for Cycle Superhighways in the Capital Region of Denmark. The office is responsible for the cross municipal coordination and communication, for ensuring a similar standard and visual identity across the network and to outline intentions and visions for the cycle superhighways. (Technical and Environmental Administration City of Copenhagen, 2018 p. 21) Each involved municipality is responsible for the implementation and initiatives within own municipal boundaries.

To get an understanding of the work that the individual municipality undertakes in connection with the Cycle superhighways and their implementation, Pia W. Bentsen a planner and urban designer from the municipality of Roskilde was referred to and contacted. She kindly took the time for an interview/conversation in Roskilde.

The intention of the interview was fourfold: Firstly (1), to get a sense of how far the project is, where will any interventions be made, what is the budget etc. Secondly (2), to get an understanding of how working across municipal lines work in this case. And to uncover visions and intentions of the municipality. Why invest in a ‘supercykelsti’ (cycle superhighway)? Thirdly (3), does a ‘supercykelsti’ actually help in lessening problems of congestion, or is it also a matter of ‘branding’. And who is the intended user of the Cycle superhighway? Finally (4), it was the intention to find out what type of work it is to design mobilities spaces for cyclists? Is this done only by traffic planners? Landscape architects? Road engineers? The aesthetics, the affordance and the sensorial elements to mobilities spaces, are they considered, and if not, should they, or if they are, How?

The conversation/interview was recorded, (see link and code to the audio material in appendix 10.3. p. 132). A few of the questions and points that came up during the conversation were: how the municipality works with the particular route and that making the arterial road section along Københavnsvej (that becomes Roskildevvej (for most of the trajectory) closer to Copenhagen) in Roskilde, more attractive is something that the municipality wishes to address. (Interview 1, Pia Bentsen at min 03:58 sec, appendix 10.3. p. 132). One part of this is to work with the bus stops along the road, to change the layout so it becomes more efficient to the cyclist s and to public transport (the busses) by creating bus platforms or ‘islands’. (Interview 1, P. Bentsen at min 05:38 sec).

Investing in the cycle superhighway and being part of the network is a political priority, it is a signal of being part of the promotion of green transport and it has a 'branding value'. There are in reality relatively few cyclists on this route, and it is not the intention or expectation that commuters cycle the full 30 km distance, but rather that parts of the route will be cycled (Interview 1, Pia Bentsen at min 08:32 sec)

For Roskilde Municipality, the work with the cycle superhighway is part of a larger plan (helhedsplan) to transform a "*dull and identitylacking artery road [Københavnsvej, the entrance-road (indfaldsvej) to Roskilde from the east] into an attractive urban and retail street and environment*" (Pia Bentsen, follow-up correspondence, own translation from Danish p. 133). An external consultant (design practice) was working on a masterplan for this trajectory, and the cycle superhighway is part of the solution. Pia Bentsen added that projects in a municipal reality often are realized when a leverage of funding initiates one project (e.g. funding from the Road Directory to the cycle superhighway project). The synergy from one project or topic may spark political interest and priority. Then the opportunity to look at other challenges that may be addressed at the same place and time arises. (Pia Bentsen, follow-up correspondence, own translation from Danish p. 133)

The process of implementing and planning a cycle superhighway is one that involves several parts. From planning, budging to actual implementation on site. What takes a long time is the planning and budgeting, ensuring funds and coordinating with other projects. (Interview 1, Pia Bentsen at min 22:06 sec) Pia Bentsen's background is as an urban designer in the cross disciplinary and teamwork requiring work of planning and implementing a cycle superhighway in a municipality, the urban design background has many advantages. (Interview 1, Pia Bentsen at min 33:12 sec)

Pia Bentsen suggested to contact Anna Garrett from the Office for Cycle Superhighways in the Capital Region of Denmark. This was followed up on later.

### ● ***The Office of Cycle Superhighways in the Capital Region***

A representative from the Office for Cycle Superhighways in the Capital Region of Denmark was contacted with questions regarding the role of the network and this thesis' discussion of the role of the cycle superhighways as a transport corridor or urban design tool (find prepared questions, correspondence and interview recordings in appendix 10.3. p. 132) The questions prepared to Anna Garrett were concerning:

*Should cycle superhighways be used as a 'tool' in urban design to create different types of mobilities spaces and cycling experiences, or is the main point of the cycle superhighway to get us fast, comfortably and safely from A-B?*

*Could it be imaginable that the concept of cycle superhighways was expanded or that a differentiation of route typologies took place within the network of cycle superhighways?*

*How do you work to ensure a coherent and similar identity and design of the many different routes?*

*How do you make a cycle superhighway that accommodates and encourages many different kinds of cycling commuters to use the trails? Is it important if there are many different users and ways to use a cycle superhighway?*

Please see the questions and the context in which they were posed in appendix 10.3. p. 135 The questions and conversations are in Danish.

The cycle tracks are aimed at the bicycle commuter, and the initiatives and interventions to the cycle superhighway are meant to optimize the journey for the commuter. The point of what an attractive route is and how to measure and define attractiveness would be an issue if working with a fifth quality measure, as it is done in the Netherlands. (Interview 2 Anna Garrett 10.3. p. 135, audio at min: 05:55 sek, min 08:17 sec and 09 min:26 sec). The conversation posed some interesting points and it was suggested comparing *Roskilderuten* to another proposed route; *Vestbaneruten*, a route that similarly to *Roskilderuten* connects Roskilde and Copenhagen, but runs along the railway track, shielded from other traffic and through green areas. A markedly different route, slightly longer - and

a lot costlier to implement. (Interview 2 Anna Garrett at min 14:20 sec). Anna Garrett also pointed out that the new revision of the ‘Fingerplan’ (2019) has given opportunity for cycle superhighways to be implemented in the otherwise reserved ‘green wedges’, which opens opportunities for new (green) routes. (Interview 2 Anna Garrett at min 07:18 sec.)

### ***The Danish Cyclists’ Federation***

A third party that has an interest in cycle superhighways is the Danish Cyclists’ Federation. The Cyclist Federation is a non-governmental organization with 16.000 members and it has local departments throughout the country. The cyclists’ federation is organized to promote bicycle interests to “*create a funnier, healthier and more sustainable world with the bicycle as the driver*” (Cyklistforbundet, 2019). The Cyclist federation is relatively strong, and their opinion and concerns are often consulted and taken into account in questions of bicycle infrastructure development, both locally and for national strategies.

The local departments are active in debates about local traffic and mobilities politics, they arrange campaigns and local cycling trips to mention a few of their activities. The Cyclist’s Federation’s local Roskilde Department was contacted to ask what concerns they may have for *Roskilderuten*. A main concern has been the route trajectory and whether the part along *Vesterbrogade* (the road leading from Roskildevej to City Hall) is a smart choice in terms of the road layout and urban structure. An alternative route trajectory had been suggested, going slightly south of the original route (appendix 10.3. p. 136).

\*\*\*

In the next section, the mappings and analysis of the route trajectory begin. First the Route-rhythm, the physical and quantitative measures influencing the route are mapped.



Fig. 16

#### ● 4.4. Route-Rhythm *Analysis* – *Quantitative Measures*

The *route-rhythm* analysis shows seven parameters affecting the route and the cycling experience. They are quantitative measures that also could be observed on any other cycle superhighway. In a diagrammatic way, the route has been rendered into a straight line, the length representing the 31 km of the route starting at Roskilde station (0 km) and ending at the City Hall of Copenhagen (31 km). The locations of rail stations along the route, and intersection with other cycle superhighways etc. has been marked according to distance in km from Roskilde station (0 km). Illustrated in this way, the diagrams show a pattern of what affects the route and where it does so. It shows that the concentration of stops (light regulations and intersections) is higher the closer to 31 km, which is also dense city center and where the route crosses most municipal borders. The route in this area is not at as close a distance to rail stations, but it intersects several north-south bound cycle superhighways (\*includes not-yet completed routes). The route should also be slightly ‘easier’ to cycle from west to east (Roskilde-Copenhagen) according to the slope and a prevalent wind direction from north-west (Sources: \*\*DMI \*\*\*GPS-evaluation extracted using the tracking app Sportstracker).

The following diagrams, drawing and analysis are meant to look at the ‘physical environment’ and the ‘atmospheres’ and ‘sensescapes’ of the route, as mentioned in the theoretical framing from chapter 2. The philosopher Gernot Böhme mentioned earlier, writes that capturing the atmosphere of a city is a subjective but shared experience. In the following quote, Böhme describes why ‘*analyzing the generators of atmospheres*’ is central if we are interested in finding the conditions in which certain atmospheres can develop:

*“The atmosphere of a city is the subjective experience of urban reality which is shared by its people. They experience atmosphere as something objective, as a quality of the city. And it is indeed the case that, by analyzing the generators of atmospheres from the point of view of the object (i.e. through city planning), we can bring about the conditions in which atmospheres of a particular character can develop”* (Böhme, 2017 p 133)

# Route-Rythm Analysis - Quantitative Measures

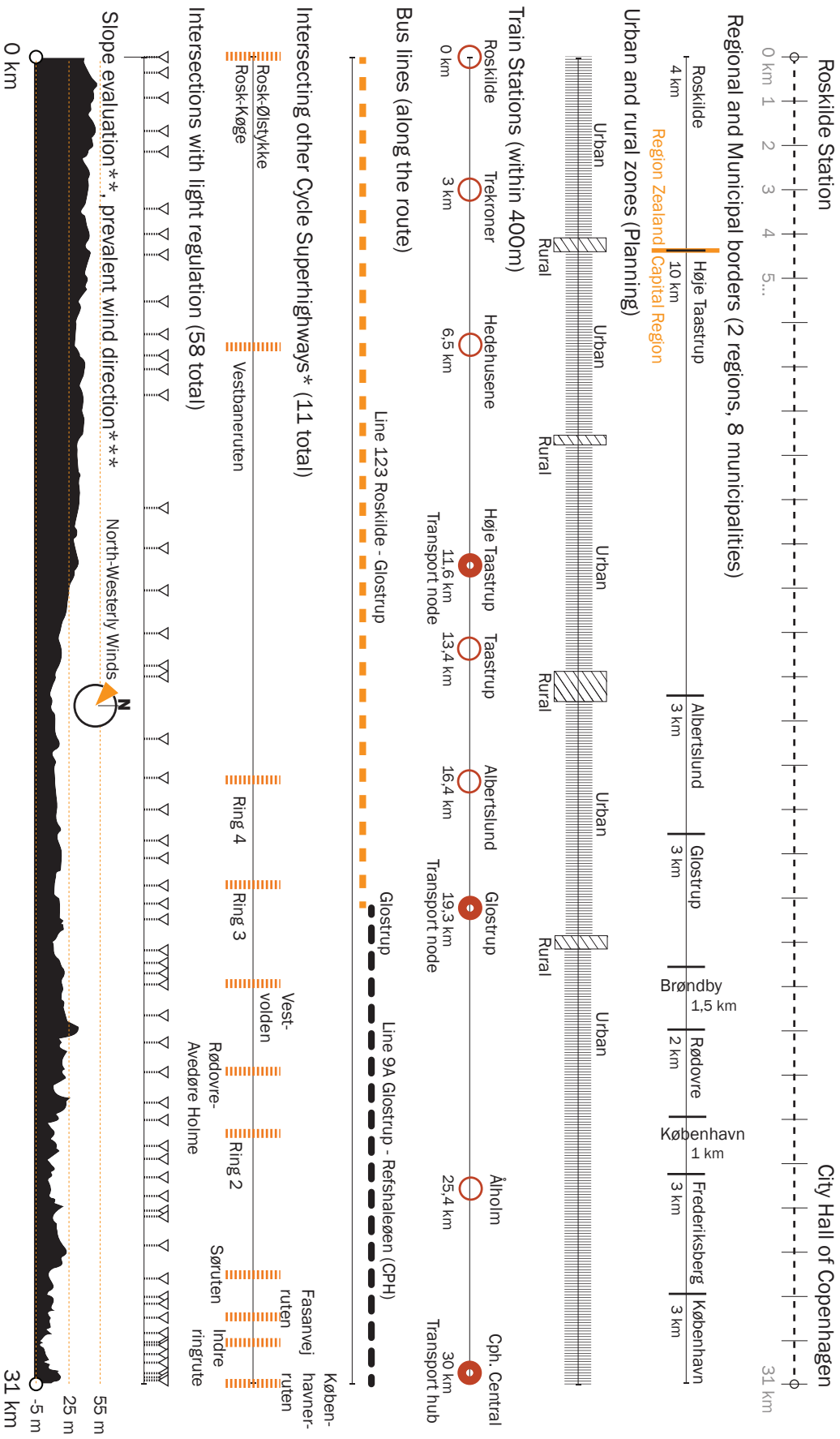


Fig. 17

## ● 4.5. Route Context *and* Path Environment *Analysis*

Like the ‘*route-rhythm*’ analysis, the ‘*route context*’ and ‘*path environment*’ analysis are diagrammatically illustrated as one straight line from 0 km to 31 km. The diagram illustrates two conditions of the environment affecting the bicycle path. The immediate route context and the path environment. (the diagrams on the following pages elaborate the characteristics of the different categories used to describe those environments).

### ***Route context***

The top graph on the diagram shows the context and what type of land-use or structure is dominant along the route, there is distinguished between six types of use. (see explanation below) The ‘BCI’ land-use takes up a relatively large share of the space between the Roskilde and Copenhagen urban areas. Otherwise housing areas dominate, interrupted briefly by green areas.

According to functions mapped, the road and areas immediately next to the route are operating between 8-18 (the most prevalent opening hours of most of the places).

### ***Path Environment***

The bottom graph on the diagram shows the environment as it is dominantly perceived from the cyclist’s perspective. Six types of ‘path environment’ are distinguished. In contrast to the ‘*route context*’ the ‘*path environment*’ shows a much higher prevalence of ‘BCI’ and ‘In-between’/‘Backstage’ environments. (See description of the different categories on the next pages).

The *route context* has been divided into six categories that are described on the next spread. The categorizing is based on the character of the build environment and land use, and the predominant character of the area determines what category it has been placed within. The context of the urban fabric as can be analyzed from a mapping of the larger area may not be entirely what is experienced from the bicycle path (see next section on Path environment descriptions for a more detailed account of the predominant experience of the spaces) as the housing and apartment blocks for example are not open to the road where *Roskilderuten* runs. Usually noise barriers and green natural barriers are placed between housing areas and the road. Despite this, the type of urban fabric that the path moves through does have an impact on what type of cycling experience it is. It influences the type of activity, and modes of mobility that are seen in the areas.

# Route Context and Path Environment Analysis

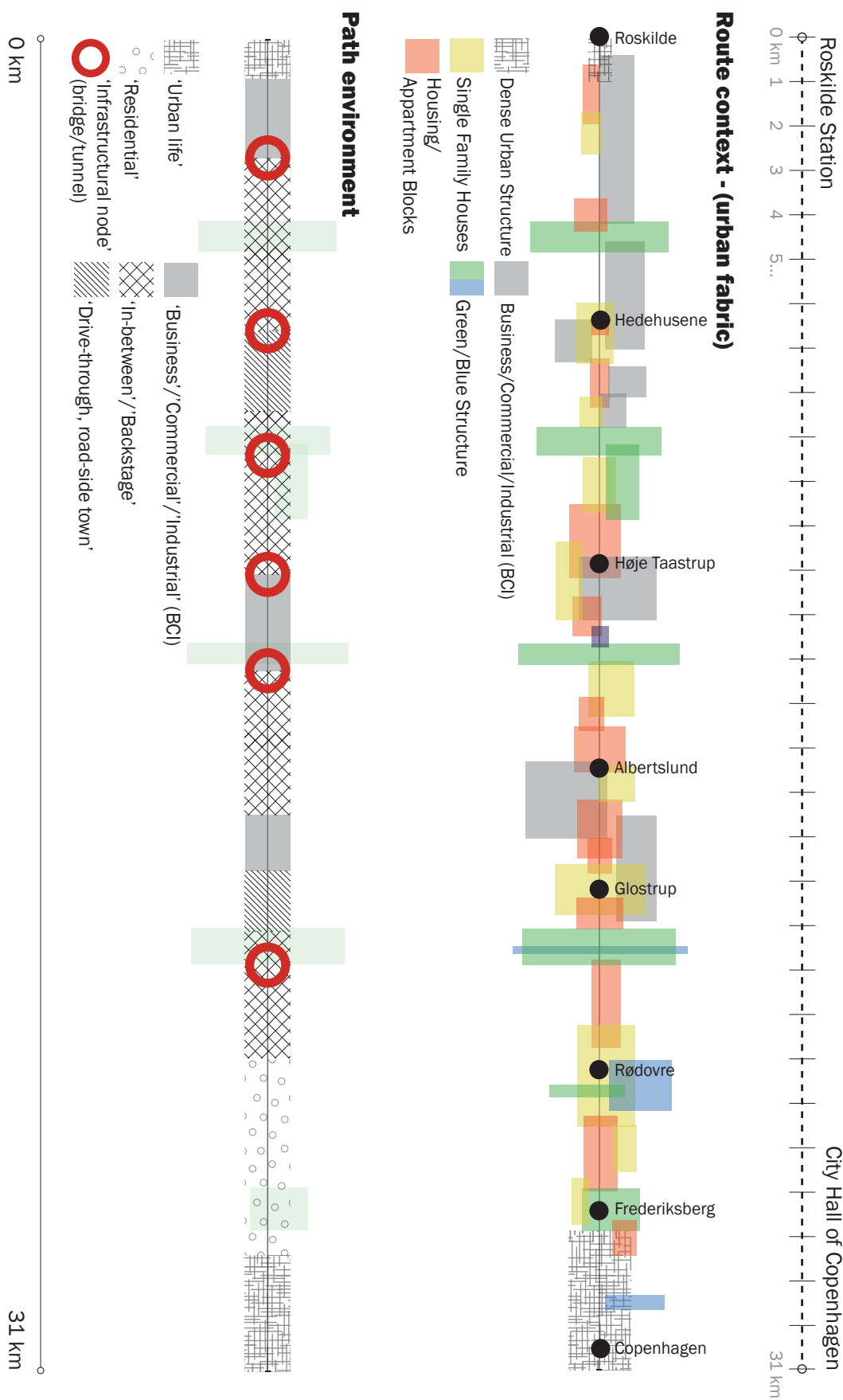


Fig. 18

## ● 4.6. Route Context II (*Urban Fabric*)

**A. Dense Urban Structure:** Buildings are taller than three floors, commercial activity at street level such as shops and cafés. In this section there might not be a great visibility or long sightlines as the urban structure may be dense, roads not always straight and much activity is happening in the streetscape. The area is busy with cars, pedestrians and cyclists, shoppers and urban users.

**B. Social Housing and Apartment blocks:** Apartment blocks of 3-10 floors. Public space or shared space for the residents between the buildings. Playgrounds and parking lots, green shared areas make up the space in between the buildings. A relatively long distance between the buildings and areas of other functions. Bus lines and S-train stations within walking and cycling distance.

