



**CiViTAS**  
Cleaner and better transport in cities

**AALBORG**

## **Aalborg**

### T51.1 Cycle Motorway in Aalborg

Aalborg Kommune  
August 2011



THE CIVITAS INITIATIVE  
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# Contents

1. Introduction .....	4
1.1 Background CIVITAS .....	4
1.2 Background ARCHIMEDES .....	5
1.3 Participant Cities .....	5
2. Aalborg .....	6
3. Background to the Deliverable .....	7
3.1 Summary Description of Task .....	8
4. Cycle Motorway in Aalborg .....	8
4.1 Specification of Cycle Motorway in Aalborg .....	8
4.1.1 Reorganization of cycle flow at bus stops .....	9
4.1.2 Segregated Bicycle Filter Lane .....	10
4.1.2 Bicycle Counter .....	11
4.1.3 Automatic Air Pump .....	12
4.1.4 Lane Lights .....	13
4.1.4 Signposting .....	14
4.2 Description of Work Done .....	15
4.2.1 Planning phase .....	15
4.2.2 Construction .....	16
4.2.3 Implementation and evaluation .....	17
4.3 Communication .....	17
4.4 Problems identified .....	18
4.5 Future plans .....	18

# 1. Introduction

## 1.1 Background CIVITAS

CIVITAS - cleaner and better transport in cities - stands for City-VITALity-Sustainability. With the CIVITAS Initiative, the EC aims to generate a decisive breakthrough by supporting and evaluating the implementation of ambitious integrated sustainable urban transport strategies that should make a real difference for the welfare of the European citizen.

CIVITAS I started in early 2002 (within the 5th Framework Research Programme); CIVITAS II started in early 2005 (within the 6th Framework Research Programme) and CIVITAS PLUS started in late 2008 (within the 7th Framework Research Programme).

The objective of CIVITAS-Plus is to test and increase the understanding of the frameworks, processes and packaging required to successfully introduce bold, integrated and innovative strategies for clean and sustainable urban transport that address concerns related to energy-efficiency, transport policy and road safety, alternative fuels and the environment.

Within CIVITAS I (2002-2006) there were 19 cities clustered in 4 demonstration projects, within CIVITAS II (2005-2009) 17 cities in 4 demonstration projects, whilst within CIVITAS PLUS (2008-2012) 25 cities in 5 demonstration projects are taking part. These demonstration cities all over Europe are funded by the European Commission.

### Objectives:

- to promote and implement sustainable, clean and (energy) efficient urban transport measures
- to implement integrated packages of technology and policy measures in the field of energy and transport in 8 categories of measures
- to build up critical mass and markets for innovation

### Horizontal projects support the CIVITAS demonstration projects & cities by:

- Cross-site evaluation and Europe wide dissemination in co-operation with the demonstration projects
- The organisation of the annual meeting of CIVITAS Forum members
- Providing the Secretariat for the Political Advisory Committee (PAC)
- Development of policy recommendations for a long-term multiplier effect of CIVITAS

### Key elements of CIVITAS

- CIVITAS is co-ordinated by cities: it is a programme “of cities for cities”
- Cities are in the heart of local public private partnerships

- Political commitment is a basic requirement
- Cities are living 'Laboratories' for learning and evaluating

## 1.2 Background ARCHIMEDES

ARCHIMEDES is an integrating project, bringing together 6 European cities to address problems and opportunities for creating environmentally sustainable, safe and energy efficient transport systems in medium sized urban areas.

The objective of ARCHIMEDES is to introduce innovative, integrated and ambitious strategies for clean, energy-efficient, sustainable urban transport to achieve significant impacts in the policy fields of energy, transport, and environmental sustainability. An ambitious blend of policy tools and measures will increase energy-efficiency in transport, provide safer and more convenient travel for all, using a higher share of clean engine technology and fuels, resulting in an enhanced urban environment (including reduced noise and air pollution). Visible and measurable impacts will result from significantly sized measures in specific innovation areas. Demonstrations of innovative transport technologies, policy measures and partnership working, combined with targeted research, will verify the best frameworks, processes and packaging required to successfully transfer the strategies to other cities.

