



CHALMERS
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How to arrange the trafficability in central Gothenburg during the years 2015 to 2018

- An investigation of Mobility Management and interaction between selected projects in Trafik 2016

Master's thesis in the Master's Program, Infrastructure and Environmental Engineering

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CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden 2014
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Cover: Mobility Management will be used to promote the trafficability for different modes of
transport in Gothenburg [Photo: (Grek & Ómarsdóttir, 2014)]

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ABSTRACT

Gothenburg is growing rapidly which implies a huge challenge for the traffic system. Beyond projects within the West Swedish Agreement several other projects will be constructed during the same time period. In order to coordinate the traffic planning for all projects during the years 2015 and 2017 the parties of the West Swedish Agreement together with Västtrafik shall operate a traffic coordination work, called Trafik 2016. This survey will investigate to which extent nine of the projects within Trafik 2016 will use Mobility Management during the construction phase, individually as well as in cooperation with other projects. Mobility Management is a concept that promotes sustainable modes of travel by influencing travellers' attitudes and behaviour. Mobility Management measures can be divided into both "soft" and "hard" measures. The "Mobility Management during the construction phase" is a combination of both soft and hard measures. The goal with Mobility Management during the construction phase is to encourage travellers to change their traveling behaviour to more sustainable alternatives and to ensure a desirable accessibility during the construction phase. The study is based on interviews where both project representatives and Mobility Management Coordinators were interviewed at both the Swedish Transport Administration and the Traffic and Public Transport Authority. The coordinators were asked questions related to Mobility Management and the project representatives were asked questions related to traffic impact, cooperation and Mobility Management. It came clear that the two organizations define the concept Mobility Management quite differently which causes a difference in working methods related to Mobility Management. What would promote a successful Mobility Management work and facilitate cooperation and understanding between the two organizations would be to harmonize the definition on the concept. What also came clear is that information is very important and the ways of informing might need to be updated. The West Swedish Agreement demands that cooperation with other projects should occur, if it is considered necessary. For the trafficability to be able to work out a great cooperation between the projects is always necessary for projects that intersect. According to the interviews all of the project cooperated with another project to some level. Although in some cases the cooperation only took place within the organization or only with the nearest projects. By setting requirements of cooperation for all projects the projects will be forced to expand their view and become more aware of other projects and the trafficability situation. When it comes to the traffic proposals the projects seem to be aware of the impact their traffic proposals might cause and that other projects' traffic proposals might affect their trafficability. Although there is no system so that the project can ensure its trafficability.

Hur framkomligheten i centrala Göteborg ska arrangeras under åren 2015 till 2018
- En undersökning av mobility management och samverkan mellan utvalda projekt i Trafik 2016

Examensarbete inom Infrastructure and Environmental Engineering

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Väg och trafik

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SAMMANFATTNING

Göteborgsregionen växer vilket innebär stora påfrestningar på transportsystemet. Förutom projekten i Västsvenska paketet är flera andra projekt planerade att äga rum under samma tidsperiod. För att kunna samordna trafikplaneringen för alla projekt under tidsperioden 2015 till 2017 kommer parterna i Västsvenska paketet tillsammans med Västtrafik driva ett trafikkoordineringsarbete, kallat Trafik 2016. Syftet med studien är att undersöka i vilken grad nio av projekten i Trafik 2016 nyttjar mobility management i byggskedet, individuellt såsom genom samverkan med andra projekt. Mobility management är ett koncept som ska främja hållbara färdssätt, genom att påverka trafikanternas attityd och beteenden. Mobility management-åtgärder delas vanligen in i ”hårda” och ”mjuka” parametrar. I mobility management i byggskedet kombineras dessa typer av åtgärder med varandra för att få en större effekt. Målet med mobility management i byggskedet är att uppmuntra trafikanterna att ändra sina resvanor till ett mer hållbart alternativ och på så vis säkerhetsställa trafikanternas framkomlighet under byggskedet. Rapporten baseras på en intervjustudie där både representanter för de nio projekten samt mobility management samordnare på Trafikverket och Trafikkontoret intervjuades. Både samordnarna och projektrepresentanterna fick frågor som kan relateras till mobility management. Representanterna fick även frågor angående trafikpåverkan och samverkan. Studien visade att det fanns skillnader i hur de två organisationerna definierade konceptet mobility management, vilket bidrog till att mobility management-arbetet skilde sig mellan organisationerna. En synkronisering av konceptet mobility management skulle främja mobility management-arbetet och underlätta samverkan och förståelsen mellan de två organisationerna. Studien visade också att information till trafikanterna är viktigt, men att sätten att informera behöver uppdateras. I Västsvenska paketet finns det krav på att projekten ska samverka med andra projekt, om detta anses nödvändigt. Det kan dock anses att samverkan mellan projekt alltid är nödvändigt för att lyckas bevara framkomligheten för trafikanterna. Intervjuerna visade att alla projekten samverkade med något annat projekt på ett eller annat sätt. Vissa samverkade dock endast med projekt inom den egna organisationen eller med närliggande projekt. Genom att kräva att alla projekt ska samverka med andra projekt, oavsett om projektet tillhör Västsvenska paketet eller inte, tvingas projekten att lyfta blicken och på så vis bli mer medvetna om den trafiksituation som råder. När det kommer till trafikförslag verkade alla projekt vara medvetna om att deras trafikförslag kan påverka andra projekt, samt att andras trafikförslag kan påverka framkomligheten hos det egna projektet. Dock finns det inget system där projekten kan säkerhetsställa trafikanternas framkomlighet.