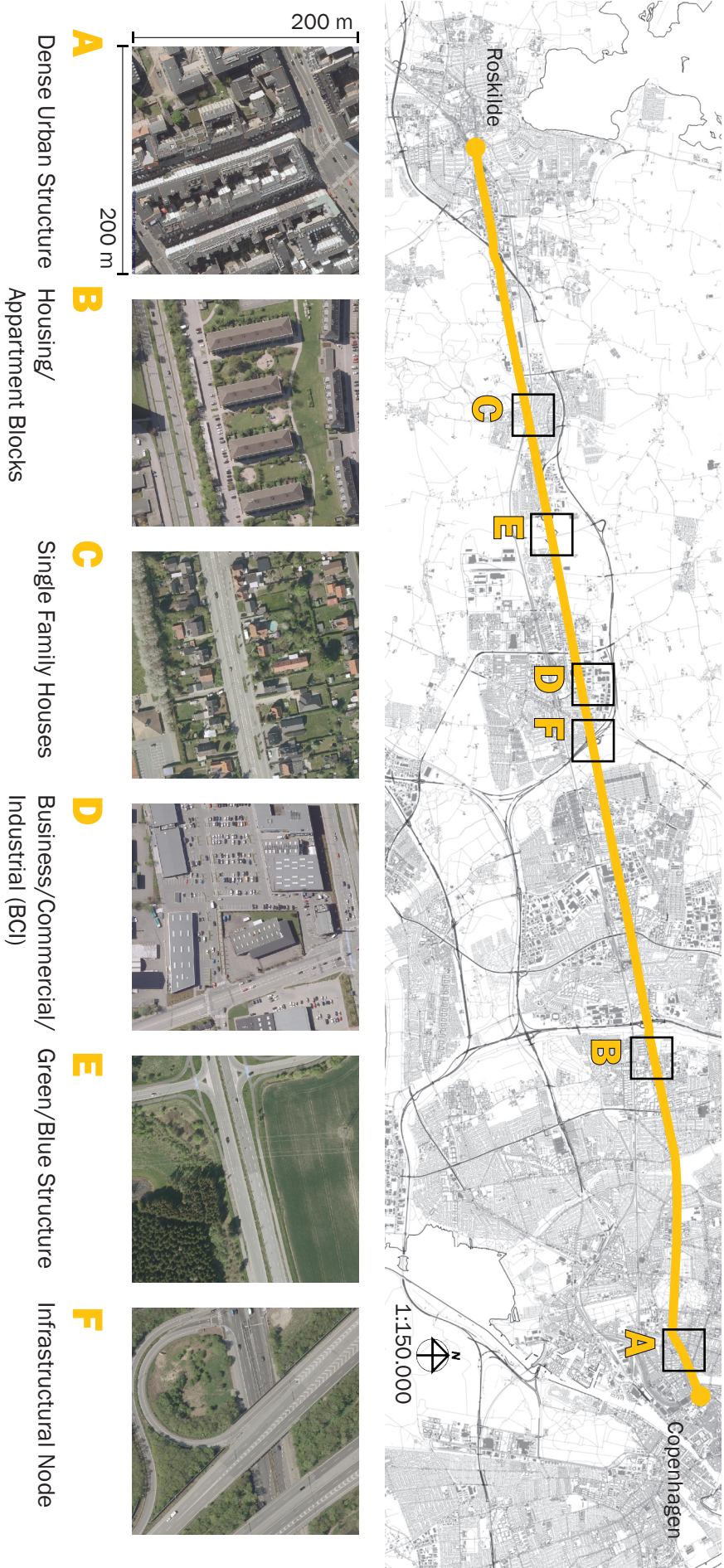
**C. Single Family Houses:** This typology of urban fabric is dominated by single family houses with private gardens. Areas vary in density and in year it was build, but is a relatively homogenous structure. It consists of houses, minor roads distributing traffic to the private lots and relatively low traffic. The car ownership in this type of area is relatively high compared to apartment blocks and dense urban structure, and the likelihood of commuting by car is high.

**D. Business/commercial/Industrial (BCI):** As the example shows, these spaces are dominantly gray, covered by asphalt and concrete; parking spaces, large warehouses and roads. Car-dominated mobility in these spaces. Sparsely with green and aesthetic elements.

**E. Green/blue Structure:** Parks, open green areas, fields and farmland, smaller rivers, lakes and ponds. Good visibility, open views, aesthetic and preferred elements for cyclists (Stefansdottir, 2014).

**F. Infrastructural Node:** Where larger intersections of infrastructure occur, where two or more levels and types of infrastructure overlap or interconnect, this could be a highway bridge/overpass or a railway tunnel. The areas are often noticeable and perceived as ‘landmarks’.

# Route Context II (*Urban Fabric*)



**Fig. 19**  
*The diagram illustrates the different route contexts shown in examples of 200m x 200m squares. It is indicated on the map where the examples are found along the route (the squares do not represent a correct scale but illustrate where the examples are located).*

## ● 4.7. Path Environments (*'Sensescapes'*)

The six categories of path environments or 'sensescapes' are elaborated below. They describe the immediate environment as seen from the bicycle *en route*.

**1. Urban Life:** Life and activity are taking place and experienced close to the road/cycling path. Building percentage is high with urban blocks above three floors. Ground floor of the buildings have a 'front stage' to the street with shops, cafes and other activity. Walking is prevalent as functions are in close proximity and public transport is widely available and frequent, cycling is also prevalent, in rush hour it appears busy and congested on the cycling lane.

**2. Residential area:** Mainly residential buildings, both apartment buildings and single-family houses with accompanying green spaces, parking facilities, and private gardens. Functions such as school, library, grocery stores and public transport are within walking and cycling distances. The paths are relatively busy with commuting cyclists, especially during rush hour.

**3. Roadside town:** A town structured around a main road, no dense town center, functions are distributed along the road. Behind the 'road town' is housing and residential areas. The cycling paths can be relatively busy and the streetscape has activity and shops at ground floor.

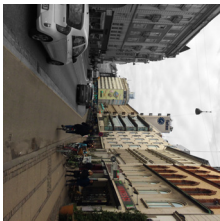
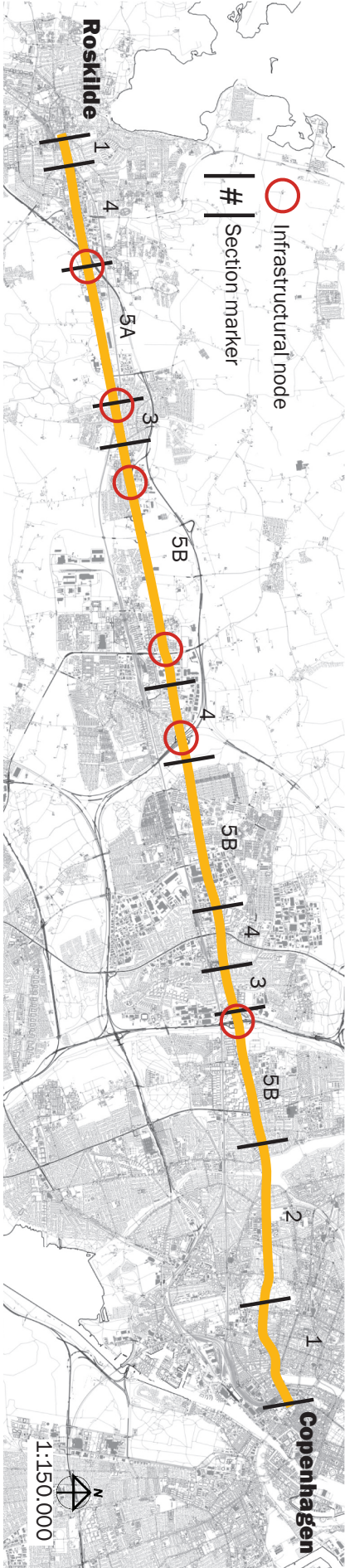
**4. Commercial/Business park/Industrial ('CBI')** – Landscape of parking lots, large warehouses, building supply stores, furniture and appliance stores, car-dealers and light industry. Areas dominated by and designed for mobility by car. Large, monofunctional areas. Few pedestrians and cyclists, too far between functions. Connected to public transport, but not well supported and frequent as in an 'urban life' area. People who work, shop or do business here mostly drive a car.

**5. In-between and backstage** – Functions appear to have been pulled away from the road. The sections are mostly transport corridor. Barriers and fences, both green natural ones to hide the view to the road, shield from noise as sound barriers dominate the immediate view from the bicycle. Gives the appearance of the route being a backstage, a transport corridor, one to move swiftly through, no functions to stop by, monofunctional spaces, monotonous view. Designed for paces faster than walking and cycling. Very few pedestrians, few cyclists and many cars. At sections without too many intersections, this affords fast and uninterrupted cycling.

**6. Infrastructure node** – In this context is meant a place where infrastructure intersect and thus create a noticeably different space such as a tunnel at a railroad underpass or a bridge crossing over or under a motorway. The structure may be a landmark, be perceived as an obstacle or place to cycle with extra caution, or it may feel like a transition from one section of the route to a new.

Note: While the 'sensescape' in the study *Retracing Trajectoreies...*(vanDuppen, J. et al.2013), from where the expression is borrowed, refers to one 'scene' along a trajectory, the 'sensescape' in this analysis can refer to more than one place or 'scene' which has the described characteristics.

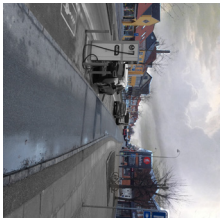
# Path Environments II ('Sensescapes')



1. Urban Life



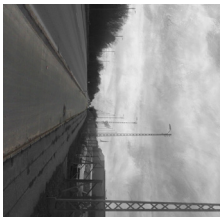
2. residential area



3. Road-side Town



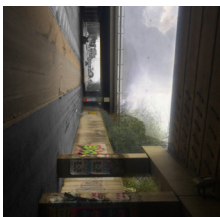
4. BCI



5A. Back-stage



5B. In-Between



6. Infrastructural node

## Path environment

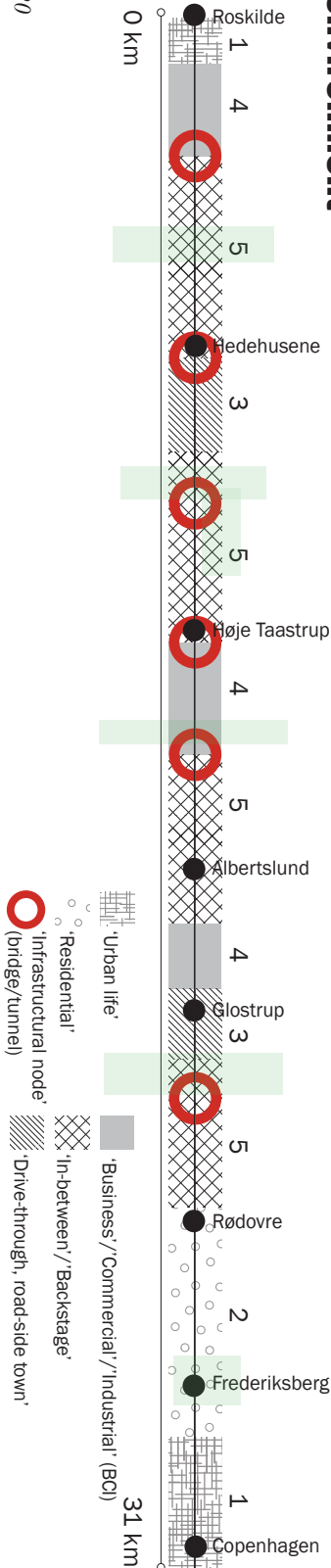


Fig. 20



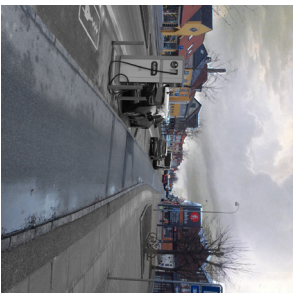
*Fig. 22 The collage of photos gives an impression of the scenery along Roskildewen. A scenery dominated by car-dealers and industry, back-sides and barriers, with intermissions of green, wide views of open fields.*



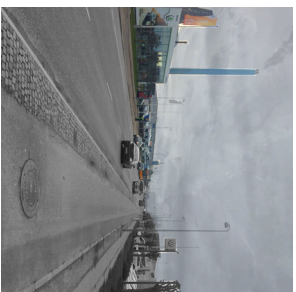
**1.**  
'Urban Life'



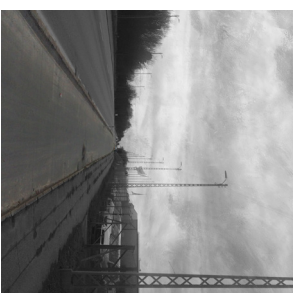
**2.**  
'Residential'



**3.**  
'Drive-through,  
Road-side town'



**4.**  
'Business/Commer-  
cial/Industrial' ('BCI')



**5A.**  
'Back-stage'



**6.**  
'Infrastructural Node'  
(bridge/tunnel)



**5B.**  
'In-Between'

Fig. 21 Diagram showing where the path environment examples are located along the route.

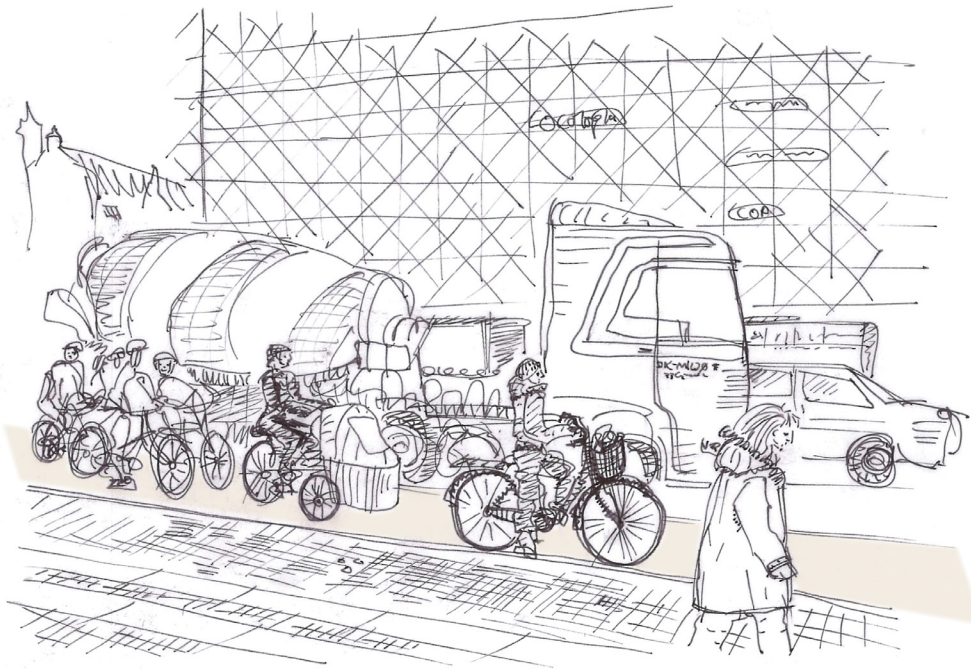
#### ● 4.8. *A View from the Saddle – A Serial Vision*

The series of drawings that will follow next, are a relatively detailed interpretation of photographs taken en-route on a bicycle ride from Rådhuspladsen in Copenhagen to Roskilde station along the cycle superhighway *Roskilderuten* a February day, 2019. The drawings and short descriptions that follow each ‘scene’ (presented after the drawings) are intended to capture the cycling experience and takes note of the ‘character’ and ‘atmosphere’ of the different parts of the route. The notes are written down after the ride but are influenced by the rider/authors knowledge and experience of cycling the route regularly over a number of years.

As the drawings show, not many other cyclists were cycling that day (being a day in February may of course carry some of the explanation). But this is also how the route is experienced in general. It is not a congested cycling path for most parts of the route - aside from the sections in Roskilde city and the center of Copenhagen. As can also be seen, the roads are long, straight and wide. And so are the cycling lanes. In that sense the conditions are good. But then places of poorly maintained asphalt are noticed, traffic intersections and traffic lights interrupt the flow, the long straight roads with functions that are moved away from the road gives the sense of a traffic corridor. A space to move through. There is a lack of activity other than cars. No ‘street life’, distances between functions are too great, very few pedestrians for the same reasons.

But here is potential. The route seems very well suited to the cyclist who chooses to cycle for the same reasons as Jonas Larsen finds in his ethnographic study of the route. The route should afford a speedy, smooth bike ride. This route is cycled to get to and from work, but also for the additional benefits the cyclist gains at the same time; physical activity and fitness, space and time to think or to clear one’s mind.

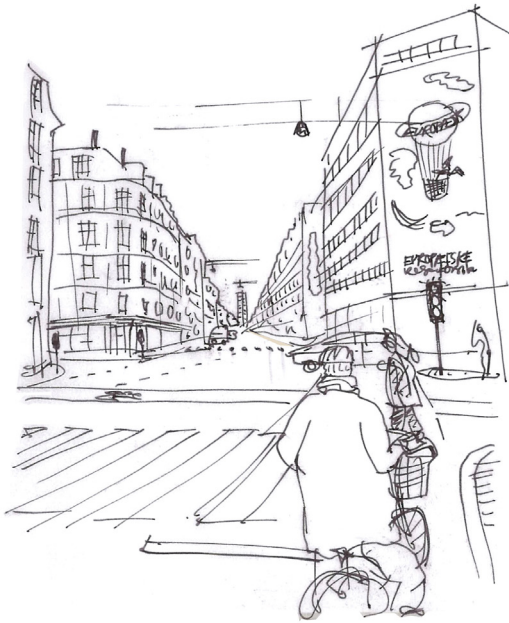
1



2



Fig. 23 (Collective for the 19 drawings)



3



4



5

6



7



8





9

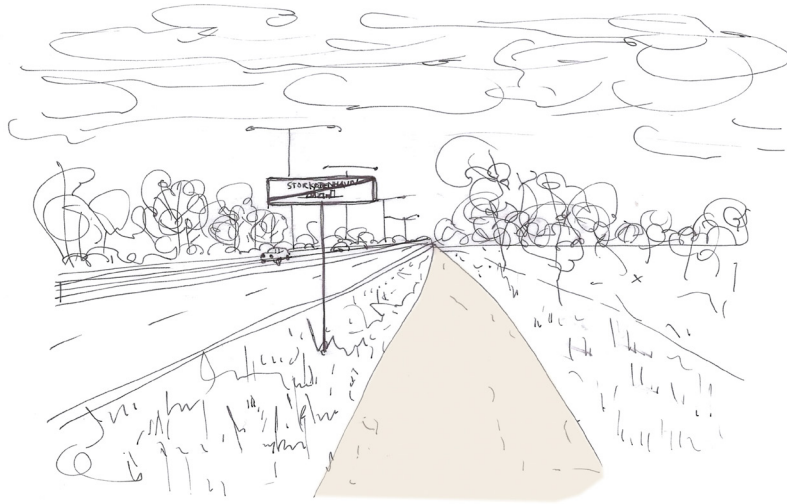


10



11

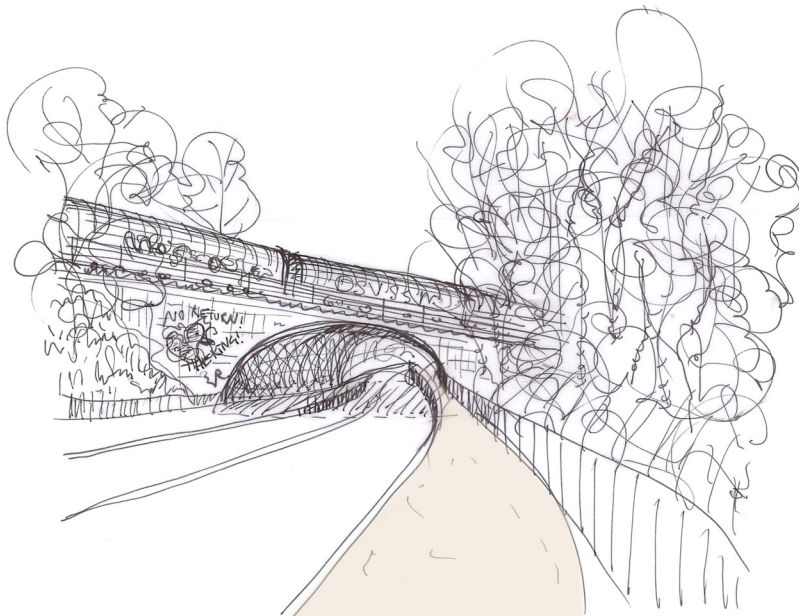
12



13



14





15



16



17

18



19



**(1+2) The City Hall of Copenhagen.** One of the most congested roads in the city, one of the most polluted. The image is dominated by myriads of people, moving in flows regulated by the traffic lights. Tourists visiting the city for the first time, pigeons, homeless, cyclists, pedestrians, cars, trucks, busses. A scene dense in impressions, smells, sounds. Tall buildings, a mix of new and old, shops at street-level, signs and advertisement, billboards and traffic signs, construction work and noise.