## 1.3 Participant Cities

The ARCHIMEDES project focuses on activities in specific innovation areas of each city, known as the ARCHIMEDES corridor or zone (depending on shape and geography). These innovation areas extend to the peri-urban fringe and the administrative boundaries of regional authorities and neighbouring administrations.

The two Learning cities, to which experience and best-practice will be transferred, are Monza (Italy) and Ústí nad Labem (Czech Republic). The strategy for the project is to ensure that the tools and measures developed have the widest application throughout Europe, tested via the Learning Cities' activities and interaction with the Lead City partners.

### 1.3.1 Leading City Innovation Areas

- The four Leading cities in the ARCHIMEDES project are:
- Aalborg (Denmark);
- Brighton & Hove (UK);
- Donostia-San Sebastián (Spain); and
- Iasi (Romania).

Together the Lead Cities in ARCHIMEDES cover different geographic parts of Europe. They have the full support of the relevant political representatives for the project, and are well able to implement the innovative range of demonstration activities.

The Lead Cities are joined in their local projects by a small number of key partners that show a high level of commitment to the project objectives of energy-efficient

urban transportation. In all cases the public transport company features as a partner in the proposed project.

## 2. Aalborg

The City of Aalborg, with extensive experience of European cooperation and having previously participated in CIVITAS I (VIVALDI) as a ‘follower’ city, is coordinating the consortium and ensures high quality management of the project. The City has the regional public transport authority (NT) as a local partner, and framework agreements with various stakeholder organisations.

Aalborg operates in a corridor implementing eight different categories of measures ranging from changing fuels in vehicles to promoting and marketing the use of soft measures. The city of Aalborg has successfully developed similar tools and measures through various initiatives, like the CIVITAS-VIVALDI and MIDAS projects. In ARCHIMEDES, Aalborg aims to build on this work, tackling innovative subjects and combining with what has been learned from other cities in Europe. The result is an increased understanding and experience in order to then share with other Leading cities and Learning cities.

Aalborg has recently expanded its size by the inclusion of neighbouring municipalities outside the peri-urban fringe. The Municipality of Aalborg has a population of some 194,149, and the urban area a population of some 121,540. The ARCHIMEDES corridor runs from the city centre to the eastern urban areas of the municipality and forms an ideal trial area for demonstrating how to deal with traffic and mobility issues in inner urban areas and outskirts of the municipality. University faculties are situated at 3 sites in the corridor (including the main university site). The area covers about 53 square kilometres, which is approximately 5 % of the total area of the municipality of Aalborg. The innovation corridor includes different aspects of transport in the urban environment, including schools, public transport, commuting, goods distribution and traffic safety. The implementation of measures and tools fit into the framework of the urban transport Plan adopted by the Municipality.



Figure 1: The ARCHIMEDES Corridor in Aalborg



### 3. Background to the Deliverable

Creating good facilities for cycling is an important element in any strategy for sustainable transport. On a long term level, creating a city with a high level of bicycle use has positive effects both in terms of improved energy efficiency and improved public health in general. Recent Danish research on the use of the bicycle has shown that it is especially the shorter commuting trips (< 5 km) that can be changed to bicycle use.

This measure focuses on implementing a Cycle Motorway on the central cycling link, connecting the city centre and the University located at opposite ends of the ARCHIMEDES Corridor, approximately 5 km apart. The stretch was chosen as it is one of the main routes for cyclists commuting between the city centre and the university area. Before the reconstruction there were only painted cycle lanes on the stretch and no other facilities for cyclist. By implementing this measure the purpose is to provide improved and safe cycling facilities for students and other users of the stretch.

Figures from 2007 shows that the modal share of cycling within the Municipality of Aalborg is 15%. National figures have indicated a decrease in cycling across Denmark in recent years and to counteract this trend, several initiatives including the cycle motorway have been implemented within the City of Aalborg. This deliverable provides information about the implementation of ARCHIMEDES task 6.1.