Contents

| | |
|--|-----|
| ABSTRACT | I |
| SAMMANFATTNING | II |
| CONTENTS | III |
| PREFACE | VI |
| NOTIFICATIONS | VII |
| 1 INTRODUCTION | 1 |
| 1.1 Background | 1 |
| 1.2 Aim and goal | 1 |
| 1.3 Delimitations | 1 |
| 1.4 Methodology | 4 |
| 1.4.1 The literature study | 4 |
| 1.4.2 The planning and performing interview process | 5 |
| 1.4.3 Analysis of the interviews | 6 |
| 1.4.4 Suggestions and recommendations | 6 |
| 2 MOBILITY MANAGEMENT IN THEORY | 7 |
| 2.1 Measures to improve the sustainable transportations | 9 |
| 2.1.1 Design | 9 |
| 2.1.2 Range | 9 |
| 2.2 Behaviour-affecting measures | 9 |
| 2.2.1 Guiding | 10 |
| 2.2.2 Information | 10 |
| 2.3 Why Mobility Management is important | 11 |
| 2.4 Examples of construction sites where Mobility Management has been used | 11 |
| 2.4.1 Sweden: Älvsborgsbron, Gothenburg | 11 |
| 2.4.2 Sweden: Roundabout on route E65, Svedala | 12 |
| 2.4.3 Holland: A10 Orbital motorway, A9 Gassperdammerweg | 12 |
| 2.4.4 Ireland: Dublin Port Tunnel | 13 |
| 2.4.5 USA: Springfield Interchange, VA | 13 |
| 3 THE WEST SWEDISH AGREEMENT | 15 |
| 3.1 Some of the projects in the West Swedish Agreement | 15 |
| 3.2 The Block 2 contract | 16 |
| 3.3 Trafik 2016 | 16 |
| 4 INVOLVED PROJECTS | 18 |

| | | |
|-------|---|----|
| 4.1 | Mariefholmsförbindelsen | 18 |
| 4.1.1 | Mariefholmstunneln | 18 |
| 4.1.2 | Mariefholmsbron | 19 |
| 4.2 | Västlänken | 20 |
| 4.3 | Hisingsbron | 20 |
| 4.4 | E45, Götaleden | 21 |
| 4.5 | Skeppsbron | 22 |
| 4.6 | Älvsborgsbron | 22 |
| 4.7 | Lundbyleden, Kvillemotet | 23 |
| 4.8 | Backaplan | 23 |
| 4.9 | Kville railyard | 24 |
| 5 | RESULT | 25 |
| 5.1 | Mobility Management in practise | 25 |
| 5.1.1 | Mobility Management at the Swedish Transport Administration | 25 |
| 5.1.2 | Mobility Management at the Traffic and Public Transport Authority | 27 |
| 5.2 | Investigation of the projects | 29 |
| 5.2.1 | Mariefholmsförbindelsen | 29 |
| 5.2.2 | Västlänken | 31 |
| 5.2.3 | Hisingsbron | 33 |
| 5.2.4 | E45, Götaleden | 34 |
| 5.2.5 | Skeppsbron | 37 |
| 5.2.6 | Älvsborgsbron | 38 |
| 5.2.7 | Lundbyleden, Kvillemotet | 39 |
| 5.2.8 | Backaplan | 41 |
| 5.2.9 | Kville railyard | 42 |
| 6 | ANALYSIS | 44 |
| 6.1 | Traffic impact | 44 |
| 6.2 | Cooperation | 46 |
| 6.3 | Mobility Management | 47 |
| 6.4 | Summarizing table | 50 |
| 7 | DISCUSSION | 52 |
| 7.1 | Uncertainties of the study | 52 |
| 7.2 | Differences in working policies | 52 |
| 7.3 | Mobility Management | 54 |
| 8 | CONCLUSION AND RECOMMENDATIONS | 56 |