**(3) Vesterbrogade.** Busy sidewalks, pedestrians shopping, waiting for a bus, walking with a trolley, or cycling with a child in a wide cargo-bike. Activity at street level. Road for cars relatively narrow and slow (town center speed limit of 50 km/h). Tall urban blocks, residential or offices above ground floor.

**(4) Vesterbrogade.** Large intersection leading towards Frederiksberg. As a landmark, a tall converted silo building in the distance. A large mural on a wall is recognizable and has been the same painting for at least 25 years (I remember it from my childhood).

**(5) Roskildevej.** This section hints at what type of cycling this will be for the next 5-7 km of the route. Long, straight and wide roads. Buildings are further removed from the road. The sense of a backside is emerging. Not a lot of pedestrian and street level activity. More car traffic and cars parked at the shoulder of the road. Green spaces between the buildings and housing blocks provide green views and the sense of leaving the city center.

**(6+7) Roskildevej.** Mostly residential high-rises. Some functions at street level such as a photographer and other small private businesses.

At this point the residential high-rises are removed far enough from the road that a sense of activity and life between buildings is missing. The cycling lane is very wide considering less cyclist activity. A section to cycle fast and relatively uninterrupted.

**(8) Hovedvejen, Glostrup.** The old water tower emerges as a landmark on the route. The feel of a road-side and drive-through town. Some pedestrian activity, a grocery store, a few hairdressers and a kebab shop at street level, a second-hand shop. A mix of residential types of social housing, apartment complexes and single-family homes can be seen at the smaller side-roads.

**(9+10) Roskildevej.** The long in-between. Mostly roadside-greens that has been planted as a natural shield/sound barrier against the road. Some places a building emerges, a car dealer, a motel, a petrol station, an old scouts' cabin. But mostly functions serving the car. Wide four laned road (2 in each direction, separated by a barrier), a wide cycle lane in need of new pavement and maintenance. Large potholes and cracks in the surface. No pedestrians and very few cyclists. Behind the green, views to buildings and functions appear sporadically, but from the bicycle path it is not clear what. It feels like an in-between place. Local cyclists may use local back roads.

**(11) Roskildevej.** One of the highway underpasses on the route. A concrete bridge, concrete support walls painted and tagged with graffiti. Some green, but mostly a sense of asphalt, concrete, traffic regulating signage painted on the surface. Black and white and grey. But also another marker of a distance travelled. Sounds and light change as one cycles under the bridge. Very few pedestrians and cyclists.

**(12) Exiting the Greater Copenhagen region.** Good visibility, open landscapes. Green views, good shoulder separating the path from the road. Pleasant cycling environment.

**(13) Hovedgeden, the roadside town Hedehusene.** The last residential area before Roskilde. The town-functions at street level give some activity, pedestrians and cyclist.

**(14) The tunnel under the rail line marks a transition and exit to Hedehusene.** After the underpass, a slight inclining slope.

**(15) Københavnsvej.** At the top of the slope the border to Roskilde Municipality is crossed. The 'energy tower' and the two chimneys of the recycling and power plant are seen as landmarks in the distance. At night the 'energy tower' is lit up in color. In-between space, building supply warehouses, a dealer of tractor and other heavy machinery, a large warehouse selling fabrics, a used car-dealer. A bit further down this road, is the junction to go north to get to the University of Roskilde or to Trekroner station.

**(16) Københavnsvej.** Where the highway meets Københavnsvej and another highway underpass led the cyclist under the highway mark the entrance to Roskilde city.

**(17) Københavnsvej** is an edge of the city. Dominated by car-dealers, the chimneys of the recycling and powerplant are prevalent, an industrial character to the area. This is also a congested road at rush hours. Not busy with cyclists but with cars. An area serving cars, not many pedestrians around.

**(18) Københavnsvej. 'Røde port'** (the red railway underpass) marks the entry to Roskilde city centre, busy with cyclists and pedestrians.

**(19) Algade.** Not long after 'Røde port' the rail way station is visible. The pedestrian street starts here, activity and cyclists, the feel of being in a city. The end of the route.

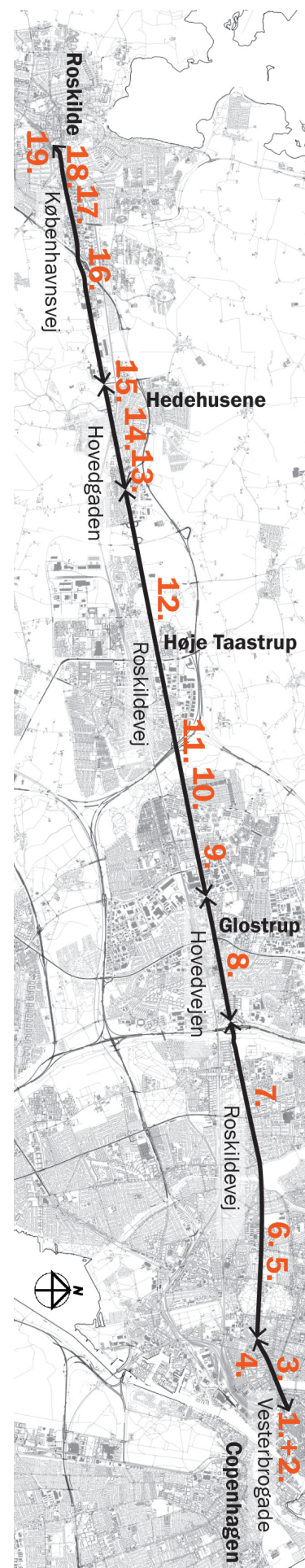


Fig. 24 Reference map (not to scale) with road names and no.

## ● 4.9. Best Practice Examples – In Conclusion

Best practice examples are researched and collected to illustrate what a path typology could mean if cycle superhighways of Copenhagen were to include a variety of typologies within the network. Examples of best practice in terms of how cycling infrastructure is used as a tool in urban design have been included. Two types of bicycle infrastructure typologies are looked at:

Appendix  
10.1 p. 120  
1.A-1.D

1. *The path typology*, refereeing to a type of path and a longer transect of a route, or a whole route. Here is distinguished between path typology in terms of the type of cyclist it appeals to and the type of cycling use and experience it is used for. In other contexts, different path typologies may refer to whether the path is completely separated from other modes of traffic, just separated by an elevated curb, or if it is a path painted on the existing road, the meaning in this context is as explained at the top.

Appendix  
10.1 p. 122  
2.A-2.D

2. *The ‘artefact’ typology* refers to a smaller part of a bicycle path or route that is noticeably different from the path course. The ‘artefact’ also has a practical function e.g. as a bridge or a tunnel.

For the first category, the *path typology*, four typologies are included (see references and examples in appendix p. 120: 1.A-1.D) The list is not extensive, more typologies could be considered, but relevant to typologies that could be included in a cycle superhighway are:

- a) **The elevated/completely separated bicycle ‘skyway’ and express-way**
- b) **The bicycle highway and (the commuter priority path)**
- c) **The urban ‘bikescape’ and ‘public domain’**
- d) **The greenway - nature and recreation**

The different path typologies show that there is a great variety in cycling opportunities and experiences available. It also shows that different types of cycle lane are appropriate in different contexts, whether it is urban or country-side. The build urban environment often has limits in terms of space and it has to accommodate multiple types of mobility within a compact area. Here planning and regulation as to what modes of mobility are prioritized plays a big role.

### ***When cycling infrastructure is used as a tool***

In the analysis it was found that places of interest, that have challenges and potentials, are often places where a sort of friction occurs. That could be a place between two zones, it can be a bridge or tunnel marking an intersection with

something else. Transition (infra)structures such as bridges, elevated cycle paths, and tunnels, intersections with another road or type of district are interesting places. And as a ‘traffic architectural’ entity, the transition or intersection has the potential to become sculptural, a landmark in its own right. It can be meaningful for a journey to mark a physical transition. Based on a review of different cases of ‘transition-architectures’ for cycling (and pedestrian) infrastructure, four examples have been included and discussed. The examples are selected to show how cycling infrastructure that is integrated well into its context can be used to shape and form urban space and the way we are encouraged to move through it. In that way the cycle infrastructure or ‘*artefact typologies*’ in these examples have been used as a tool in the urban design of the specific sites. Please refer to appendix p.122: 2.A-2.D for pictures and elaborated descriptions.

#### ● 4.10. *Analysis Conclusion* – *Design Principles and Potentials Mapping*

To answer what a cycle superhighway is and how it can be a tool in urban design, the case study was employed. Within the case study several aspects were looked at to understand the case *Roskilderuten*.

Firstly, the route was looked at in its context. Diagrammatic mappings of different parameters directly influencing the route, such as traffic intersections with light regulations and municipal boundaries were mapped. The resulting diagram (fig 17) shows an intensification of factors affecting the route closer to Copenhagen and a challenge in disruption to the cycling flow as a consequence.

Next, the urban fabric and *context typologies* affecting the route were mapped in a similar diagrammatic way. The different typologies also have different types of land-use. From the resulting diagrams (fig 18 and 20), it is seen that large parts of the context are either residential areas or ‘business/commercial/industrial’ (BCI) land uses. This makes a difference in how the bicycle ride is experienced, it matters for what type of mobility use the area affords, which also influences the cycling experience and can have an effect on the perceived sense of safety; an area mostly used for industry also has more influx of large vehicles and trucks, less pedestrians and cyclists and thus can feel less cycling friendly even though there is a separate cycling lane. The *path typology* mapping is related to the *context typology*, however, in this mapping the cyclist’s perspective is taken (the characteristics and categories of types is based on what the path looks and feel like when cycling through), and the immediate context of the bicycle

path and how it is predominantly perceived is mapped. It shows that a majority of the cycling route is on paths that are perceived to be 'backstage', 'BCI' and 'In-between', consequently the immediate context for most parts of the route is through places with low pedestrian and cyclist activity, with relatively far distances between functions and with little sense of being at a destination. This points to the important function/role of the cycling route as being a 'transport corridor' getting the cyclist through these spaces. For a 'transport corridor' to work well, a good flow - few disruptions, well-maintained path surfaces and good signage and path identity (signage and communication as to how far to the next 'destination') are important. However, the route can do more than being a 'transport corridor'. The examples of how cycling infrastructure can be a tool in shaping urban space show that this often works well in 'transition spaces', when 'connecting and intersecting' and when the route has character of a 'bikescape'. As the *path environment analysis* and final *potentials mapping* show (fig. 20 and 25), there are several opportunities for these types of spaces along the route.

The graphic *view from the bike-serial vision* gives an interpretation and impression of what the cycle from Copenhagen to Roskilde 'feels' like. Some of the spaces and types of areas that are identified and mapped in the first analysis are here illustrated and the series of drawings gives a more sensorial tour through the route. It shows a route that despite being very straight-forward and lacking interaction and activity from other cyclists and pedestrians, has variety and many different sensescales. Dominated by 'in-between' space, asphalt parking lots and roadside shoulders and buffer zones, it shows a path with variety, with different sections and types of context. At points nicely framed green/aesthetic views. *Roskilderuten* has a strong potential to be a 'highway' for a bicycle ride of a fast pace and few distractions for the majority of the trajectory.

To get a sense of how the cycle superhighways become reality, some of the stakeholders that are planning and implementing them have been contacted and interviewed. The cycle superhighway projects are often good branding, it is a well-known and successful concept where correlation between cycling-upgraded routes and numbers and diversity of cyclists has been documented. In some cases, investing in cycle superhighways can leverage funding to additional cycling related projects in a municipal planning department – this was the case in Roskilde – therefore greater positive effects on cycling environments in general. It also became clear that the political situation and 'trends' effect how we view cycling infrastructure and prioritize its implementation. In the same way planning and design reflects the political situation, currents and discourses. Cycling is a relevant topic as we see a focus on health, healthy cities, a need to tackle con-

gestion, and also the individual's and societal benefits of being in shape and its positive effects of mental well-being.

Based on the analysis findings and literature research, a list of design principles for new cycle superhighways is presented before concluding with the potentials mapping and *Roskilderuten* diagnosis.

## ● **Seven Design Principles**

A list of principles that are important to the design of cycling infrastructure could be summed up by following principles that take point of departure in the already existing principles for cycle superhighways (see pages: 43 and 47) and the findings from the review of literature. It adds the dimension of 'attractiveness and aesthetics', encouraged by Stefánsdóttir's arguments and conversation with Anna Garrett from the Office of Cycle Superhighways. What principles to prioritize and weigh the highest depend on context and type of path in a given situation.

- *Flow:* Getting smoothly and efficiently between destinations is a priority on cycle superhighway sections especially. Too many red lights, change and disruptions in surfaces and complicated crossings makes the ride unpleasant. (Larsen, 2016; Nils, Bradtberg, Universitet, Larsen, & Universitet, 2014)
- *Affordance:* of the asphalt, transitions - path into junction, lighting in narrow and enclosed spaces (i.e. tunnels). Also includes parking and storage facilities of the bicycle and designs that afford that the bicycle can be transported to a train platform for example. Wide and separated cycle lanes with high levels of maintenance, is another example. (Bradtberg & Larsen, 2014; Hull & O'holleran, 2014; Larsen, 2014)
- *Connection:* the network should be well connected, both to the cycle superhighways, other cycle networks and to public transport; train stations and bus stops.
- *Wayfinding and signage:* marking the bicycle path and connections to other cycle networks, lets the cyclist know she is on right track and how far to the next destination.
- *Attractiveness and aesthetics:* The aesthetic experience makes the ride enjoyable and makes a difference to route choice of the commuting cyclist. (Stefansdottir, 2014, 2015)
- *Accesible and accomodating:* A network of bicycle paths that are accessible, that are well connected and that connect all types of land use are key to bicycle commuting (Hull & O'holleran, 2014)
- *High (percieved) sense of safety:* The cyclist has to feel safe in traffic or she will not choose to cycle. A safe cycling environment is a precondition. (Andrade, 2013; Forsyth & Krizek, 2011; Hull & O'holleran, 2014; Stefansdottir, 2015)

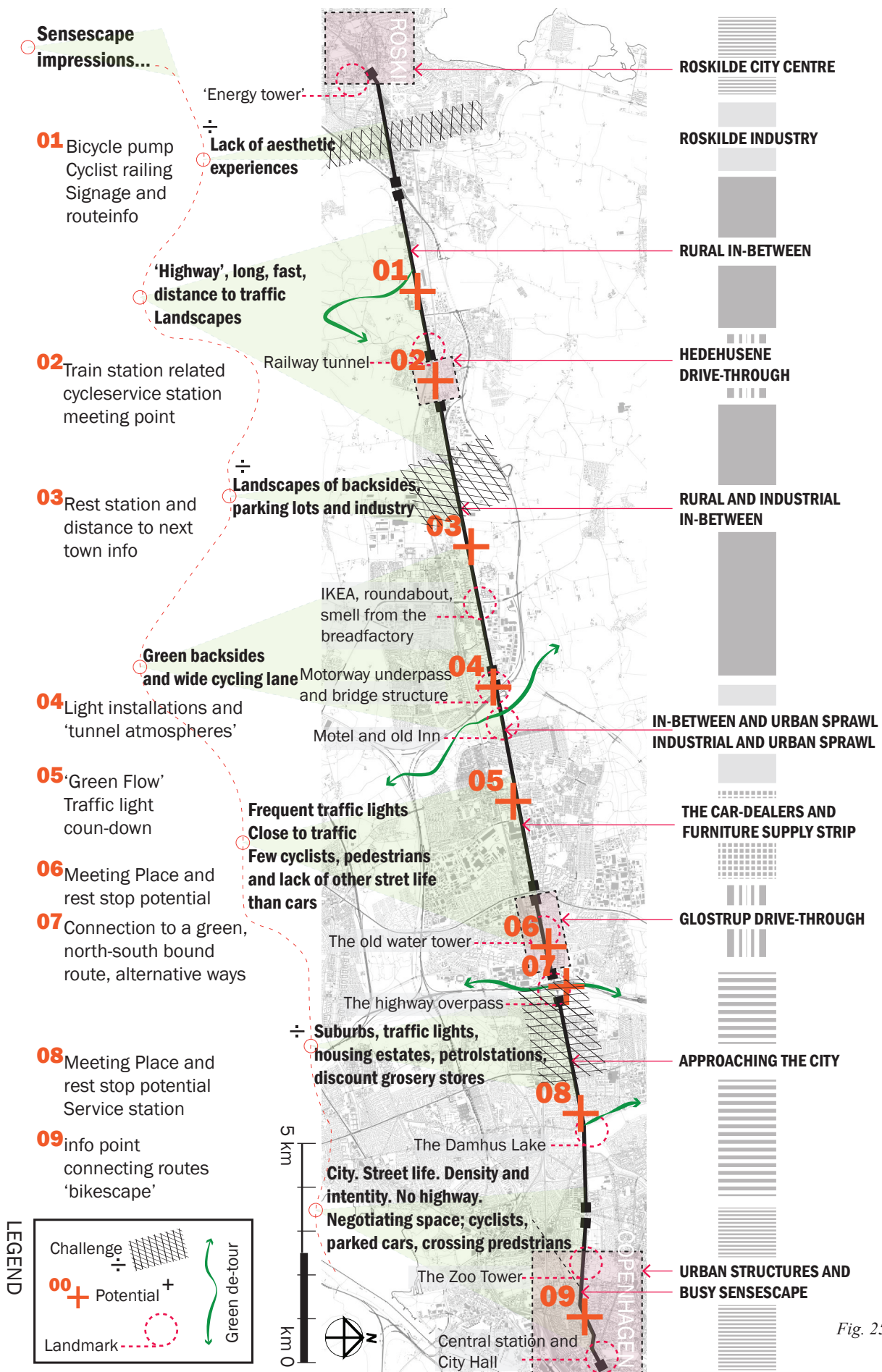


Fig. 25

← Finally, the potentials and challenges mapping points at several interesting ‘pinpoints’/transects along the route, where interventions by the cycling superhighway tool could be taken into use. Next chapter will develop the idea of this cycle superhighway tool.

← ***The Roskilderuten ‘diagnosis’***

Today, *Roskilderuten* is a long line of cycling path following the secondary road 156 between Copenhagen and Roskilde. It is the shortest and most direct trajectory between the two cities by bicycle. One-way bicycle paths exist either in its own trace immediately next to the road or separated by a shoulder of varying widths, from narrow strips of grass or cobbled stones to wide shoulders planted with trees or separated by some other kind of barrier. The route passes through a backdrop of industrial zones, backsides, retail parks and green ‘in-betweens’. A fundamental challenge to the route is the proximity to traffic. As seen in previous studies, the proximity to heavy traffic is one of the most off-putting features to a cyclist (Stefánsdóttir, 2014).