Figure 2: Map of the cycle motorway between the city centre and university area.

### 3.1 Summary Description of Task

The whole 5 km long stretch from the city centre to the university area have been rebuild and upgraded from an ordinary cycle lane to a highclass Cycle Motorway. A dedicated bicycle track has been established for a large part (approx 2 km) of the route combined with new solutions for cyclists at bus stops. The infrastructure work has been financed outside of the ARCHIMEDES project (an investment of approx. 1.2 million. Euro). The ARCHIMEDES project has contributed through staff time to design, plan and project manage the implementation of the measures, and by financing special equipment, not usually part of a cycle path.

The overall objective of the measure has been to increase the number of trips made by bicycle and thus improve energy efficiency and public health. On a strategic level this means that the measure focuses on increasing the modal split of cycling amongst students and other people travelling along the corridor.

In order to achieve these objectives a concept for the cycle motorway has been developed. The concept is based on developing a cycle stretch with specific attention to the following three subjects:

- **Free flow conditions for cyclist:** The focus is on establishing a cycle stretch without unnecessary stops and detours. Recent Danish research has revealed that these factors are important in relation to the choice of the bicycle as a means of transport.
- **Traffic safety:** The route should be a safe route for cyclists.
- **Visibility and service:** Providing cyclists with extra services is seen as a way to increase the attractiveness of cycling. In addition, these extra services are a way of making cycling visible across the city, and thereby to promote cycling.

These focus areas have been the prerequisites in the design of the route and the choice of the different initiatives on the route, financed by the ARCHIMEDES project.

## 4. Cycle Motorway in Aalborg

### 4.1 Specification of Cycle Motorway in Aalborg

The following innovative ARCHIMEDES initiatives have been implemented as part of the bicycle lane project

- Reorganization of cycle flow at bus stops
- Bicycle counter with electronic information for cyclists
- Automatic air pump for cyclists
- Lane lights for cyclists at one of the intersections
- Signposting of the entire stretch
- A segregated bicycle filter lane

The initiatives will be explained and presented in the following sections.



### 4.1.1 Reorganization of cycle flow at bus stops

As described above the stretch has been renovated with dedicated cycle path and solutions at bus stops, improving cycle facilities along the stretch overall. Special attention has been given to improving the safety and free flow conditions for cyclists at the bus stops. The photos below illustrate a before and after scenario of how the dedicated cycle path passes a bus stop.



Figure 3: Before and after picture of how the dedicated cycle lane passes a bus stop.

Before the reconstruction, the cyclist had to either stop and wait behind the standing bus or pass the bus on the left side, which meant merging with the car traffic in the middle of the road.

In the new situation the cyclist can continue on his dedicated path without stopping. This is further made possible as an island has been established for waiting or exiting bus passengers to step down between the bus and the cycle lane. Having such an island between the standing bus and the cycle lane instead of letting the passengers

step directly down on the cycle lane changes the duty to give way from the cyclist to the bus passenger, letting the cyclist pass the bus without stopping.

Through the implementation of this measure both the safety for the cyclist and free flow is improved.

#### 4.1.2 Segregated Bicycle Filter Lane

As an initiative focusing specifically on improving the free flow conditions for cyclists, a segregated bicycle filter lane which allows cyclists to turn right without coming onto the intersection has been established at one of the important intersections for cyclist on the cycle motorway.

By allowing cyclists to turn right without waiting for a green light at the intersection the cyclists avoid unnecessary waiting time at the intersection. Therefore, the cyclists get a feeling of being prioritised and travel time is reduced as well.



Figure 4: Segregated bicycle lane filter.



Figure 5: Segregated bicycle lane filter. Photo taken from the traffic light.

Please note that the road surface markings shown on the pictures in this report is not yet updated to reflect the new cycle lane.