REFERENCES

LIST OF FIGURES AND TABLES

APPENDIX A

APPENDIX B

Preface

This Master's thesis has been elaborated on the behalf of the Swedish Transport Administration during the spring 2014. The Master's thesis is performed within the division of GeoEngineering, Road and Traffic group, at the department of Civil and Environmental Engineering, Chalmers University of Technology. The work has been carried out at the Swedish Transport Administration's office in Gothenburg on the behalf of Trafik 2016. The work has been supervised by Jan Englund at Chalmers University of Technology and Karin Sandstedt at the Swedish Transport Administration.

This report has been depended on several people, the authors would therefore like to send a special thanks to:

Karin Sandstedt, supervisor at the Swedish Transport Administration, which has helped and supported us during the Master's thesis and helped us to make necessary decisions. Jan Englund, supervisor, Åsa Fransson, examiner, and Gunnar Lannér at Chalmers University of Technology for supervision when it came to structuring and writing the report.

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Gothenburg, June 2014



Maritha Grek & Hildur Ómarsdóttir

Notifications

The *construction phase* includes all work that are connected to the project, constructing as well as the preparatory work. The *preparatory work* includes work that does not need to be covered by a Development Consent Order with associated EIA. In this survey the Development Consent Order with Associated EIA will be written as Development Consent Order.

The parties of the West Swedish Agreement are; the Swedish Transport Administration, the City of Gothenburg, the Region of Västra Götaland, the Region of Halland and the municipality of Gothenburg.

Shuttle bus service is a way to quickly transport road users from a collection point to another.

Abbreviations

| | |
|-----|-----------------------------------|
| DCO | Development Consent Order |
| EIA | Environmental Impact Assessment |
| ITS | Intelligent Transportation System |
| MM | Mobility Management |
| PT | Public Transport |
| SEK | Swedish currency |
| SMS | Short message service |
| TBM | Tunnel boring machine |
| QR | Quick Response |

Dictionary

Development Consent Order – vägplan/järnvägsplan

Local plan – detaljplan

Mobility Management investigation – mobility management utredning

Needs assessment – behovsanalys

Port of Gothenburg – Göteborgs Hamn

The Environmental Governance – Miljöförvaltningen

The Housing and Urban Development – Stadsbyggnadskontoret

The Management Cycle and Water – Kretslopp och Vatten

The Provincial Government – Länsstyrelsen

The Real Estate Department – Fastighetskontoret

The Swedish Maritime Administration – Sjöfartsverket

The Swedish Transport Administration – Trafikverket

The Swedish Road Administration – Vägverket

The Traffic and Public Transport Authority – Trafikkontoret Göteborgs Stad

The West Swedish Agreement – Västsvenska Paketet

1 Introduction

Within the next fifteen years there will be a lot of changes in the Gothenburg area¹. The main part of these changes depends on the West Swedish Agreement which is a society building project that will contribute to an attractive and a sustainable city. Beyond the West Swedish Agreement several other projects will be constructed. Many of the projects intersect simultaneously and some of them even intersect geographically, especially in the city area around Göta Älv.

The projects will, particularly during the construction time, affect the trafficability to and from the city¹. To prevent major disturbance, the traffic around the construction sites needs to be redirected or reduced because of decreased road capacity. Normally projects only need to take its own construction site into account when redirecting the traffic. The problem is that many of the construction sites are located close to each other which will complicate this process. It is therefore interesting to investigate how different projects are cooperating to succeed with Mobility Management perspective during the construction phase.

1.1 Background

It has now been known for couple of years that many projects are on the agenda within the same time period². To get a whole picture of the upcoming situation all the projects in the Region of Västra Götaland, governmental as well as municipal projects, were mapped with respect to time. The mapping showed that the most problematic year due to trafficability was the year 2016. In order to coordinate the traffic in Gothenburg during the years as the infrastructural investments takes place, a mission was established. The mission got the name Trafik 2016 (e. Traffic 2016), where 2016 refers to the most problematic year according to the mapping at that time. In the construction industry it is common that projects are moving in time. Today many of the project have moved forward and the most problematical years are now 2017 and 2018.