From start to finish, the 30 km route is a long distance for a daily commuting cyclist. Rest stops, service stations, good parking facilities at bus stops on the route, wayfinding to train stations on the way, and wayfinding and signage to indicate distances to next place and intersecting alternative routes or ‘by-paths’ are recommended. For parts of the route, traffic light regulations at junctions disrupt the flow to a high degree. Remaining time counters at traffic lights, a ‘green wave’ indication to ease a better flow for the cyclist would also improve the cycling experience.

Highway underpasses and railway tunnels could benefit from better lighting, or for example art and light installations to make them appear more interesting to pass through. The materiality and experience of riding through a tunnel could also be explored and highlighted as seen in the chapter ‘*Tunnel Atmospheres*’ in *Designing Mobilities* (Jensen & Lanng, 2017, chapter 5).

A few places along the route, the perceived sense of safety can be low, especially at large junctions and roundabouts. Letting the cyclist get ahead in the junctions so they are seen, good lighting making the cyclist visible in the dark may help increase the perceived sense of safety.

The temporality and seasonality to cycling is a mentionable aspect to some of the challenges and opportunities in designing cycling infrastructure. (In winter months, good lighting and high maintenance of the path (clearing of snow and

bicycle friendly ice-prevention (not over-salting) are important).

There is a potential to let the route indicate ‘alternative’ routes, offering variety and options to a daily commuter, for example a route that might be longer, but that is green and totally separated from traffic. Interventions such as rest stops with information on the route, service stations with a bicycle pump are good options. Certain places along the route, a service station in connection with a bus stop or bicycle parking could also serve as a meeting point for commuters and colleagues to cycle together for parts of a long commute if they wish to do so, or it could be a starting-point for an excursion arranged by the Cyclist’s Federation.

The nearby environment of *Roskilderuten* could be seen as a ‘stage-set’. It is the back-drop of the ‘motilities play’ that we take part in when moving between destinations. The stage-set of *Roskilderuten* is, as it was seen in the analysis conclusion, a back-side and an asphalt dominated world.

*Roskilderuten* is long. And it is not busy with cyclists for most of it’s trajectory. To make the route attractive, it would be important to make sure a coherent distribution of functions and service stations are in place, that the route ensures a good flow for the cyclist and that the aesthetic sections along the route are accounted for.

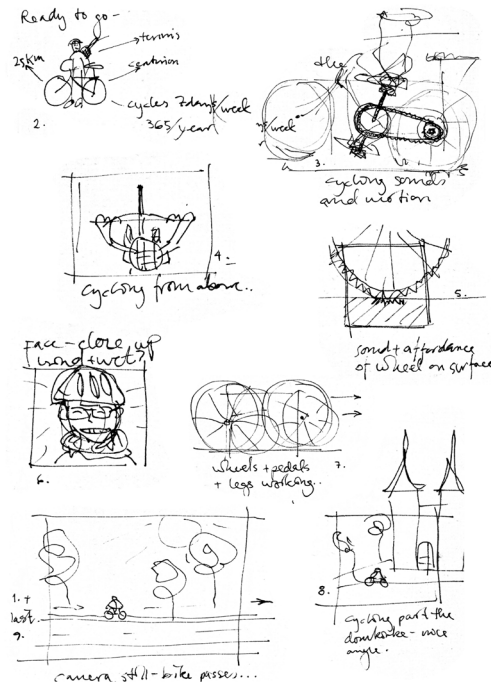


Fig. 26 Notes on cycling

## 5. Developing a Cycle Superhighway Tool

In the beginning of the thesis, a theoretical framework was set up, then the cycle superhighways and case of *Roskilderuten* were studied. Following section will synthesize the previous findings and present a solution to the research question: how can the cycle superhighways be used as a tool in urban design, and what the typologies and design principles shaping them would be like? This urban design ‘tool’ is developed, and the design principles and typologies, along with intervention ideas, will be presented in this chapter.

The cycle superhighway is a bicycle commuter-oriented cycle way. But as found in the analysis and when looking closer at the cycle superhighway phenomena, it is argued that the cycle superhighway has the capacity to breach a wide range of cyclists and cycling practices - to be more than a highway. Accommodating this gives the opportunity to think more path typologies as part of the network. The typologies are context specific, and they nuance the way the cycle superhighway will be designed and what experiences the ‘superhighway’ offers the cyclist.

Through a user manual, that include the design principles and how to devise/identify typologies and interventions from a ‘bank of ideas’ to a cycle superhighway, it is demonstrated how the cycle superhighway – that includes a wider variety of typologies and experiences – can be a cycle superhighway ‘tool’ for the urban designer to take into use.

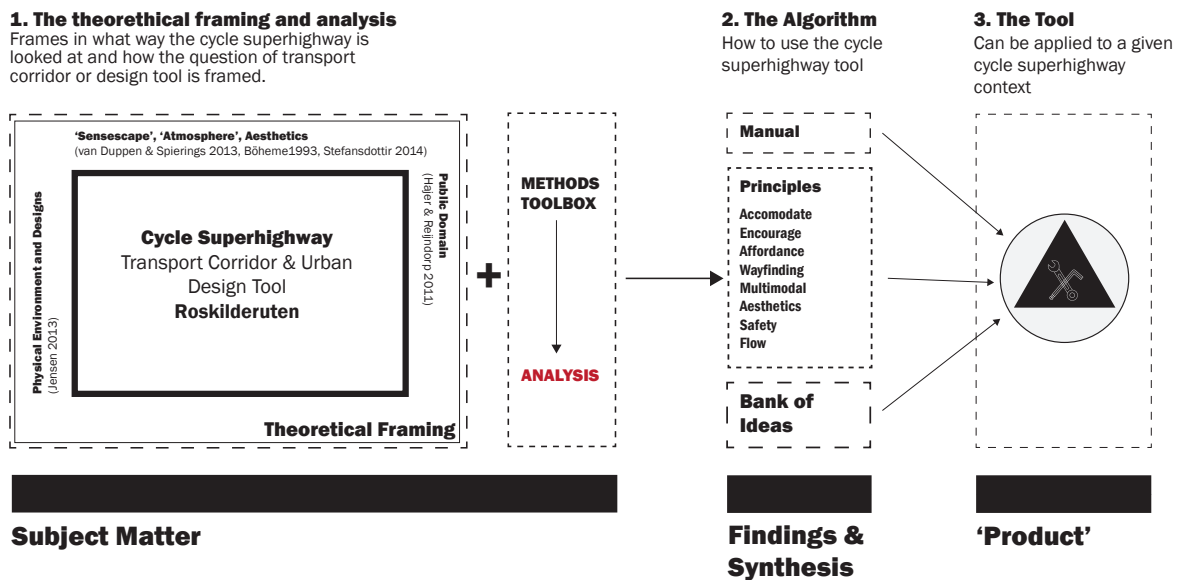


Fig. 27 The diagram illustrates the steps of getting to the ‘tool’, through theoretical framing and analysis (the subject matter). This leads to the findings and synthesis - that make the ‘product’ or the tool that consists of the manual, principles and Bank of (intervention) ideas. These three aspects will be presented next.

### ● *The design principles*

As a conclusion to the analysis section, a set of design principles for the cycle superhighway was compiled. The principles are based on arguments found in literature and from the analysis material.

The design principles for a new cycle superhighway are ones that:

- Ensures a good cycling **flow**.
- Makes cycle superhighways **accessible and accommodating** to the bicycle commuter.
- Are experienced as **safe and secure** mobility environments.
- **Connects** to other routes, urban nodes and important traffic nodes.
- Should prioritize **attractive and aesthetic** routes when possible.
- Are clearly marked and **signed** for easy **wayfinding** and ‘recognizability’
- **Afford** smooth and even cycling surfaces

The principles were elaborated earlier, here they are mentioned as they will be taken into use when applying the ‘tool’ to *Roskilderuten*.

### ● *The typologies*

From the four path typologies defined by selecting best practice examples (appendix 10.1. p. 120), three typologies are selected to be included in the cycle superhighway network. The three types are illustrated and described on the next spread.

**The Bicycle Highway**  
**The Urban Bikescape**  
**The Greenway**



### ***Distribution of Urban bikescape, Highway and Greenways along Roskilderuten***

Diagrammatically the distribution of Urban bikescape, Highway and Greenways along *Roskilderuten* can be illustrated as below (fig 28). It shows that the Bikescape is seen in areas with denser city center, in Roskilde and Copenhagen. The route is otherwise dominantly Highway. The Greenway has been placed the places along the Highway where the context offers green open views. Intensity, flow and aesthetics, are marked with a little icon, to represent three main characteristics. Intensity comes along with dense city center and places of industry and busy traffic. Flow is important to long Highway-sections, and aesthetics is associated with Greenways - green views and open spaces, as these are shown to have positive aesthetic qualities to the cyclist. The diagram also shows that one route may have characteristics of several typologies distributed throughout the route. The Diagram has been kept like a sketch, and not in detail assigned typologies to the whole route. In the application examples that will follow in the next chapter, the typology of the application example-context is put more precicely.

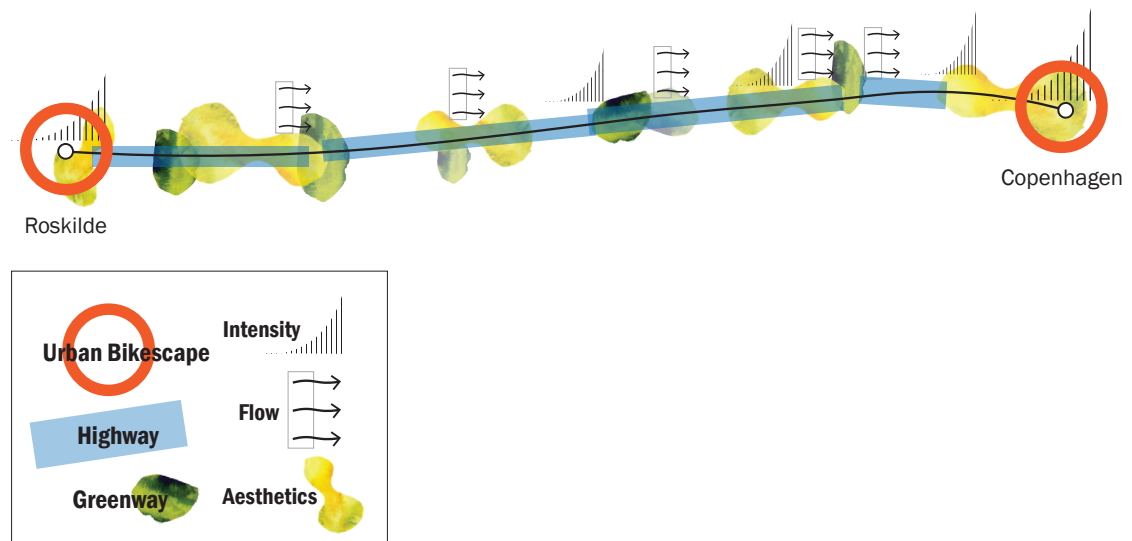


Fig. 28

● *The Bicycle Highway – the commuter priority path*



Fig. 29

The Bicycle Highway is a path where flow, accessibility and affordance are main principles. The Highway is for cycling fast and far with as few interruptions as possible. The ‘highway’ lane is wide and few traffic junctions and distractions are within the vicinity of the path. If possible ‘bypassing and express’ structures (see the bank of ideas p. 91-92) are implemented to let the cyclist bypass busy roads and avoid traffic junctions. This kind of cycle path is often situated outside of city centres, and make up the longer distances in between nodes. The asphalt and e.g. transitions to a bicycle bridge or tunnel must be as smooth as possible with surfaces that afford a pleasurable ride for thin and sensitive tyres of a racing bike. For this typology, flow, affordance and accessibility are prioritized first, along with safety.

(The ‘highway’ is not to be confused with the cycle superhighway and what it stands for today. The three typologies here are meant to nuance what typologies that make up the network of bicycle paths of the cycle superhighways (and the different cycling experience they afford)).

## ● *The Urban Bikescape and Public Domain*



Fig. 30

This typology is mostly located in (dense) urban environments. While maintaining a high service and afford a good commuter experience, the path of the Urban Bikescape may compromise on some of the requirements of fast and uninterrupted travel. The urban environment is busier, more intense in terms of volume of other cyclists and interactions that the cyclist has to be aware of. But the bikescape also has the capacity to connect areas of a city by providing a safe, attractive and accommodating bicycle path. Attractiveness and aesthetics are important design principles. The route may not always be the most direct if a slightly longer route ensures a better cycling experience, for example by passing through a park or other features that are appealing and keep cycling separated from cars. Connections, wayfinding and signage are important in a city. Although a commuter knows her route and area well, urban routes must also accommodate tourists and recreational cyclists. Clear signage, good information points and maps that show where you are, and suggestions of other routes is a good service to the urban cyclist. The Urban bikescape has the opportunity to become ‘public domains’. Being paths that give attractive urban rides through different neighbourhoods and parts of a city gives the opportunity for many types of people to meet and use the urban spaces. ‘Superkilen’ in Copenhagen is a good reference to what an urban bikescape in a Copenhagen context could be like (app. p. 121).

## ● *The Greenway – Nature and Recreation*



Fig. 31

The Greenway is – as indicated by the name, a trajectory that passes green areas, parks, forest and green corridors. The greenway will often be removed from other traffic, and the sense of safety, of attractiveness and aesthetics is high. The typology may attract recreational cyclists and families, and commuters willing to cycle a few extra km to have a green cycling experience. This type of route has to have some degree of lighting at night, which can be a problem in green areas if they are part of nature reserves, as the light will disturb wildlife. Smart use of lighting, e.g. that only light up when the path is occupied, discrete ‘glow in the dark’ indications along the sides of the path are some solutions. Indications of distance to next destination, information points and rest areas are suitable initiatives here. The greenway may be a previous railroad line or other type of minor road that is converted into a bicycle lane.

## ● *The bank of ideas – catalogue of possible interventions*

The Bank of Ideas is a catalogue of possible interventions along a cycle superhighway. Some of the ideas are already in use on other cycle superhighways, others are new. The catalogue is not complete, and an idea must be adapted to its context, and many more can be added. A description explains each idea on the next page.

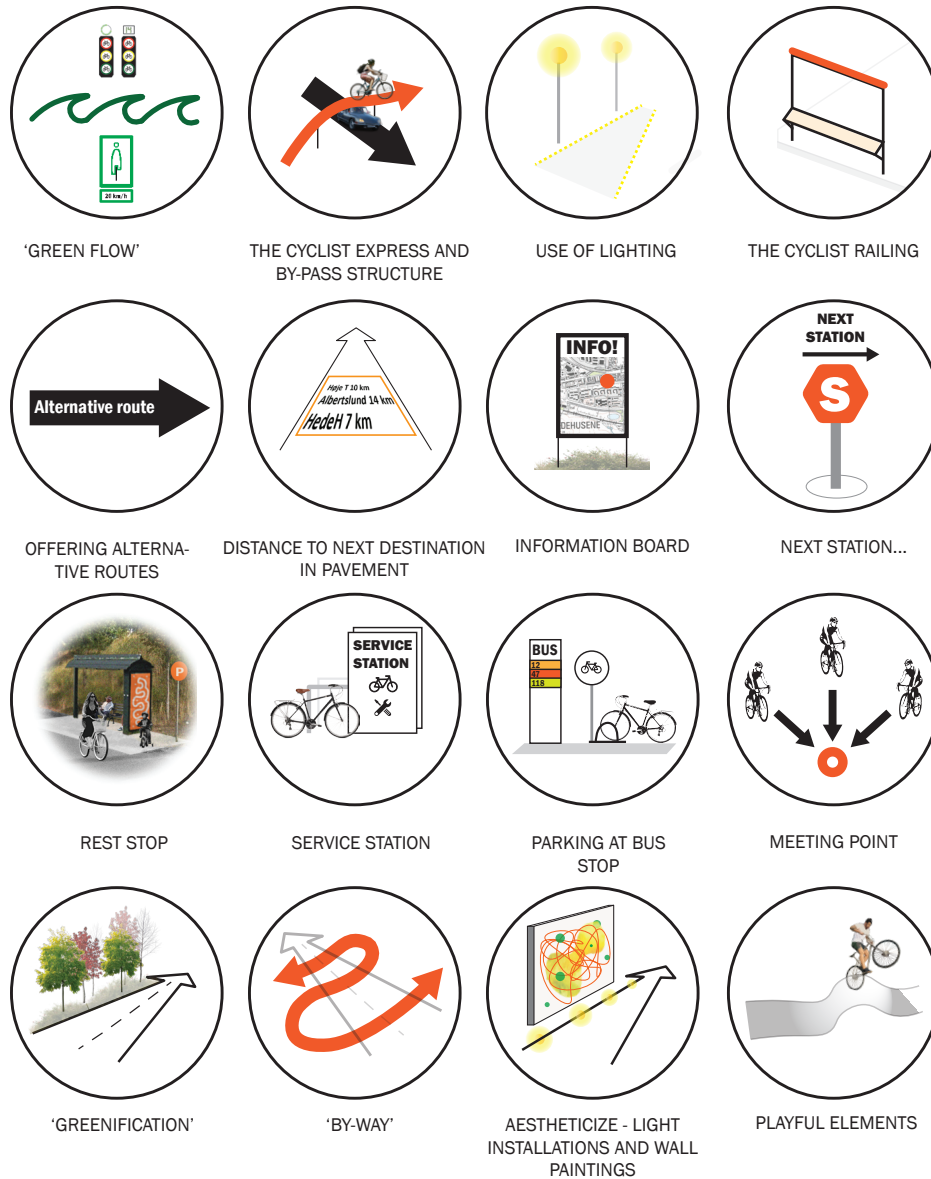


Fig. 32

- **‘Green Flow’** – Intelligent transport system solutions that are implemented to ensure a good flow for the cyclist by optimizing green lights crossings for the cyclists. (See appendix 10.2. p. 125)
- **The cyclist Express and bypass structure.** Could be a cycle bridge surpassing a busy junction or road. Safer and faster ride for the cyclist.
- **Use of lighting** - Feel safe – be seen and be able to see your surroundings in dark and in bad weather.
- **The cyclist railing.** A service to the cyclist when she has to stop for a red light. Also shown to place her correctly at the intersection and to jump fewer red lights (Leegaard et al., 2016)
- **Offering alternative routes** can give variety to a commuters choice of cycling routes, can offer different sensescapes and cycling experiences.
- **Markings on the pavement** indicating distance to the next destination.
- **Information point.** Has information and maps on the cycle superhighway and connecting cycle path networks. Info on sites and things to see in the area.
- **Signage** for example indicating location of connecting public transport.
- **The rest stop** can be a small shelter or pavilion with basic rest facilities. A place that gives shelter from a heavy rain shower, or a place to rest on a longer tour. Often has information board as well.
- **The service station** allows the cyclist to stop and do a basic bike maintenance. Bicycle pump, hex keys and option to wash and clean the chain.
- **The bicycle parking at a bus stop** (or train station). Good parking facilities in connection to public transport, expanding the transport options and distance range for the cyclist.
- **Meeting point.** A place where cyclist can meet up to cycle together. Can be students cycling to school together or cycle commuting colleagues that meet to cycle some of the way. Could also be in connection to a ‘park and ride’ site at a bus stop.
- **‘Greenification’** – initiatives that greenify and makes a route more attractive to cycle. May also be implemented as a green barrier towards heavy traffic in some cases.
- **The ‘by-way’** inspired by the ‘bikescape’ in New York that consisted of a ‘main way’ and ‘by-ways’ as little de-tours connecting unexpected sites and routes.
- **Aestheticize** – art, light installations, wall paintings
- **Playful elements** are small interventions at appropriate places adding fun to the ride..