#### 4.1.2 Bicycle Counter

Along the southbound section of the cycle lane (towards the University) a bicycle counter has been installed. The purpose of the counter is to give cyclists valuable information during their journey, and thereby contributes to the fulfillment of the overall purpose of providing a high level of service and information on the cycle motorways. In addition, the counter increases the visibility of cycling for other road users.

The counter provides cyclists and other road users with information on the number of cyclists that have passed by on that day. The technology is based on senso-lines being placed in the asphalt of the cycle lanes.

The counter also gives information on the date and time, temperature, the speed of the cyclist passing and based on this speed, an estimated remaining travel time to the university. If the temperature is close to 0 degrees or bellow a snowflake indicator will appear on the display to make the cyclists aware of the risk of icy cycle lanes.

The counter can be followed live on the municipality homepage:

[http://www.aalborgkommune.dk/Borger/trafik-og-veje/aalborg-cykelby/service-for-cyklister/Sider/Cykelbarometer\\_Hadsundvej.aspx](http://www.aalborgkommune.dk/Borger/trafik-og-veje/aalborg-cykelby/service-for-cyklister/Sider/Cykelbarometer_Hadsundvej.aspx)



Figure 6: The bicycle counter installed at the cycle motorway.

#### 4.1.3 Automatic Air Pump

Two air pumps have also been installed on the route. The purpose of the air pumps is to make cycling even more attractive by providing the cyclists with extra services.

One of the pumps is located close to the bicycle counter and the other is placed at an intersection on the cycle motorway which is closer to the city centre, ensuring that a lot of cyclists pass the pumps every day.

The pumps have a built in compressor and by pushing the button and using the connecting pipe that fits different tyre valves, bike tyres are easily inflated.



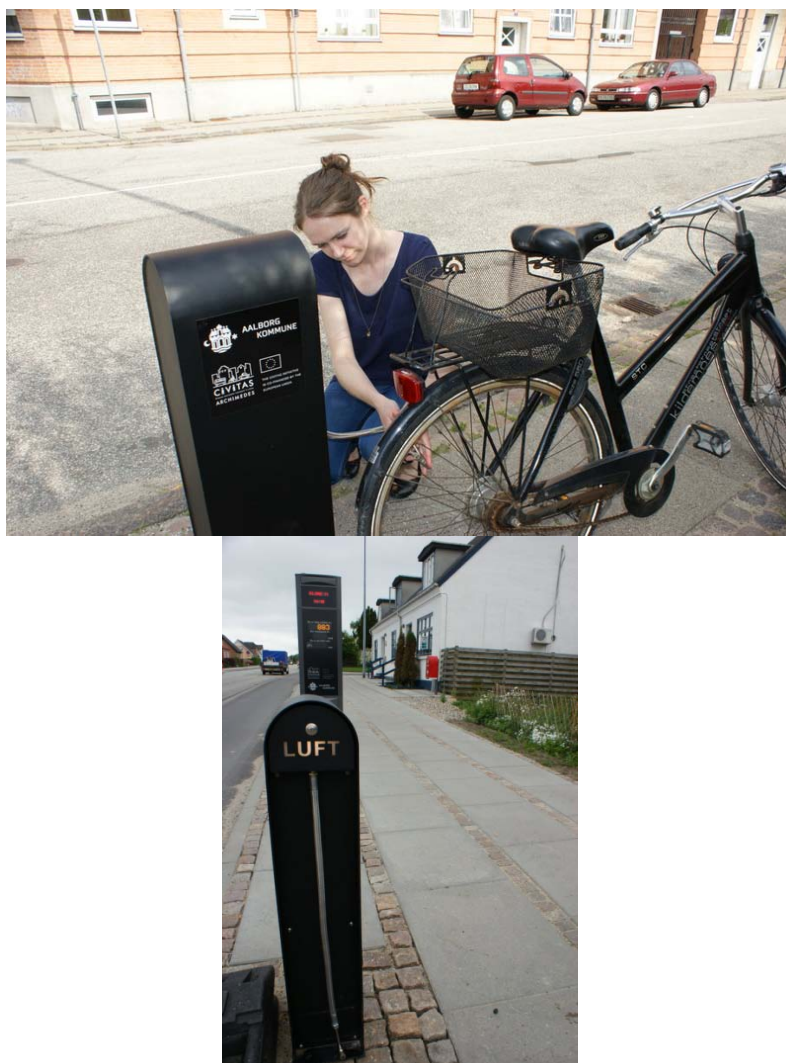


Figure 7: The bicycle pumps installed at the cycle motorway.