1.2 Aim and goal

The aim of this survey is to investigate the upcoming changes on the traffic system in the Gothenburg region during the years 2015-2018. The main aim is to investigate to which extent projects in Trafik 2016 are using Mobility Management during the construction phase, individually as well as in cooperation with other projects, to facilitate the trafficability in the central Gothenburg. The survey will also investigate if projects are transmitting the knowledge about Mobility Management, from project manager to builder. The goal is to suggest improvements, to facilitate the Mobility Management work and cooperation between projects to minimize the traffic impact due to constructions, in cases where deficiencies are obtained.

1.3 Delimitations

The main task of Trafik 2016 is to coordinate the traffic in the Gothenburg Region from year 2015 and onwards with focus on the years 2015 to 2017. As projects have been moving in time, this survey will focus on projects that conflicts with each other between year 2015 and 2018.

¹ Karin Sandstedt, Traffic Coordinator, Trafikverket, Mail contact, November 28th 2013

² Karin Sandstedt, Traffic Coordinator, Trafikverket, Supervision meeting, January 23rd 2014

Only a part of the conflicting projects within Trafik 2016 are included in this survey. The choice of projects included in this survey depends on their geographical location with respect to traffic amount and intersecting projects. The projects have been selected by the authors together with the Traffic Coordinator at the Swedish Transport Administration, Karin Sandstedt. The selected projects are the following; Marieholmsförbindelsen, Hisingsbron, E45/Götaleden, Skeppsbron, Lundbyleden/Kvillemotet, Kville railyard, Backaplan and preparatory work of Västlänken, inclusive the station at the Central Station. Regarding Backaplan, the survey will only investigate road-related projects.

Every day 230 000 vehicles are crossing the river Göta Älv (Trafikverket, 2014 (e)). It is therefore important that the passages over the river are working properly. During the surveys selected time period, maintenance work will be carried out on Älvsborgsbron. The bridge is not conflicting with the other projects geographically but will have a huge impact on the traffic and is therefore included in this survey. The new Region's house, Regionens Hus, and the redevelopment of Stora Hamnkanalen has also been investigated but is not relevant for the selected time period and has therefore been excluded from this survey. How all projects in this survey correlates to each other, with respect to construction time, can be seen in Table 1 below, how the projects intersect geographically can be seen in Figure 1.