### ● **Using the cycle superhighway tool – The manual**

The design principles, the path typologies and the bank of ideas have been presented. These are the elements that are put into play when using the cycle superhighway ‘tool’. Next, a simple manual of two steps, describing how the ‘tool’ is taken into use is provided.

**Step 1.** Mapping and surveying the site and context of the case. First, know the entirety and overall characteristics of the trajectory. Next, zoom in on specific and strategic sites. Be there and get to know the place to grasp the challenges, opportunities and potentials. A mapping of functions, challenges and potentials will help with this. How will the principles be prioritized in the place? What type of path will it be? What type of cycling experience could this site provide?– are questions to consider.

**Step 2.** Once the mapping and context appraisal is done, it is easier to choose one or more interventions from the Bank of ideas that can be adapted to best serve the place and the intention for the cycling experience. Solutions from the catalogue of ideas can be adapted to the context, and the challenge or potential of the place can be realized – e.g. the place becomes more attractive, gets a better flow, better sense of safety etc.

The diagram below shows how the cycle superhighway of *Roskilderuten* can become a coherent trajectory from A-B (with interventions and different path and cycle experiences along the way).

1. Assessment of the current situation along the Roskilderoute:
2. New contextually-responsive, cycle superhighway interventions placed according to analysis
3. Roskilderuten with a coherent cycle superhighway trajectory from A-B

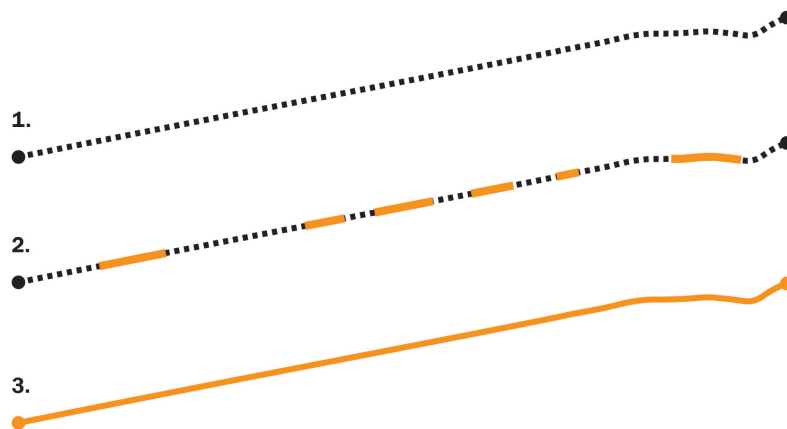


Fig. 33



## 6. *Application*

The Cycle Superhighway can be more than a transport corridor from A-B especially in places where it has the ability to transition from one environment to another, for example in shape of a bridge or a tunnel; transport from one side to another. When it integrates and embeds existing physical structures, as seen in the best practice case from the Netherlands (appendix 10.1. example 2.D) where a school, a canal bridge and a play area are integrated and connected by a bicycle path and ramp – additionally, on a bigger scale, the path also connects two parts of a city. Or when the bicycle path functions as a ‘bikescape’ as exemplified in the case of the Manhattan Waterfront Greenway in New York city (Marling & Jespersen, 2017). The places where a cycling superhighway becomes a tool, are when they respond to and interact with the context.

The cycle superhighway tool can be implemented as different types of functions along a cycle superhighway route. It is important to note that they always will be context specific and must be carefully integrated and adapted to the site or section of route. Although the cycle superhighway can accommodate the three beforementioned typologies, functionally, the cycle superhighway should always work as a transport lane affording practical accessibility and passability for the commuting cyclist.

In the following section, three challenges/potentials have been chosen and a solution, using the cycle superhighway tool, has been exemplified in each case. The route trajectory for *Roskilderuten* is long, and many more solutions and challenges could have been addressed, however for the scope of the thesis only three examples are selected and presented here. The manual is followed, but to synthesize the solutions, the examples do not show details of every step. Each application is in reality a whole project in itself. The three application examples take some of the elements from the bank of ideas into use to show how they could be interpreted context specifically into the into the given context.

***When cycle superhighways can be a tool in urban design***

***- the case of Roskilderuten***

*Roskilderuten* is, as found in the analysis, a bicycle route that mainly passes through ‘backsides’, ‘in-betweens’ and residential areas with their ‘backs’ turned to the road. This easily gives the purpose of transport corridor an advantage, and the route is most of the time straight road cycling on wide cycling lane. In that sense, the variety of typologies along the route is not great and most of the trajectory is appropriately as ‘highway’. However, the route starts at one of the busiest and most congested places in the country (City Hall, by H.C Andersens Boulevard) and also passes through what seems to be quiet backroads, and green open country side around Hedehusene. This obviously offers different ride experiences. The route also passes nodes of intersecting traffic, different sections of landscape and urban typologies, and infrastructures that work as ‘transitions’ that mark a change from one zone to another, and that that give some sense of *friction* on an otherwise straight-forward route.

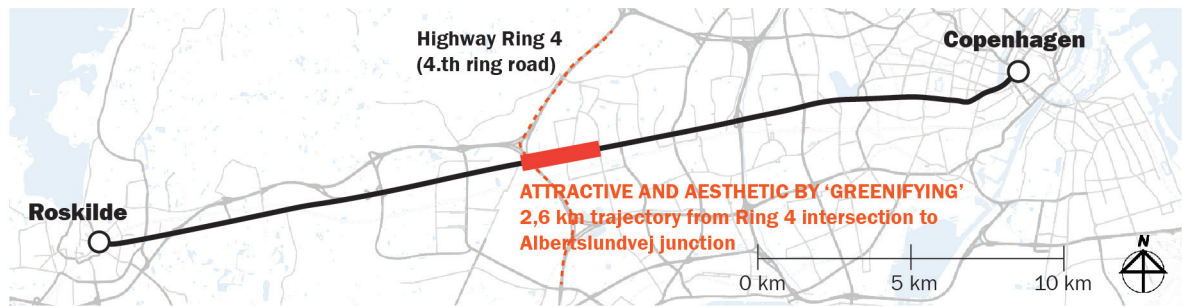


Fig. 34

● **Application 1.**  
*The highway underpass encounter and*  
*The attractive and aesthetic green barrier to heavy traffic*  
Path typology: The Highway

As before mentioned, the route is challenged by its proximity to traffic. Solutions to this are to offer alternative routes and ‘by-ways’, but that will not challenge the problem of proximity to traffic on *Roskilderuten*. However, in many places the cycling lane and sidewalk, along with a wide shoulder to the road does offer the opportunity to design some sort of green, aesthetic barrier between traffic and the cycle path. This type of solution has been exemplified in a 2,6 km trajectory from the underpass of the 4th ring road to the Albertslundvej intersection to the east (Fig. 35).

Following the manual, **step one** in using the tool is to get to know the site/trajectory and to identify challenges and opportunities. This was already done in the analysis section. More trajectories along the route could benefit from a similar application, but this section in particular would benefit from being more attractive. This section is a long ‘in-between’ section that lacks a sense of place.

For this type of site the design principles that weigh high are: Safety and security (proximity to traffic does not feel safe, this needs to be addressed). Attractiveness and aesthetics (being close to heavy traffic is not attractive nor aesthetic, the horizontal gaze is dominated by bare asphalt and concrete) and flow (the trajectory is long and straight, getting from A-B should be fast and with a good flow).

**Step two.** From the catalogue of ideas, ‘greenification’ and making attractive are an obvious pick. For flow and affordance, it is clear that the cycle path surface is in need of maintenance, cracks, bumps and unevenness makes the cycling experience less attractive. Here is how attractiveness and aesthetics along with flow and affordance could be implemented in the chosen sites by the relatively simple concept of a green barrier, and working with the experience of passing under a highway bridge.



Fig. 35



Fig. 36

*Intervention site 1. The place under the 4th ring road has a lot of potential to become an interesting and sensorial place to ride through.*

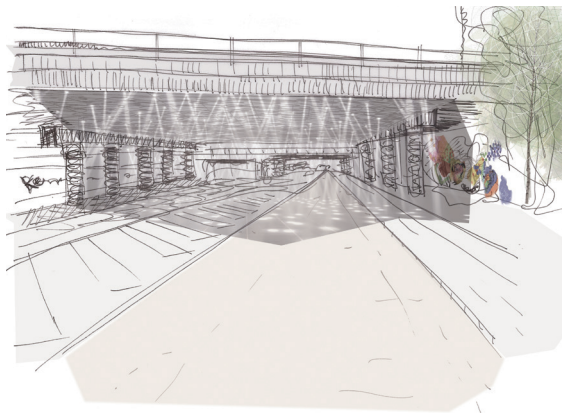


Fig. 37

*A sketch/collage imagines how light installations and murals on the concrete surface of the bridge could enrich the passage under the highway.*

Fig. 38 An illustration of how a plan and road section of the 'green barrier' solution could look like at a scale of 1:200

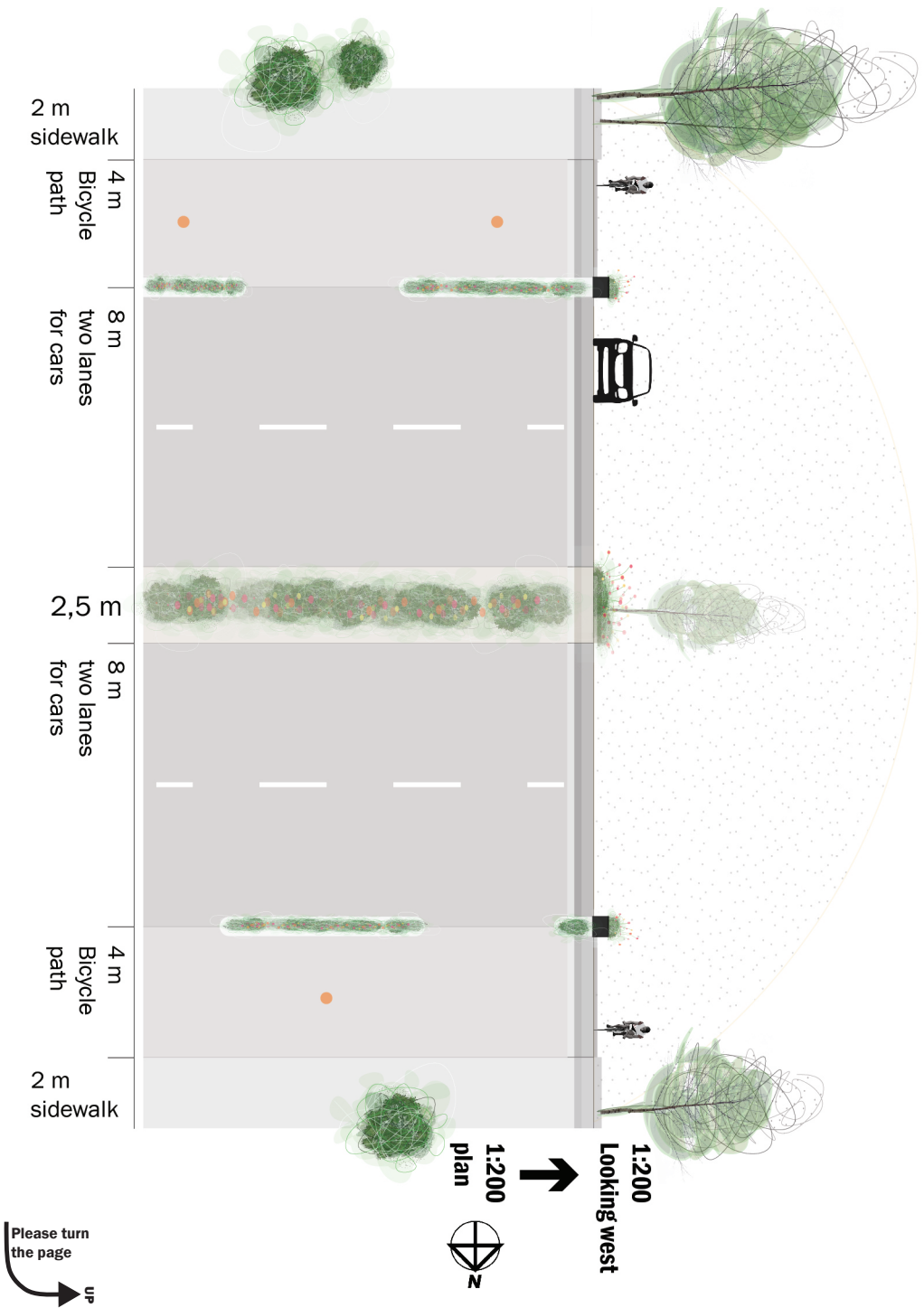




Fig. 39

*The path as it appears today (site 2). The surface is in need of repair. Despite a wide bicycle path, the distinction between bike path and (at times busy) traffic road is only marked by an uneven narrow curb.*



Fig. 40

*An illustration imagines how a green and attractive barrier could create a barrier to the road and make the ride more attractive, without compromising on flow and efficiency of a 'Highway' bicycle ride.*

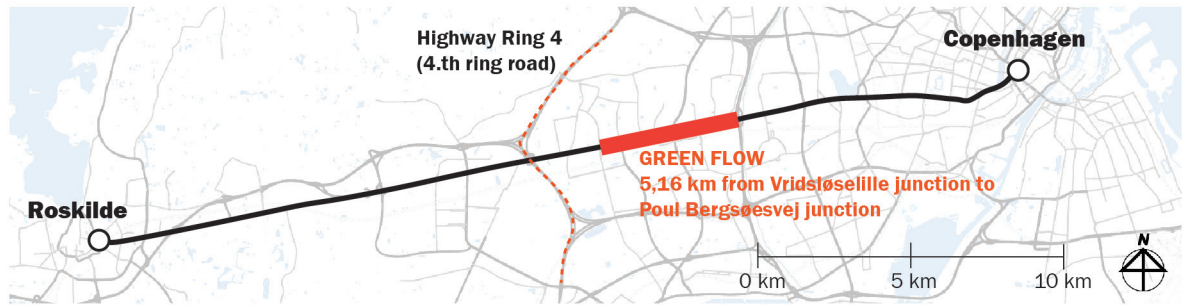


Fig. 41

## ● **Application 2. The 'Green Flow'** Path typology: The Highway

The route is challenged by many traffic lights and intersections. It would be of great advantage to implement an ITS solution on several parts of *Roskilderuten*. A place in particular that is challenged by many traffic lights and stops for the cyclist is a 5 km passage from Albertslund to Glostrup. Tracking the bicycle ride between Roskilde and Copenhagen confirmed that this stretch is problematic in terms of stops and disruption to flow. (See appendix 10.2. p. 125) The cycling experience would be markedly improved as a Highway if the number of stops were reduced and the flow improved.

The stretch passes 11 traffic lights within 5 km. The distance between the intersections can be seen from the map. The 'worst' part being from Herstedøstervej till the entry/exit of the 3rd ring road. The design principles to prioritize in this particular case are flow, signage, connections and safety.

Having examined the solutions presented in the *Cykel ITS løsningskatalog* (Bicycle ITS catalogue of solutions, own translation) (Bjørn-Pedersen & Svantesson, 2015), two solutions in particular could be suitable for implementation on this particular section of *Roskilderuten*. One is a 'Green wave, the other a 'remaining time indicator' (please see appendix 10.2. for a comparison and discussion of implementation of ITS and 'green flow' solutions). Considering the relative high volume of cars compared to cyclists at this part of the route, the effect of a green wave on other traffic should be taken into account. The green wave does have a significant influence on other traffic as it is adjusted to fit with a cycling speed of 18-20km/hr. Here, it has not been the intention to establish the actual impact on traffic when implementing a 'green wave', the solution is chosen as an ideal to the cycling experience in affording a good flow. The two solutions are presented and compared in the table (p. 128) and short chapter in appendix 10.2. p. 125.

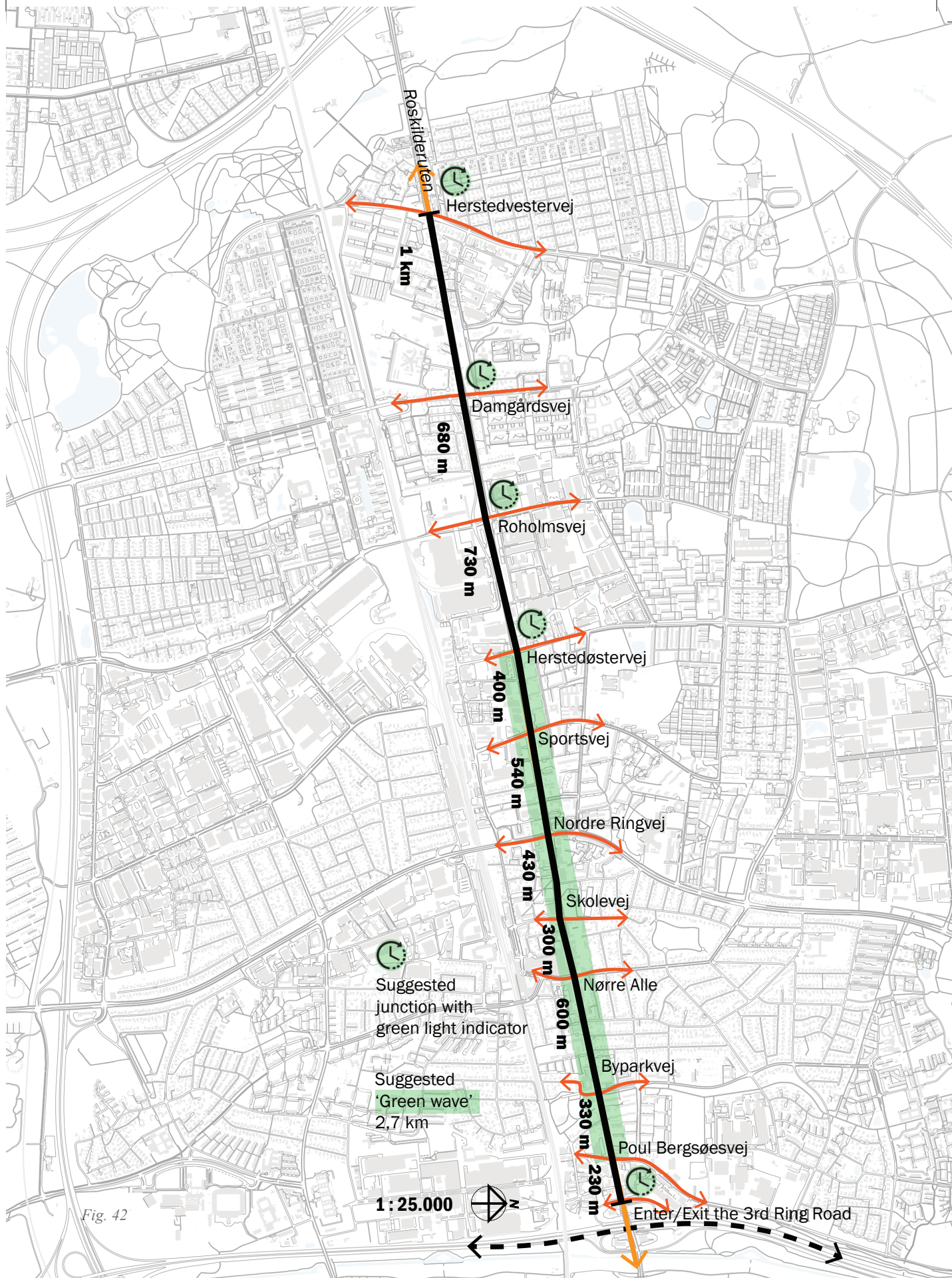


Fig. 42

As a final remark and assessment of a 'green flow' implementation on the route of the two solutions looked at here, the 'green wave' might not be an entirely appropriate solution from the perspective of the car-driver. It would be optimal for the cyclist, and if serious about making cycling attractive and driving less attractive, it is a good option. But perhaps not entirely realistic for the general flow of traffic at the site as it looks today. The volume of cars relative to cyclists at this stretch of road could be an argument against implementation. The volume of commuting cyclists is not nearly as busy as some of the places where the 'green wave' solutions have been implemented in the city center of Copenhagen. In the case of Nørrebrogade, the volume of cyclists is almost double of that of cars. (Bjørn-Pedersen & Svantesson, 2015) It is not known to what degree the 'green wave' is less efficient when junction-distance is -for instance 600 m, rather than the 300 m that is seen to be the most effective distance for a green wave flow. Of course, further distances between junctions will always be better to a cycling flow. A 'lane light' indicator between the lights will help the cyclist keep the correct speed so she will reach the green light, this may add to the efficiency of the flow.