#### 4.1.4 Lane Lights

To improve free flow conditions for cyclists a lane light initiative is being implemented at one of the intersections. The purpose of the initiative is to test whether the lights can improve free flow conditions for cyclists, and to evaluate how the cyclists experience this.

In the initiative 10 LED lights will be installed at a distance of between 50-140 m before one of the traffic light controlled intersections at the cycle motorway. In order not to distract cyclists approaching the intersection it has been decided not to place lane lights closer than 50 m to the intersection.

The lights are installed in the cycle lane and are connected to the traffic light to ensure that if a cyclist follows the lights during a green wave and keeps up with the wave at a speed of 18 km/h they will reach the intersection during the green phase.



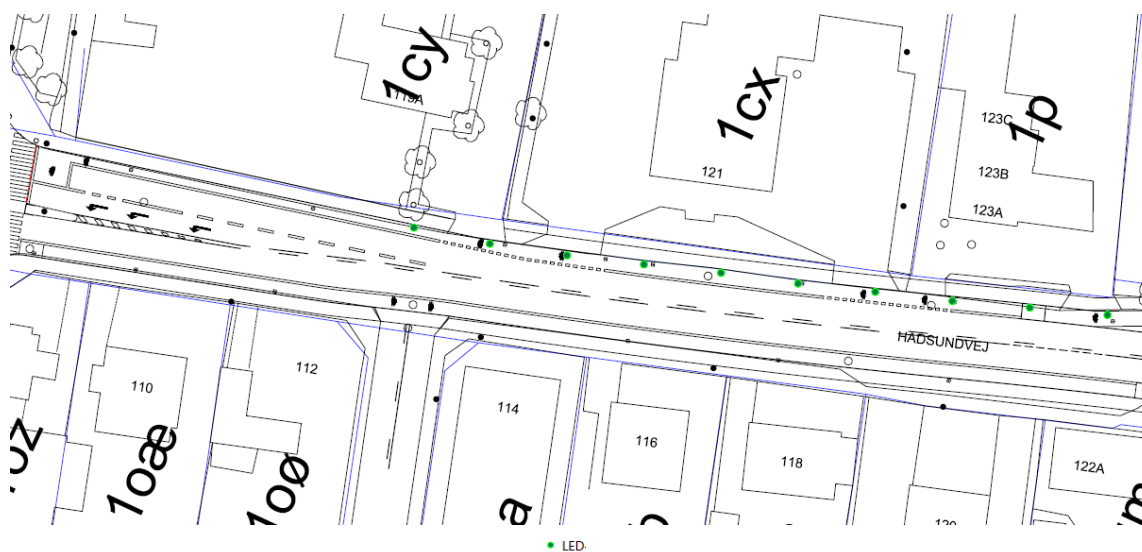


Figure 8: The placement of the 10 LED light at the Cycle Motorway.

As a result of this initiative the cyclists are able to adjust their speed to the traffic light and thereby decrease waiting time at the intersection.

The initiative is to be implemented shortly, but has had to wait for another project at the intersection to be implemented.

#### 4.1.4 Signposting

To keep cyclists informed on their journey, the cycle motorway has been equipped with signs all the way from the city centre to the university area. The signs show that you are on the cycle motorway to the university (in Danish Universitetsruten, route nr. 100) and show the distance to the university or city centre.



Figure 9: Signposting of the cycle motorway.

## 4.2 Description of Work Done

### 4.2.1 Planning phase

The planning phase was led by a working group consisting of different professionals from the Technical and Environmental department within the City of Aalborg. This handful of people has been responsible for both the planning and the implementation of the measure.