The remaining time display is a good but less ambitious solution that would have little influence on other traffic. And as an artery road to Copenhagen, already experiencing congestion in peak hours, it may be appropriate to implement a solution that does not greatly affect other traffic. The remaining time display would not reduce the numbers of stops, but if implemented with cyclist railings may ease the waiting time for the cyclist. And both initiatives are gestures that show a positive attitude towards the cyclist and an effort to improve her cycling experience.

Together the suggested solutions would ease the cycling flow and make a potential stop and waiting situation less of a nuisance.

From the catalogue of ideas, the 'green flow' in this case with 'green wave' and green-light indicators along with signage/info in the pavement and lane lights are chosen as relevant. Additionally, cyclist railings would be a nice service, especially at lights without green wave, giving the cyclist an easier stop/rest at the intersection.

In the table in appendix 10.2., the pro and con to each solution is presented. The green wave is suggested as an ideal solution if prioritizing the flow of the cycle superhighway.

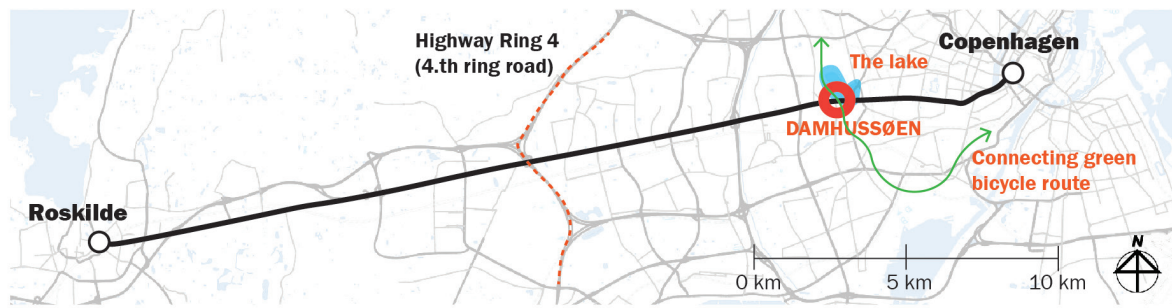


Fig. 43

### ● Application 3. The Meaningful Stop

Path typology: The Highway meeting a Greenway and a hint of an Urban Bikescape

Where the cycle superhighway mostly associates to flow, commuters, accommodating the rider fast and efficient from A-B, it was seen that many users use cycle the routes for recreation and shorter local trips. The cycle superhighway should accommodate many types of cyclists and differently 'loaded' and cycled bicycles (from the racer to the family cargo bike). In this endeavor a service and feature to the routes become the Meaningful stop. The meaningful stop can mean a bicycle pump, as is already seen implemented as a service to the cyclist of the cycle superhighway. It can mean a bicycle parking facility by a bus stop along the route. But it can also mean a meeting point along the way, where colleagues could meet to cycle some of the route to work together. It could be a rest stop for the recreational cyclist or family on a Sunday ride, to enjoy their lunch, to take a break on a longer journey of cycling discovery. And a place to find information on the route and the network of routes that it connects to. Or it could mean a cycle service facility offering a place where the cyclist can bring her bicycle to give it a basic maintenance and cleaning to have the bicycle ready for another week of commuting.

The meaningful stop is a bit different to many of the other initiatives to the cycle superhighway as it in its nature is slightly opposing to the criteria of flow and accessibility, that the highway offers. However, the meaningful stop is a feature that does contribute to a good cycling experience, and in the bigger picture may also be part of what a good flow and good cycling experience means. The design principles that are important are *attractiveness and aesthetics, affordance and signage and wayfinding*.

On *Roskilderuten* a potential place for a *meaningful stop* is by Damhussøen. The place is relevant as it meets the corner of a green and recreational area, and it links to one of the already established 'Green routes' of Copenhagen (Københavns Kommune, 2019). The site has space for a rest pavilion, for a cycle service station and for signage and information to be posted. Potentially the place can serve as a meeting point as well.



Fig. 44



Fig. 45

*Sketching an idea – before and after the cycle superhighway with a ‘meaningful stop’ – for example rest pavilion and cycle service station. The view shows the corner where the cycle superhighway meets a ‘Greenway’ (a green bicycle route) (the path going left).*



Fig. 46 A simple plan of the site located in context, on the corner of Damhussøen where the cycle highway meets a Greenway.

### ***Reflection on application***

Applying the tool to *Roskilderuten* shows that cycle superhighways can add qualities to the mobile- and urban environment that it is part of. And the three applications to *Roskilderuten* are ones that could be useful to other cycle superhighways.

The section where the initiatives are imagined implemented (from the underpass of the 4th ring road to Damhussøen) is a transect that in the potentials mapping were called ‘in between’, ‘industrial and urban sprawl’ and ‘car dealer and furniture supply strip’. The sensescape along the trajectory is dominated by traffic, traffic lights and stops, lack of street life (from pedestrians and cyclists), parking lots and back-sides (until reaching Glostrup ‘drive-through’ and Damhussøen). It is a part of the route, in my opinion, in biggest need of cycle-superhighway-tool initiatives.

The initiatives are applied to a part of the route where it is not yet city centre and it has left the areas with views and open fields, long uninterrupted stretches of cycling. Here there are more distractions, more ‘friction’ in the distracting sense of traffic. The scale of the immediate build context is still large; drive-to warehouses and car dealers. Car-dependent activity along the route.

The initiatives are meant to make the ride through this part smoother and with a better flow by the Green Flow solutions, and more attractive by adding a green barrier towards traffic, until it reaches (if cycling from west to east) Damhussøen for a ‘meaningful stop’ before approaching the denser urban areas of Frederiksberg.

The application examples are not meant to be detailed design solutions, but illustrations of how the cycle superhighway has been used as an urban design tool, to both make an intervention (and improvement) to the urban space and to the mobile experience.

## 7. Conclusion

The initial question to this thesis was into the distinction between the cycling superhighways as a transport corridor or an urban design tool. An answer in conclusion to this query is that the cycle superhighway is both. It is a transport corridor, a route connecting major nodes, both urban centres and transport hubs, this is key to the identity and purpose of the route. Looking at a planning context, the route is a transport corridor connecting major, larger nodes (Rambøll, 2018). But the cycle superhighway is also the sensescapes that are presented to the cyclist, the atmospheres and impressions that she meets on her way.

Looking through a theoretical framing, using the concepts physical environment – from the staging mobilities model (Jensen, 2013), the notion of a new public domain in relation to ‘bikescapes’ (Hajer & Reijndorp, 2001; Marling & Jespersen, 2017) and the influence of atmospheres – aesthetics and sensescapes as important concepts in this (Böhme, 1993; Stefansdottir, 2014a; van Duppen & Spierings, 2013). The frame informed what aspects in particular to look at in the analysis, and the analysis was summed up with a mapping of potential opportunities to take an urban design tool into use with the cycling superhighway along *Roskilderuten*. A manual, a bank of ideas and a set of principles were the outcome. The design principles and the typologies that the (future) network cycle superhighways breaches can be summed up:

- Good flow
- Accessible and accommodating routes
- Safe and secure
- Connects
- Attractive and aesthetic
- Signposted and easy wayfinding
- Cyclist Affordance

The design principles are prioritized according to context and path typology; whether it has the characteristics of a ‘Highway’, a ‘Greenway’ or an ‘Urban Bikescape’, which were the three typologies that were included in the network of cycle superhighways.

Cycling from home to work or education is a ride that is likely to take the cyclist through a variety of different environments, sensescapes and staged atmospheres. The way a roadside sensescape is ‘composed’ can to a high degree be determined by planning. The type of function that an area accommodates will also bring a certain kind of atmosphere.

*Roskilderuten* is dominated by ‘back-sides’ and ‘in-betweens’, by proximity to traffic and busy roads. ‘Back-sides’ and ‘in-between’ are perhaps inadequate labels to describe an atmosphere. Yet, along with images, drawings and describing the ‘scene’ with words, the impressions of what is called a ‘back-side’ and ‘an in-between’ does evoke an atmosphere and a sense of a place.

From own cycling and commuting experience along the route, I gather that familiarity and routine with a route also brings a kind of pleasure to a ride. Knowing a route well, as a commuter does, she will cycle and navigate the route with ease and routine. This gives space and time to think or let the mind wander, an important (everyday) quality that can contribute to a sense of well-being.

*Roskilderuten* has an inherent challenge in the way it follows a secondary but major artery road. It is a main traffic corridor, an artery road (*indfaldsvej*) following one of the ‘fingers’ (in the Copenhagen ‘fingerplan’, Erhvervsministeriet, 2019) creating an urban belt and corridor from suburb to city, from Copenhagen to Roskilde. This means the route is close to relatively heavy and busily trafficked roads for a majority of the time. As concluded by Stefánsdóttir: “*proximity to traffic seemed to be the most negative factor affecting cyclists’ emotional well-being.*” (Stefánsdóttir, 2014 p 18). Solutions to aestheticize the route and contribute to better ‘emotional well-being’ for the commuter can include interventions of ‘Greenification’, to offer a possibility of alternative routes and ‘by-paths’, and to work with some of the transitioning and landmark structures to make them places that are more than transition sites and passing places. Interventions to the tunnels and bridges may cast a new light on these structures, and the aesthetic properties of infrastructures and mobility spaces may appear.

Thinking of urban design as a discipline that can transform the urban ‘stage set’, and as a craft that has the potential to arrange the composition of a view from the saddle, it becomes an important part of the task to create aesthetic sensescapes along the way through urban and sub-urban areas. The cycle superhighway can be a tool among many in an urban designer’s backpack, when working with the urban surfaces of the public realm.

Seeing the cycle superhighway as a tool to create ‘sensescapes’, urban places and ‘public domains’ means to be aware of the context that the path is part of and to tease out the potential of the different sites. That the safety, efficiency, comfort and accessibility that define efficient ‘transport corridors’ is connected to the cycling experience, the atmospheres and sensescapes, is key. And especially

a key in understanding the cycle superhighways as a tool in urban design and as part of the field of mobilities design (Jensen, 2014; Jensen & Lanng, 2017).

A suggestion of a manual to do so (to find the places of intervention and seeing transport spaces as much more than places of flow) and how to use the ‘superbike tool’ has been presented in this thesis. It was suggested and presented in through a manual of how to identify relevant sites, what principles were important to the path in a particular context, and a catalogue of ideas that are inspired by already existing components and by new, what can be added to make the cycle superhighway a good mobility space.

In the application examples, the cycle superhighway is more than a transport corridor. By Damhussøen, the ‘meaningful stop’ exemplifies how relevant stops and facilities affording a useful break are part of enhancing a longer bicycle trip. From the point where the route crosses the 4th ring road and five km east, it was shown that the route could be made more attractive and aesthetic by adding a green barrier between the cycling path and the heavy traffic. Here the cycle superhighway becomes a tool for creating a more attractive cycling (and driving) experience along an otherwise monotone traffic corridor. And the third example gives a suggestion of a technical solution that will ease the flow of the cyclist making it a smoother and better ride, while still considering the reality of other traffic along the route. This example makes it clear that the cycle superhighway is also part of a programmed and (sometimes) ‘invisible’ network of technology, signaling and planning that happen ‘from above’. This aspect to the cycle superhighway and how it is part of this ‘traffic programming’ and planning can also be used as part of the tool - to adjust it into smooth and well flowing mobility spaces for the cyclist.



## 8. Reflections and Perspectives

The network of cycling superhighways undoubtedly has an effect on travel behavior and it offers an alternative to car dependent travel by providing a good cycling environment. The promotion of the lanes and money invested in the projects show willingness to support cycling.

As the cycling network grows, so does the types of paths, the routes they go through and the variety that is available. Evaluations of existing paths give lessons to what to do in the future, what works and what does not. The network of cycling superhighways will potentially expand, gain numbers of cyclists and offer a variety in cycling experiences and afford different practices.

Interestingly, a cycle superhighway parallel to *Roskilderuten* will offer a greener, slightly longer route as an alternative or variation to *Roskilderuten*, showing that within the network of cycling superhighways, there is space for different ‘typologies’. Studying and comparing the two routes could potentially give insights to the different uses of the cycling superhighway, and hypothetically it would show that the two routes would have different uses. It also raises the question whether it is worth investing in more (alternative) paths although a similar route that already exists, ‘just’ for the sake of the sensescapes, atmospheres and variety in cycling experiences? (a study showed that the expensive but safer and greener *Vestbaneruten* parallel to *Roskilderuten* would be a better investment. (Rasmussen & Kallesen, 2015)) But what are the criteria and measurements of ‘attractiveness’ and how to quantify this value does to some degree depend on perspective, and is another interesting discussion.

An upgrade and investment in the cycling infrastructure is also a step in a green direction, it is willingness to invest in a means of transport that is shown to be good for the individual and it can be economically well paid off. (A. Nielsen et al., 2018)

Looking at a broader perspective, cycling infrastructure, that is well designed, planned and prioritized as seen in many cases in Denmark and the Netherlands for example, is rare in many other parts of the world. The perspectives of cycling and how to change attitudes towards cyclists and cycling, to build a cycling commuter ‘culture’ as seen in cycling research literature, shows that cycling is much more than a person on a bicycle and a strip of asphalt. Cycling is culture, is politics, is identity making and displaying. Cycling is an individual’s pleasure of ‘wind through ones hair’ (Krizek, 2019), it is strategic lines drawn on a map and political visions.

In the realm of urban design, cycling superhighways become an urban and sub-urban typology, becomes part of the urban fabric. The Cycle superhighways can have the ability to transform and shape urban spaces and how they are sensed and moved through, how that mobile situation is 'staged'. Cycling infrastructure is righteously part of urban design. Whether we cycle or not can be encouraged or nudged at, but as found in the Johannesburg study (Morgan, 2018), establishing a commuting cyclist culture requires a multifold approach and more than good design intentions. Urban design and planning can get us a long way, as shown by studying the influence of the urban environments, urban design and cycling infrastructure on whether it persuades us to cycle – it does have an influence. But it is not everything. Sometimes we need movements from people out-side of professions and offices, and from the bottom up, as Jane Jacobs showed in New York city in the 1960's when campaigning for streets for the people. Similar acts of claiming their rights to the streets are seen from bicycle activists in various parts of the world, 'the land of the car' - the USA, being one of the places.

If cycling infrastructure is well designed, developed, maintained, and well-integrated into the urban fabric, then the mobility structures that accommodate cycling afford cycling practices and cultures to become a part of people's daily lives and routines. Then they are also, I would argue, vital parts of shaping a good city; the 'stage set' of everyday life and the good experiences moving through it.

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### ● *List of illustrations and figures:*

**All figures, with the exception of those listed below are Own Material/Production (diagrams, photos and illustrations).**

- Fig. 7. Based on map from Supercykelstier.dk (Sekretariatet for Supercykelstier, 2019)
- Fig. 12. Based on map from Kortforsyningen.dk, Styrelsen for DataForsyning og Effektivisering, 2019
- Fig. 19. Same as above.
- Fig. 22. Own work, based on image extracted from Google street view, 2019
- Fig. 24-25. Based on map from Kortforsyningen.dk, Styrelsen for DataForsyning og Effektivisering, 2019
- Fig. 35. Same as above
- Fig. 42. Same as above
- Fig. 44-45. Own work, based on image extracted from Google street view, 2019

Fig. 47a SkyCycle Photograph: /Foster and Partners <https://www.fosterandpartners.com/projects/skycycle/>

From Dissing + Weitling architects, <http://www.dw.dk/xiamen-bicycle-skyway>

Fig. 47b Pressphotos for download: <https://supercykelstier.dk/pressphotos/> (Sekretariatet for Supercykelstier, 2019)

Fig. 47c Superkilen. Image from Superflex/BIG. Photo by Iwan Bann, <https://www.dezeen.com/2012/10/24/superkilen-park-by-big-topotek1-and-superflex/>

Fig. 47d Banvalleden, Sverige. Gunnar Engström, <http://cykelsydtillnord.blogspot.com/2014/05/tre-landskap-idag.html>

Fig. 48. Image from NEY & Partners, By Stijn Bollaert 2013. NEXT architects, & Iseger, M. (2016). Bicycle bridge Utrecht. Retrieved March 15, 2019, from <https://www.designboom.com/architecture/>

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Fig. 49. Own collage based on <http://www.dw.dk/cykelslangen-bicycle-snake> D+W Architects

Fig. 50. Image: Måløv Aksen, ADEPT, <http://www.byens-netvaerk.dk/da-dk/arrangementer/arrangement-er/2012/m%C3%A5l%C3%B8v-aksen.aspx>

Fig. 51. NEXT architects & Iseger, 2016 from [http://www.nextarchitects.com/en/projects/dafne\\_schippers\\_bicycle\\_bridge](http://www.nextarchitects.com/en/projects/dafne_schippers_bicycle_bridge) next-architects-dafne-schippers-bicycle-bridge-utrecht-netherlands-10-02-2018/ NEXT-architects-dafne-schippers-bicycle-bridge-utrecht-netherlands-designboom-01. (n.d.).

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Trafiktællinger fra Glostrup Kommune

## 10. Appendix

### 10.1. Best Practice References and Descriptions

#### Path

#### Typology

For the path typology category (1), four types of cycling paths have been included. They are chosen for the different kinds of cycling experience they give and the different type of cycling and cycle user they may appeal to. The examples are found from around the world; China, the USA, the Netherlands, Germany, the UK, New Zealand, and Denmark. One example is utopian and may never be implemented, it is however technically possible and an interesting case to consider. The table below describes the typologies.

#### 1.A

The elevated/completely separated bicycle ‘skyway’ and express-way: Xiamen, China (longest in the world), New Zealand, London vision/utopias (only exists as designers’ visions and drawings)

- Description The elevated and completely separated path and ‘skyway’ is often seen in utopian examples, fx a London example, where the cyclists have their own skyway corridor. In places this typology is implemented, fx Xiamen, China, it is to keep transport modes separated and as the car traffic is so dense and highway-like, that a separate ‘skyway’ is a solution that keeps the transport corridors separated. This draws back to modernist planning visions of separation of functions and transport modes.



Fig. 47 a

## 1.B

The bicycle highway and (the commuter priority path)  
Denmark, Germany, London

- Description Supercykelstier in Denmark, cycling superhighway in London, in Germany and the Netherlands. Cycle Superhighways have been implemented in many countries and contexts. Often cycle highways are a cycle path typology that is separated entirely from the road traffic, ensuring that the cyclist's perceived sense of safety is high. They are routes intended for bicycle commuters of longer distances, and to give fast, safe and direct routes with high degree of cyclist comfort.



Fig. 47b

## 1.C

The urban 'bikescape' and 'public domain'  
New York City at Manhattan waterfront greenway, Copenhagen at Superkilen, the POT - Trail of Remembrance and Comradeship (Pompe, 2019)

- Description The bikescape has been described in the case of New York city, but many of the characteristic defining the 'bikescape' can be found in other contexts. I the selected examples here, Ljubljana and Copenhagen have been included. In Copenhagen the 'superkilen' is an example of an urban space that is both a public space and a mobility nerve, connecting cultures, people and neighbourhoods. in Ljubljana, a city trail also functions similarly to the bikescape in New York.



Fig. 47c

## 1.D

The greenway - The converted trail – nature and recreation  
USA, Slovenia, Sweden

- **Description** The recreational nature trail is to be found in many countries. Often they are made on former railroad sections or countryside roads that are no longer used for car traffic. Or they can be paths on less trafficked minor roads going through countryside and forest. They are often long, cross-regional and sometimes country crossing routes, such as the EuroVelo network.



Fig. 47d

### ‘Artefact’ *The cycleway as a tool in urban design 4 examples*

**Typology** The first second type of infrastructure (‘artefact’ typology) is: *highway and landscape, shortcut and cycle priority*. A compact *center and infrastructural node* by a railway station and a *multifunctional path* that integrates with a public function (school) and connects different parts of a city across a river. And finally, the bicycle bridge which can be categorized as a ‘*shortcut and cyclist priority*’. This typology has some similarities to the bicycle ‘skyway’ described above, however, as an ‘artefact’ typology this type is closer related to the sculptural or landmark-characteristic landscape bridge. The examples are from Danish and Dutch contexts as they are relatively comparable. They are also examples of cycling infrastructure integrated into the urban fabric in clever ways that make them, what I would consider, urban design tools.

## 2.A Highway and landscape, shortcut and cycle priority

A transition structure like a bridge can be a structure that sits beautifully in the context and landscape that it is placed within. (fx the cycle bridge by Belgian NEY+Partners in 2013 “t Groentje” in the Netherlands crossing an autobahn and connecting a bicycle route to a station)



Fig. 48

Image from NEY & Partners, Stijn Bollaert 2013

## 2.B *Shortcut and cyclist priority*

Cykelslangen - A cyclist-only 'shortcut' to another cycling bridge crossing a canal in Copenhagen.

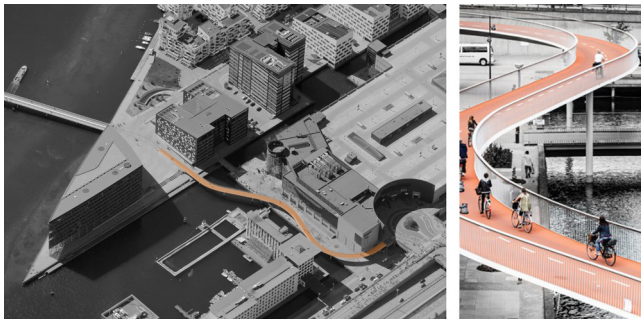


Fig. 49

## 2.C *Center and infrastructural node*

Another example is the prizewinning design for the 'Målev axis' a strategic section of the railstation village Målev, including a rail Station underpass. With a playful and dynamic expression, an otherwise 'dull' rail underpass has been shaped into a landscape that can be climbed, played and sat on. From a gray concrete space with an unremarkable tunnel, a clever coating of light and colour has made the underpass appear to be an experience to cross. (Målev st. Denmark by Adept architects 2008-2011, received the Danish landscape award in 2010)

2.C



Fig. 50 Image: Måløv Aksen, ADEPT

## 2.D *Multifunctional*

The Dutch are known for their playful designs and cycling culture. Another great example where cycling infrastructure has been used as tool to shape urban space is around a cycle bridge and ramp crossing a river, connecting two parts of a city and integrating a school with the bicycle path and shaping a green landscape in the ramp leading to the bridge. The integration and landscaping is cleverly done and a great example of a transition marker and a multifunctional mobility space. (NEXT architects & Iseger, 2016)



Fig. 51 Image: NEXT architects & Iseger, 2016

## 10.2. The Green Flow

*-a short reflection on use and implementation of ITS solutions related to the cycle superhighways of Copenhagen and implementation on Roskilderuten.*

The term ‘green flow’ is in this thesis used to refer to a number of Intelligent Transport Systems (ITS) solutions that can be implemented for cycling infrastructure. The purpose of these solutions is to optimize a good cycling flow for the cyclist by ensuring as few stops for red light at traffic intersections as possible, or to make the stop and wait for a green light a safe and a better experience (the cyclist railing is an example).

There are several ITS solutions that work in different ways to optimize flow. For the cycle superhighways of the capitol region, a report from 2015 (Bjørn-Pedersen & Svantesson, 2015) suggests a catalogue of solutions for the network. The solutions are ordered in three overall types of optimizations that may be implemented in connection with the establishment of the cycle superhighway. They are (1) solutions that change the signal control at light regulations, (2) solutions that detect the cyclist and (3) other means (could be a combination or simpler optimizations measures such a green light indicator/counter that counts seconds to the next green light).

What solution to choose will be context specific and has to be a consideration of several factors including the volume of cyclists vs. other traffic, distance between the junctions, costs of implementation and maintenance, the level of change to cyclist and traffic behavior, the ‘nuisance’ the initiative may cause other traffic and the predicted effect of the different solutions in a given context.

### ***Applying an ITS solution to Roskilderuten***

It would be of great advantage to implement an ITS solution on parts of *Roskilderuten*. A place in particular that is challenged by many traffic lights and stops for the cyclist is a 5 km trajectory from around Albertslund.

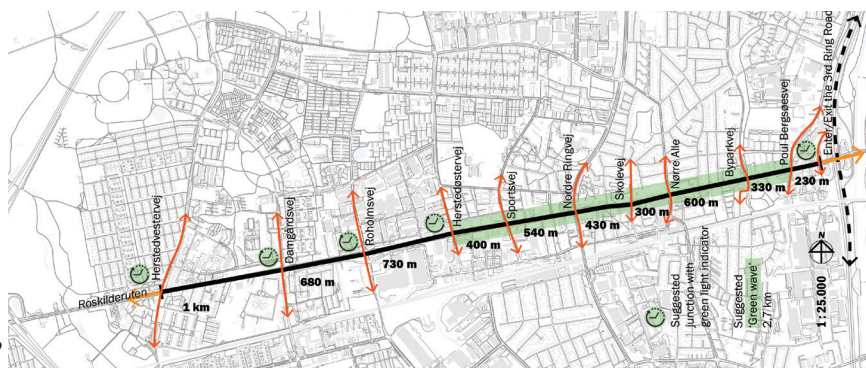
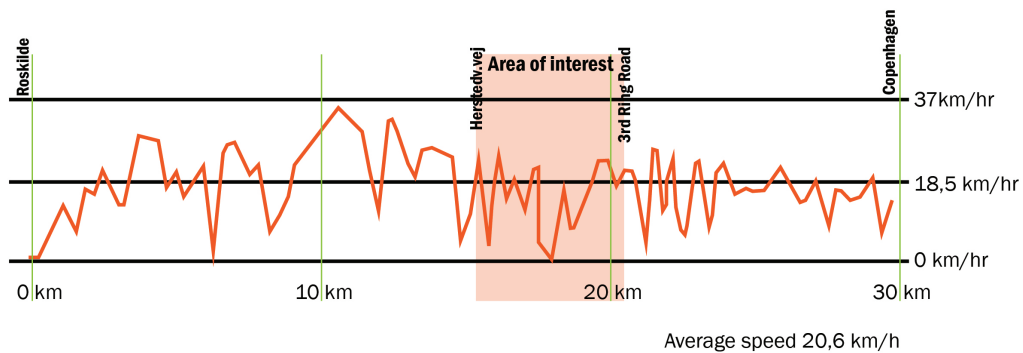


Fig. 52

*Map to scale on page 101*

Tracking the bicycle ride between Roskilde and Copenhagen confirmed that this stretch in particular is problematic in terms of stops and disruption to flow, relative to the rest of the ride. (The tracking is based on data from two rides one from west to east, one from east to west and the trackings are not done at the same time of the day or of the week. In that sense the tracking data is not necessarily showing the real picture of the situation, the two trackings may not give a representative picture of how the pattern of stops is on this trajectory in reality. However, for the purpose of finding potential solutions for the route this will be the basis.)



Graphic representation of tracked speed and distance. The area of intervention is indicated by the red box.

Fig. 53

The zoom shows the section from Herstedøstervej to the 3rd ring road. As indicated by the cycling speed, this is a section where the speed fluctuates and almost comes to a complete stop several times. (there are other sections that also would benefit from a green flow solution, however only one section is looked at here).

The cycling experience would be markedly improved if the number of stops were reduced and the flow improved markedly. The stretch passes 11 traffic lights (and potential stops), and as seen from the tracking data, cycling speed comes to a complete stop several times.

Having studied the solutions presented in the Cykel ITS løsningskatalog (Bjørn-Pedersen & Svantesson, 2015), two solutions in particular could be interesting for implementation on this section of *Roskilderuten*. The solutions are a 'Green wave' and count-down and remaining-time indicators for the cyclist (the solutions are presented and compared in the table below).

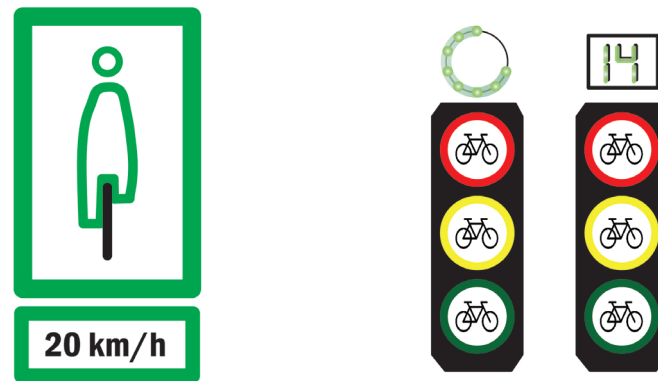




Fig. 54

The ‘green wave’ ensures a good flow of green lights for the cyclist by having traffic light signals programmed to give green lights to a cyclist of a given speed (e.g. 18 km/hr). Usually the green wave is at effect within a given timeframe in one direction such as morning rush hour from 6.30-10. The solution does of course have an effect on other traffic. It will influence traffic that joins the route from adjacent roads, as they stop for red while the cyclist has green light).

In a test of the use of a ‘Green Wave’ in Copenhagen (Hoegh, 2007) on a part of Nørrebrogade of ca 2.2 km through 13 traffic lights, it was found that the green wave for a cyclist of 20 km/hr improved travel time from almost 9 minutes to 6:25 minutes, saving more than 2,5 minutes and increasing the average cycling speed with up to 5 km/hr. (Hoegh, 2007)

As with most interventions to traffic, both a green wave solution with specific signage and marking in the surface of the cycle path and count-down signals (‘remaining time display’) require a dispensation from the Danish Road Directory (Vejdirektoratet) (Transportministeriet, 2013).

Establishing ‘lane lights’ (lights in the surface of the bicycle path that indicate a speed to follow to synchronize with a green wave or to catch a green light) is a good service to the cyclist. In the Netherlands, in some junctions it has been experimented with ‘rain detectors’ that regulate the traffic lights to give better green flow for cyclists in bad weather.

	<b>Solution A – Green wave with lane-lights</b> 	<b>Solution B – count-down and time indicators (‘remaining time display’) for cyclists with cyclist railing.</b>
<b>How it works</b>	<p>The green wave is a solution to implement where traffic lights that are within close proximity (less than 300 m apart gives a more efficient green flow) are programmed to show green light to cyclist of a given speed, often 18 km/hr. The ‘green wave’ can be implemented within a time range where most cyclists may use the path. (A solution with dynamic off-set time, where the cyclist is detected for the green wave to be activated, also exists). The ‘green wave’ also requires that traffic lights are coordinated (‘samordnede’), so they can be reprogrammed to a specific flow.</p> <p>The lane-lights are often implemented in the surface of the cycle lane as led lights, being led up to indicate a speed to follow. If following the light, the cyclist will reach green lights in the junction.</p>	<p>There are two versions considered here. One has a counter that shows seconds till next green light. Another solution is a graphic and relative representation of time left till green. For example, a bar or circle of light that gets shorter and shorter until it reaches green light.</p>  <p>According to traffic planner in Roskilde Kommune, Pia Bentsen, the numerical display is used less frequently as most traffic signals are traffic detected and dynamic, meaning that the counter may not count down properly. In that sense the graphic indication of remaining time is preferred. (Interview 1, Pia Bentsen at min 30:48 sec, appendix XX)</p> <p>The remaining time display does not work in cases where the traffic lights are controlled by traffic, that means when the signals are adjusted according to detected traffic, and that the traffic lights are then dynamic and the time interval changes according to detected traffic. Although in reality this is the case for many light regulations and junctions, it is a fact that has been overlooked for the sake of</p>

		including the solution to work at this trajectory.
<b>Improvement to flow?</b>	The initiative is estimated to have a good effect on flow, a study of an implemented route in Frederiksberg showed significant improvements to flow and time saved by the cyclist. (Hoegh, 2007)	Does have an improvement to flow by letting the cyclist adjust her speed to the prediction of next green light. It also makes a stop less inconvenient by giving the cyclist a sense of when the light changes to green.
<b>Effect on other traffic?</b>	The initiative has a relatively high effect on other traffic as the light regulations are suited to the speed of the cyclist.	Does not have an effect on other traffic.
<b>Requires a change in cycling behavior?</b>	The initiative is user-friendly to the cyclist. It does however require a specific cycling speed. Adding lane-lights to accompany the 'green wave' can help indicate the correct speed.	User-friendly, only requires that the cyclist understands what the count-down is for. The numerical countdown is easier/more precise to read than the graphic one.
<b>Improving safety?</b>	It is predicted that the green wave and the lane light will result in fewer cyclists crossing at a red light, in that way it is safer.	The two initiatives differ in the contribution to cyclist safety. The numerical counter is shown to have a positive effect on safety, fewer crosses a red light. Whereas the graphic indication is shown to have a risk of cyclists starting a crossing too early. This has been seen when the graphic indication is implemented at lights where the signaling is dynamic, and changes depending on traffic.
<b>Implementation and maintenance costs?</b>	If the traffic signals are already coordinated ('samordnede trafikantlæg'), the initiative usually needs to reprogram the flow of lights, (ca 15.000 kr/junction-signals). In the case of Roskilderuten, there are no specific bicycle lights, they should be implemented. Signage will be an additional cost.	An estimate is around 160.000 kr/junction. In the case of Roskilderuten, there are no specific bicycle lights, they need to be implemented.

	Lane-lights that were implemented in Aalborg municipality had a cost of 20.000 kr for implementation of 10 led lights along one trajectory.	
<b>Pro application at this section</b>	Would improve flow and the cycling experience for the cyclist.	Would improve flow, be convenient to the cyclist and not have a negative effect on flow of other traffic.
<b>Con. Application of the solution at this section</b>	<p>The traffic lights are in some cases more than 600 m apart. How much less efficient it would be compared to distances of less than 300 m is not found here. But the cyclist, greater distance between the junctions is always better for cycling flow.</p> <p>Relative to sections in central Copenhagen, the volume of cyclists is not as great, and the initiative would be a nuisance to other traffic considering the relatively low volume of cyclists it would accommodate, with possible consequences that have not been looked into here.</p>	Does not give a great improvement in time, as the cyclist still has to stop for light red as frequently.
<b>Final recommendation (the final assessment was already presented in the green flow solution on page XX)</b>	As a final remark and assessment of a 'green flow' implementation on the route the 'green wave' might not be an entirely appropriate solution from the perspective of the car-driver. It would be optimal for the cyclist, and if serious about making cycling attractive and driving less attractive, it is a good option. But perhaps not realistic for the general flow of traffic at the site as it looks today. The volume of cars relative to cyclists at this stretch of road could be an argument against implementation. The volume of	The remaining time display is a good but less ambitious solution that would have little influence on other traffic. And as an artery road to Copenhagen, already experiencing congestion in peak hours, it may be appropriate to implement a solution that does not greatly affect other traffic. The remaining time display would not reduce the numbers of stops, but if implemented with cyclist railings may ease the waiting time for the cyclist and they are gestures that show a positive

	<p>commuting cyclists is not nearly as busy as some of the places where the ‘green wave’ solutions have been implemented in the city center of Copenhagen. In the case of Nørrebrogade, the volume of cyclists is almost double of that of cars. (Bjørn-Pedersen &amp; Svantesson, 2015) It is not known to what degree the ‘green wave’ is less efficient when junction-distance is for instance 600 m, rather than the 300 m that is seen to be the most effective distance for a green wave flow. Of course, further distances between junctions will always be better to a cycling flow. A solution then can be a ‘lane light’ indicator between the lights will help the cyclist keep the correct speed so she will reach the green light.</p>	<p>attitude towards the cyclist and an effort to make her cycling experience better.</p>
<p><b>Assesments of the two types of Green-flow solutions are based on the <i>Cykel ITS løsningskatalog</i> (Bicycle ITS catalogue of solutions, own translation) by Bjørn-Pedersen &amp; Svantesson, 2015.</b></p>		

## ● 10.3. Interviews and Correspondance

### Interview 1

**Interview/conversation with mobilities and traffic planner, Pia Bentsen, Roskilde Municipality. February 5, 2019, Roskilde Townhall, Rådhusbuen 1, 4000 Roskilde.**

The interview was semi-structured. The interviewer (JPK) had prepared the following questions that were arranged in four themes. The intention of the interview was fourfold: Firstly (1), to get a sense of how far the project is, where will any interventions be made, what is the budget etc. Secondly (2), to get an understanding of how working across municipal lines work in this case. And to uncover visions and intentions of the municipality. Why even invest in a 'supercykelsti'? Thirdly (3), does a 'supercykelsti' actually help in lessening problems of congestion, or is it also a matter of 'branding' (Roskilde municipality is categorized as one of Denmark's most bike friendly cities). And who is the intended user of the supercykelsti? Finally (4), it was the intention to uncover what type of work it is to design mobilities spaces for cyclists? Is this done only by traffic planners? Landscape architects? Road engineers? The aesthetics, the affordance and the sensorial elements to mobilities spaces, are they considered, and if not, should they, or if they are, How?

The conversation/interview was recorded, (see link and code to the audio material). Following the interview, a few of the questions that were not explored in depth, or that came up as interesting were looked at.

The prepared questions that were loosely followed during the conversation.

#### 1 Roskilderuten

Hvor langt er I med projektet?  
Hvad er tidsperspektivet?  
Hvad er det som konkret skal gøres? Og hvor?  
Hvad koster det? Havd er budgettet og hvem betaler?  
Hvor er der problematiske steder på ruten som skal designes?