As part of the initial planning phase a vision workshop was held with different groups of citizens and professionals being represented, which included a presentation from a hired professional used as inspiration. The purpose of the workshop was to develop new ideas on implementing a cycle motorway and to get feedback from the bicycle users on previously developed ideas.

The participants represented a broad range of people and interest groups engaged in bicycle matters; from the students who cycle to the university daily and the local branch of Danish Cycling Association to the traffic police. Furthermore, a range of

different professionals from the City of Aalborg involved in bicycle planning participated in the workshop. The workshop constituted a platform for further planning of the measure and in addition, the participants contributed with valuable inputs to improvements to some of the initiatives already discussed for the cycle motorway.



Figure 10 participants at the workshop discussing different possible locations for initiatives

During winter 2009-2010 and spring 2010 the planning and drawings for the project were finalised. As part of this process the manufactures of technical equipment were contacted and contracts were signed. As part of the planning process an application was sent to the Danish Road Directorate in order to get approval for the lane light project, since this initiative, as a new and untried solution, needed dispensation from existing Danish legislation to be implemented. An approval to implement the project for a test period was obtained.

During the planning phase in spring 2010 a before-count of cyclists was carried out and data on speed of the cyclists on specific parts of the route were collected in October 2011.

#### 4.2.2 Construction

The construction work started in August 2010 and was expected to be finished by the start of December 2010. The construction works included, as described,



establishment of a dedicated bicycle track along a main part of the stretch. The ARCHIMEDES initiatives were either installed in relation to this work or depended on finalisation of this work.

Had the winter been a normal winter, the project would have been finished in December, but in the middle of November the first snow fell and a lasting period of frost started. This put the construction work on hold. Very unusually for Denmark, the frost lasted more or less without pause until March. Even though the continuation of the construction work was attempted on additional occasions, the work had to be paused from the middle of November 2010 to March 2011.