#### 2 Samarbejde og visioner/ambitioner/intentioner

Jeg er interesseret i at høre hvordan I arbejder med cykelstien?  
Tværkommunalt samarbejde? Hvem udfører løsningerne, fælles for hele strækningen eller hver kommune sin del?  
Hvad er Roskilde kommunes ambitioner med en supercykelsti til kbh?  
Hvorfor overhovedet opgradere til supercykelsti?

#### 3 Cykelpeldleren

Hvem er pendlere, som vil benytte sig af stien?  
Hvor langt cykler en pendler? (hvor langt hvis der er en supercykelsti?)  
Hvor mange mennesker vil benytte sig af ruten?

Afhjælper supercykelstien trængselsproblematikker (er det en grund projeket? Ringvejene i Roskilde.)

Hvor mange regner I med vil droppe bil til fordel for cykel pga supercykelstien?

Hvordan indtænkes det, at cyklister kan benytte cykel og offentligt transport. Er parkeringsfaciliteter del af supercykelstien?

El-cykler, spiller de en rolle? (Kommunen's el-cykel låne-ordning som pilot til at få flere til at skifte fra bil til cykel som transportmiddel til arbejde)

#### **4 Mobilitetsdesign, urban design og trafikplanlægning?**

Hvordan behandles og planlægges cykelstier, kan man se dem som mere end ruter og veje, de ekstra elementer, som kan tillægges urbane rum? Er det designerer, ingeniører, arkitekter som designer dem? Det evt. tværgående samarbejde, og en urban designers rolle? I hvor høj grad bliver æstetik, sansningen og oplevelsen af disse mobilitetsrum taget hensyn til og inddraget i planlægningen?

#### **A follow-up correspondence via email added following points:**

“[En ekstern konsulent] udarbejder en helhedsplan (masterplan) for strækningen, som indeholder principper for hvordan supercykelstien skal anlægges. Det er altså ikke supercykelstien der er fokus i helhedsplanen – det er faktisk hvordan vi omdanner hele gadeforløbet – fra identitetsløs indfaldsvej til attraktiv bydelsgade. Men rent praktisk er det, det faktum, at vi har modtaget medfinansiering til supercykelstien (fra Vejdirektoratet) der har skabt interessen for strækningen ren politisk – og som derfor har bevilliget ekstra midler til forskønnelse af strækningen. Og det er det der er vigtigt at pointere for et kommunalt perspektiv – at det er vigtigt at smede jernet er varmt. Der er mange kommunalt-politiske beslutninger og prioriteringer der bliver taget ud fra en 'synergi-effekt' betragtning ('nu hvor vi alligevel er i gang').” (Pia Bentsen, May 2019)

#### **Link to the reference audio recording from**

##### **Interview 1 Pia Bentsen:**

(Please type the link into your browser or scan the QR-code to access the file)

<https://drive.google.com/open?id=1mVacR10I1PgCrXt-F0OQfN-6RGxWULsk>



## Interview 2

**Anna Garrett, working at the Office for Cycle Superhighways in the Capital Region of Denmark. Conversation via phone on April 11. 2019.**

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**Below, questions sent beforehand to prepare for the conversation.**

Hej Anna,

Jeg er urban design studerende ved Aalborg Universitet, igang med mit speciale. Jeg arbejder med supercykelstierne i Hovedstadsområdet, med den kommende Roskilderute som case. Jeg har nok særligt valgt den rute, fordi jeg kender den rigtig godt, og selv cyklede strækningen mellem Roskilde og Frederiksberg flere gange om ugen gennem min gymnasietid.

Din email adresse fik jeg gennem en samtale med Pia Widerholdt Bentsen fra Roskilde Kommune, som henviste til, at du måske kunne have mulighed for at hjælpe mht. spørgsmål om supercykelstierne. Jeg har herunder fem spørgsmål, som jeg håber, jeg har formuleret forståeligt Og jeg håber, at du ville have tid og lyst til at svare, evt. over en telefonsamtale?

**1.** Har I *cykeltællinger fra cykeltrafikken på Roskilderuten*, og i så fald, måtte jeg få dem?

**2.** Jeg er interesseret i oplevelsen af cyklistens 'mobilitetsrum' og hvad der skal til, for at de bliver gode. I min opgave stiller jeg spørgsmålet om Supercykelstierne hovedsagligt er 'transport korridorer' og 'motorveje' for cyklister, eller om de også kan mere og andet end det, i forhold til urban design; være byrumsskabende i nogle tilfælde, give en god hverdagsoplevelse for os som bevæger os på cykel gennem by og landskab til dagligt, et 'frirum' mellem hjem og arbejde.

Jeg tænker, at Supercykelstierne kan rumme begge dele. At de er 'highways' for cyklister, og særligt pendlerer, men at der i nogle punkter og langs nogle strækninger er mulighed for at de kan andet.

***Hvad tænker du om det? Skal supercykelstien kunne bruges som et 'værktøj' i urban design til at skabe forskellige 'mobilitetsrum' og cykeloplevelser, eller er det vigtigste, at de får os hurtigt, komfortabelt og sikkert fra A-B?***

**3.** Supercykelstien er også et koncept, en genkendelig type cykelsti som har god tilgængelighed og høj fremkomlighed. Men kunne det tænkes, at Supercykelstikonceptet blev udvidet, og at forskellige typologier af supercykelstier og ruter blev defineret, som for eksempel de grønne cykelruter i København (nu findes de selvfølgelig allerede). ***Kunne det tænkes at supercykelstikonceptet bliver udvidet, eller at en differntiering af rutetyper fandt sted/fik plads inden for nettet?***

4. Supercyklestierne er jo særligt henvendt til cykelpendlerne, også gerne de som cykler længere afstande, og som godt alternativ til at tage bilen. På mange smarte måder gør supercyklestierne cykeloplevelsen mere gnidningsfri og bedre sammenhængende. Men der er stor forskel på, hvordan en supercykelsti opleves når man cykler på fasanvejruten gennem frederiksberg, eller om man cykler et sted mellem Hedehusene og Høje Taastrup. På den måde er der forskel på supercykelstierne i kraft af den kontekst de bevæger sig igennem. ***Hvordan arbejder I med at stierne får et ensartet udtryk på de forskellige ruter?*** Eller er det op til den enkelte kommune, at beslutte hvilke initiativer der skal til, når stien er på deres arealer, og fx udpeger hvor der skal placeres en fodstøtte ved et lyskryds?

5. Cykelpendlere er en blandet gruppe, og består både af familier med ladcykler og skolebørn, og cyklister med racercykel. ***Hvordan laver man en supercykelsti som rummer og opfordrer mange forskellige slags cykelpendlere til at benytte stierne? Er det vigtigt, om der er mange forskellig brugere og måder at bruge en supercykelsti?***

På forhånd tak og ser frem til at høre fra dig,  
Julie

**Link to the reference audio recording from  
Interview 2 Anna Garrett:**

(Please type the link into your browser or scan the QR-code to access the file)

<https://drive.google.com/file/d/1-qGFb7j6M44d6cOPkhzepf8R5CJnv4qe/view?usp=sharing>



### Correspondence 3

#### Selected correspondence from the Danish Cyclists' Federation, by Thorsten from the local department in Roskilde d. 02.02.2019

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Correspondence from the Danish cyclists' federation, by Thorsten from the local department in Roskilde d. 02.02.2019

Hej Julie,

Bjarne har videresendt din mail til mig. Lidt om mig: Jeg er en 75årig fra ældrebyrden, som næsten er gået på pension. Jeg har aldrig haft kørekort, men som forsker og udvikler har jeg optimeret brugen af mine cykler. Jeg kan stadig kan cykle langt og nyder bakkerne og gaderne i Roskilde ofte med kaffe (og kage) på en af byens caféer. Jeg er ved at planlægge en pjece: "Ældrebyrden kræver medvind på cykelstierne". Er der vestenvind triller folk som mig let fra Roskilde til København. Når man skal hjem, kan man tage cyklen med toget eller omvendt, hvis vinden er i øst. En undertrøje i merinould forhindrer, at man kommer til at lugte af sved. Bedst fungerer det med en foldecykel (f.eks. en Brompton), som man kommer i en pose og tager gratis med toget som håndbagage. I en periode på godt 10 år anvendte jeg kombinationen af tog og en Brompton foldecykel til den daglige transport mellem Roskilde og Hvidovre Hospital. Det fungerede perfekt, transporttiden var kortere end i en bil, og så kunne den parkeres under mit skrivebord. Selv i et overfyldt tog kan man få en sammenfoldet Brompton med. Da jeg holdt op med at cykle dagligt på arbejde, viste det sig, at kombinationen af en almindelig cykel og tog var for bøvlet. Medvind på cykelstierne omfatter også vedligeholdte egnede cykelstier og egnede cykler. Det er baggrunden for, at jeg bl.a. interesserer mig lidt for den kommende supercykelsti.

#### Supercykelstien??

Supercykelstien mellem Roskilde og København forventes først at blive etableret i 2020. Ser man på det kort, som er tilgængelig på nettet, er det bare den slagne vej til Rådhuspladsen i København. Jeg har cyklet den markerede strækning talrige gange i mere end 40 år. Strækningen fra Roskilde til Glostrup kan gå strygende hvis de ændringer af cykelstien, som Roskilde Kommune har skitseret på deres hjemmeside, bliver gennemført. Der er dog en cyklistuvenlig rundkørsel, Klovtoftekrydset omkring Tåstrup. Fra Glostrup forbi Zoologisk Have og til starten af Vesterbrogade går det noget langsommere grundet mange lyskryds. Så hopper kæden helt af. På kortet går den planlagte supercykelsti gennem

Vesterbrogade. Det er en langsom og alt andet end behagelig strækning at cykle. Har planlæggerne gennemcyklet Vesterbrogade???? Det vil jeg spørge om på rette sted. Fra Hvidovre Hospital har jeg inden jeg gik på pension, tit med stor fornøjelse cyklet den hurtige rute ad Vigerslev Allé osv. ind til Hovedbanegården og derfra videre ad den trafikerede korte strækning til Rådhuspladsen. Et hurtigere og mere behageligt alternativ havde været at bruge og istandsætte Hvidovre-cykelstien mellem Roskildevej (ud for Damhussøen) og Vigerslev Allé – Så ville man have fået en godt fungerende cykelrute. Et andet alternativ, jeg skal have afprøvet, er den kommende Fasanvejsrute (forventes etableret i år), hvor man kan cykle fra Zoologisk Have til Vigerslev Allé Hvis du mener du kan bruge mig til noget, så kontakt mig pr. mail eller mobil 21661770. Brug cyklen – så kører den bare. Torsten (Bromptonnørd)

## Contrasts and curiosities

Cycling scenes from Africa and Europe



### Ethiopia

Cycling in the company of kids



### France

Lonely cycling on quiet country road



### Kenya

Dirt-road for 'shared use'



### Germany

Seperated, two-way bicycle path



### Malawi

Cycling with open views



### The Netherlands

Cycling a 'greenway' through enclosing forest



### Kenya

Unpaved dirt-road is tough and rough cycling



### The Netherlands

Seperated cycle 'highway' fast, smooth cycling



### **Ethiopia**

Walking dominates the countryside roads



### **The Netherlands**

Urban cycling and pedestrian road



### **Sudan**

Off-road to see pyramids



### **Botswana**

Stopping to let an elephant cross the road



### **Malawi**

Cycling to the lake with oars



### **Sudan**

Transporting hay on the bicycle



### **Sudan**

'Cooling-devise' melting in the Sahara-heat



### **Malawi**

Getting a better view from the saddle!

## ● 10.5. Rider's Journal

### Ride 1



Fig. 56  
Photo from Røde  
Port, Roskilde

Route	Roskilderuten: Roskilde (Røde Port) - Rådhuspladsen
Date and time	Sunday, December 30, 2018 leaving 14:16
Distance	30,5 km
Time	1 hour 28 minutes
Average speed	20,6 km/hr
Conditions	Cold, but a sunny day. Wind from a westerly direction (wind at the back, easier ride)
Journey description and notes	<p><i>First ride to Cph from Roskilde since 2017. We are two today to discuss the route and get first impressions of the route from one end to the other.</i></p> <p><i>Unfortunately, the weather is not great.</i></p> <p><i>It is Primoz first ride on this route. He is a seasoned rider, but in a different context. He used to participate in road racing and is a strong and fast cyclist. Today he is on an old, not very great bike we were able to borrow. But this means that our pace lines up.</i></p> <p><i>We notice the potholes, the roundabout at Taastrup (where we almost have a small crash), the lack of signage (there is none for cyclists). The bad flow as you get to Glostrup and towards the city. Here are many traffic lights, traffic can be heavy. The scenery is dull; car sellers, fast food restaurants, large warehouses, parking lots. I get the sense that this is the backstage, a long drive-through to get to the city. Housing and gardens and parks are moved away from the road. It is not a pedestrian road either. The distances are too long, too unfriendly.</i></p> <p><i>Primoz enjoys the first part of the ride from Roskilde to the approach of Albertslund. This first part has long good stretches of straight cycling road, open views, not many stops or distractions. As the urban environment starts, the light regulations, denser traffic, he finds it less enjoyable.</i></p>

## Ride 2 and 3

### Ride 2

Route	Roskilderuten: Roskilde (Røde Port) – Høje Taastrup Station and back along same route.
Date and time	Thursday February 3, 2019., leaving 15:07
Distance	14,6 Km (the tracking includes the cycle off the path to reach Høje Taastrup train station, therefore longer than the return cycle)
Time	49 minutes
Average speed	17,6 km/hr
Conditions	Westerly winds, gray, below 5 degrees. (The westerly winds could be felt on the way back towards Roskilde and is reflected in the slower average speed.)

### Ride 3

Date and time	Thursday February 3, 2019.
Distance	12,5 km
Time	47 minutes
Average speed	15,7 km/hr

Description next page



Fig. 57

Photo taken few  
km west of Høje  
Taastrup

Journey description and notes	<p><i>The temperature is low, the humidity is high, earlier in the day it was snowing. I dress well. I have a layer of tights under my leggings, the warmest gloves I can find, wind proof, scarf, hat, wind repellant jacket. I use one ortlieb bike bag for the map, drawing equipment, camera. The tracker on my phone is on to record the progress.</i></p> <p><i>The purpose of the journey was to cycle part of the route to see what a combined cycle and public transport trip to Høje Taastrup is like. Høje Taastrup is the first station on the Roskilderuten that connects to the network of s-trains, and therefore the station and route seems to hold potential for the route and the issue of connecting public transport and cycling.</i></p> <p><i>The part between Roskilde and Høje Taastrup is a nice cycle. I think of the first stretch between Hedehusene and Roskilde as the 'home run', the last 6 km before home. Here are some nice out of town, almost rural landscapes here. Fields, a warehouse selling farming machinery.</i></p> <p><i>Approaching Høje taastrup, there is no clear signage on how to get from the path to the train station. I follow the sign for cars, but have to follow a separated bicycle lane that is removed form the road, making it less clear if I am on right track. It is not as straight forward as it could have been. It does not take long to get to the station, and it could be an option to commute part of the way by bicycle with the train. There are also parking facilities at the station, but they could definitely need an update. A nice bicycle parking house could be great and would make it seem safer to leave the bicycle at the station.</i></p> <p><i>I was in touch with a commuter who lives in Roskilde and worked at Hvidovre hospital. For more than 20 years he combined cycling with public transport from Glostrup. He pointed to the issue of head winds when cycling. I felt that cycling back to Roskilde. And he had a folding bicycle to ease transportation with public transport. A folding bicycle definitely has advantages when combining modes of mobility.</i></p> <p><i>On the cycle back, it is already getting dark. I should have brought lights on my bicycle. I only have the week magnetic-dynamo ones attached to the frame. Winter cycling is cold and dark mornings and evenings. That is not too encouraging to cycling. On a day like this I might have taken the train the whole way instead of the bike..</i></p>
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## Ride By Car (Roskildevej/Københavnsvej)

Route	Roskilderuten: Roskilde (Røde Port) – Copenhagen central station.
Date and time	Thursday February 3, 2019 leaving 16:20
Distance	32 km
Time	1 hour and 2 minutes
Average speed	30,7 km/hr
Conditions	Gray overcast, cold.
Journey description and notes	<p><i>Driving the route by car with Anne and Ole. Anne is an architect and 'Ejendomschef' in Hvidovre municipality, Ole is an engineer. Ole drives, I take photos and notes, Anne comments and points out landmarks, places of interest, what she thinks might be interesting/problematic.</i></p> <p><i>We discuss the placement of bus stops along the route. Line 123 to Glostrup goes this way. By bicycle, I have many times cycled along this bus. It stops frequently, has small detours off Roskildevejen, making it almost same speed from Roskilde to Glostrup as a cyclist. When the route becomes a cycle superhighway, the layout of the bus stops is one thing that will change. A bus-island will be made giving cyclists right of way, the pedestrian will have to stop for the cyclist.</i></p> <p><i>We discuss the area around Taastrup where several elevated highways cross the road, creating an underpass with an enclosed space/feel. There is a potential to work with lighting here, with projections on walls and bike path.</i></p> <p><i>We notice that the car drive takes more than one hour; cycling with a good pace can be done in an hour and a half. But we also agree that this would be a long distance and route to commute every day, and a driver of the whole distance from Roskilde to Copenhagen would take the highway instead of Roskildevejen. And the route follows a busy road, as a cyclist you are right next to polluting cars for 31 km, and that is not attractive.</i></p>

## Ride By Car (Roskildevej/Københavnsvej)



Photo Driving under the tunnel to Hedehusene  
Fig. 58



Photo, approaching roundabout near Taastrup, cars must cross cyclistrack if bypassing the roundabout. Can be an uncomfortable place for the cyclist Fig. 59

### Ride 4

Route	Roskilderuten: Rådhuspladsen – Roskilde station
Date and time	Tuesday, February 12, 2019.
Distance	30,9 km
Time	1 hour 46 minutes
Average speed	17,4 km/hr
Conditions	Westerly winds, but not strong. Overcast with few spells of blue.
Journey description and notes	<p><i>I try to notice the context of the path. What am I passing by. First part is urban context. Apartment buildings with shops and small businesses along vesterbrogade. It is a nice cycle, but it is not highway. It is too bust. Too much going on in the immediate vicinity.</i></p> <p><i>Later, areas with especially many business parks and shopping centers of building supply, furniture, kitchens. Places you usually drive to. A lot of space is dedicated to parking lots and warehouses. Car dealers. Discount supermarkets. Most residential areas can be seen removed from the road. It is not an attractive route to be living right up against.</i></p> <p><i>Some stretches are nice and open. Especially the last 10 km towards Roskilde. It feels great to cycle here. There is time and distance to gain speed and find a good pace. Open views. Wide skies. Traffic feels further removed.</i></p>



Photo  
Leaving  
greater CPH.  
A nice stretch  
of cycling.  
Fig. 60

## Ride 5

Route	Ishøjruuten. Hvidovre – Rådhuspladsen.
Date and time	Tuesday, February 12, 2019
Distance	4,27 km
Time	17 minutes
Average speed	14,9 km/hr
Conditions	Gray. Has been raining. Fresh. Wind is not noticeable.
Journey description and notes	<p><i>Ishøjruuten, a super bike path, from suburb to city center:</i></p> <p><i>A good experience of an urban route. I notice the path width, the signage telling me how far to different destinations. It makes a difference.</i></p> <p><i>I cycle from Hvidovre, catch Ishøjruuten to get to the beginning of Roskilderuten at City hall. It is different cycling once closer to city. Busy roads, more cyclists. Clear signage makes it very easy to cycle and navigate.</i></p>



The orange circle  
with white C or  
arrow indicate the  
cycle superhighway  
route.  
Fig. 61, 62