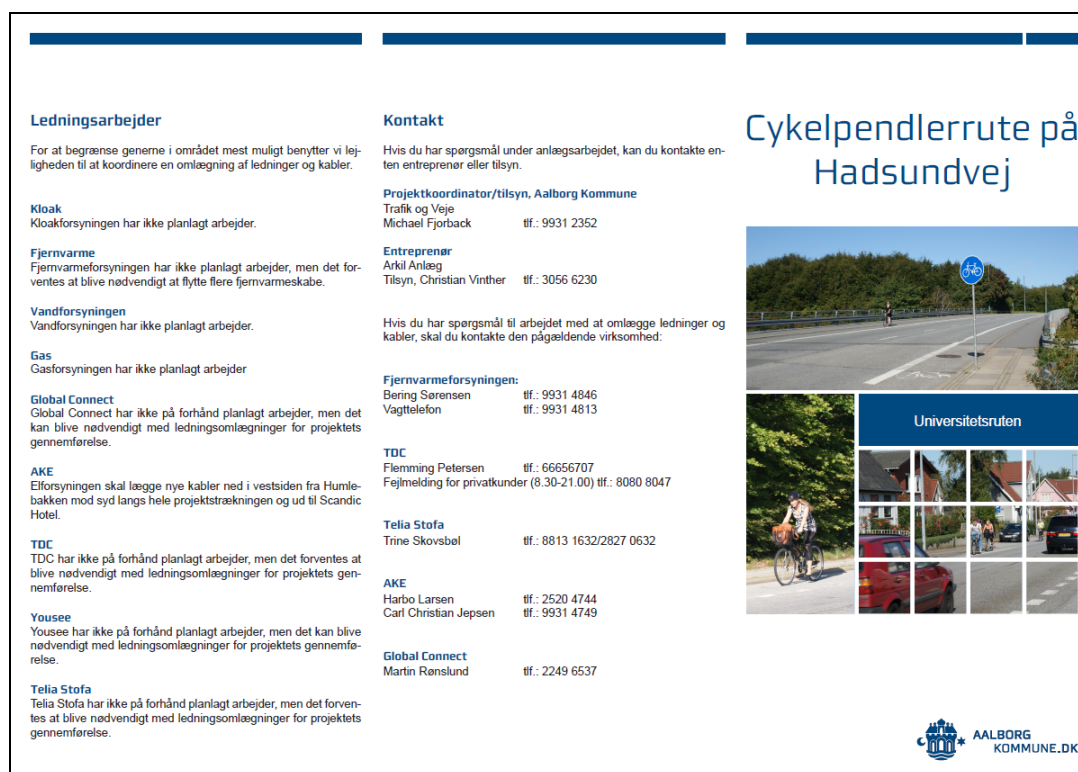
### 4.2.3 Implementation and evaluation

An after-count of cyclists was undertaken in spring 2011 (when most parts of the stretch were completed). This count will be supplemented with an additional one in autumn 2011 and data on cyclist speeds will also be collected. These numbers will be supplemented with qualitative questionnaires in order to reveal the users' perception of the initiatives on the route.

## 4.3 Communication

Several initiatives have been conducted in relation to communicating the measure. As part of the planning phase, a workshop to develop ideas was held with stakeholders, as described.

At the beginning of the construction period an information notice was put in the local paper and a short leaflet was distributed to local residents and companies.



**Ledningsarbejder**  
For at begrænse generne i området mest muligt benytter vi lejligheden til at koordinere en omlægning af ledninger og kabler.

**Kloak**  
Kloakforsyningen har ikke planlagt arbejder.

**Fjernvarme**  
Fjernvarmeforsyningen har ikke planlagt arbejder, men det forventes at blive nødvendigt at flytte flere fjernvarmeskabe.

**Vandforsyningen**  
Vandforsyningen har ikke planlagt arbejder.

**Gas**  
Gasforsyningen har ikke planlagt arbejder.

**Global Connect**  
Global Connect har ikke på forhånd planlagt arbejder, men det kan blive nødvendigt med ledningsomlægninger for projektets gennemførelse.

**AKE**  
Eltforsyningen skal lægge nye kabler ned i vestsiden fra Humlebakken mod syd langs hele projektstrækningen og ud til Scandic Hotel.

**TDC**  
TDC har ikke på forhånd planlagt arbejder, men det forventes at blive nødvendigt med ledningsomlægninger for projektets gennemførelse.

**Yousee**  
Yousee har ikke på forhånd planlagt arbejder, men det kan blive nødvendigt med ledningsomlægninger for projektets gennemførelse.

**Telia Stofa**  
Telia Stofa har ikke på forhånd planlagt arbejder, men det forventes at blive nødvendigt med ledningsomlægninger for projektets gennemførelse.

**Kontakt**  
Hvis du har spørgsmål under anlægsarbejdet, kan du kontakte enten entreprenør eller tilsyn.

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**Entreprenør**  
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Hvis du har spørgsmål til arbejdet med at omlægge ledninger og kabler, skal du kontakte den pågældende virksomhed:

**Fjernvarmeforsyningen:**  
Bering Sørensen tlf.: 9931 4846  
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**Cykelpendlerrute på Hadsundvej**

**Universitetsruten**

AALBORG KOMMUNE.DK

Figure 11: Front page and back page of information leaflet.



Figure 12: Pages from the information leaflet.

During the construction period information could be found at The City of Aalborg’s homepage. The homepage was updated several times during the construction period in order to provide citizens and especially the local residents with the newest information. This allowed people to find information on the purpose of the project and the concrete initiatives as well as the status of the work and timing.

#### 4.4 Problems identified

No risks identified.

#### 4.5 Future plans

The measure will be evaluated in autumn 2011.

The City of Aalborg is planning to develop cycle motorways on five other stretches in the city. The first stretch is planned to be established in 2011 where the route connects the city centre with a commercial area 5 km south of the city and the third cycle motorway is planned to be established in 2012. The planning, design and implementation of these projects is based on the concept developed in relation to this measure and the experiences obtained through the planning process.

The evaluation results from this measure will provide valuable input for the planning of these projects.