Table 1 The projects with respect to construction time



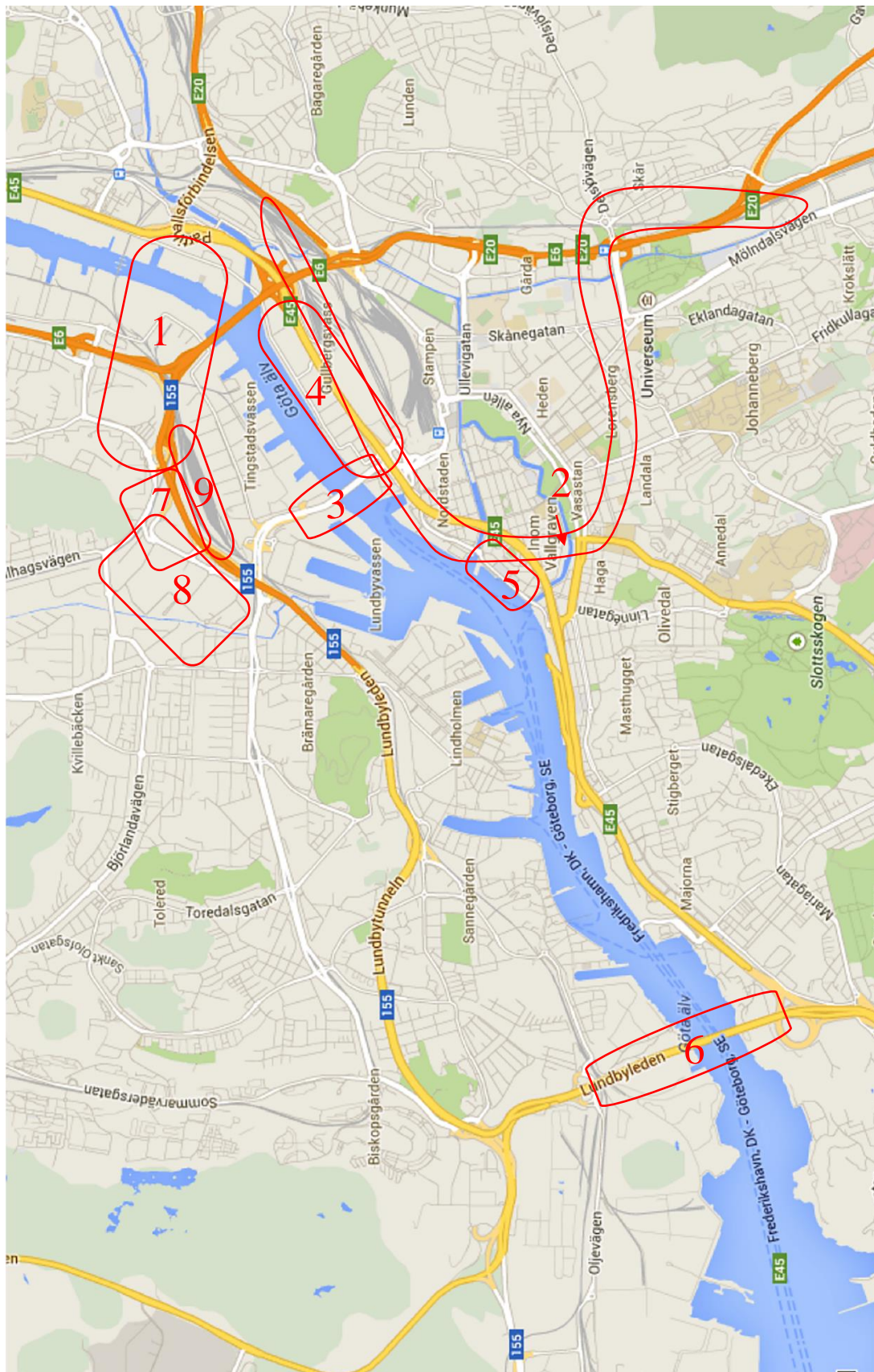


Figure 1 Location of the projects. 1 Marieholmsförbindelsen, 2 Västlänken, 3 Hisingsbron, 4 E45 Götaleden, 5 Skeppsbron, 6 Älvsborgsbron, 7 Kvillemotet, 8 Backaplan, 9 Kville railway yard (Made by information from the representatives of the projects).

1.4 Methodology

The methods that have been used to succeed with this survey is divided into four steps. Step one is the literature study. In this step internet, folders and interviews have been used to provide knowledge of Trafik 2016, the West Swedish Agreement, Mobility Management and the projects that are included in this survey. The interviews took place at both the Swedish Transport Administration and at the Traffic and Public Transport Authority. The literature study was performed during January and February in 2014. The second step includes interviews with different officials, mostly project managers, at the Swedish Transport Administration and the Traffic and Public Transport Authority. The interviews were prepared and performed during February, March and April 2014. Step three is the analytic part of the survey, where projects ability to cooperate to succeed with the Mobility Management work is discussed along with projects ability to convey to all contributors of the project the importance of Mobility Management. Finally, suggestions and recommendations, how to succeed with the Mobility Management during the construction phase is presented. Both the third and the fourth step has been performed in April and the beginning of May 2014.

1.4.1 The literature study

This survey is a complementing mission to Trafik 2016. Hence, the survey initially started with a literature study on Trafik 2016 and their task. The study showed that Trafik 2016 is a part of the West Swedish Agreement and therefore it was relevant to perform a literature study on the West Swedish Agreement, why it is needed and what it includes. The contract, Block 2, in the West Swedish Agreement has also been studied. Information about Trafik 2016 was mainly obtained during supervision by Karin Sandstedt, Traffic Coordinator and supervisor at the Swedish Transport Administration, which is also a member of the Trafik 2016 group. Material, both documents and movies, used in the literature study concerning the West Swedish Agreement was gotten from the official website.

Since the purpose of the survey is to investigate how projects cooperates to succeed with Mobility Management during the construction phase, the survey also includes a literature study about Mobility Management. Despite the fact that Trafik 2016 is a part of the West Swedish Agreement, Trafik 2016 contains projects beyond the agreement which has no contractual requirements to utilize Mobility Management during the construction phase. The Mobility Management chapter is only based on the Swedish Transport Administration's manual for Mobility Management during the construction phase since this is the only source to be found regarding the subject.

A big part of the literature study was to collect information about the projects that are included in this survey. The purpose was to get knowledge about the projects, what type of project, the objectives of the project, when the constructions will start and be finished etc. Just above half of the studied projects are projected by the Swedish Transport Administration. Their information is therefore taken from the Swedish Transport Administrations official website. Information about the remaining projects have mostly been gathered from the official website of the company that designs the constructions, or in other reliable websites.

In some cases information was not available on the internet. This mainly concerns the project Älvsborgsbron. In these cases the interviews that were made for the result have been

expanded. The expansion regards question number one in Appendix B that in this case demand a deeper explanation of the project instead of a short description.

1.4.2 The planning and performing interview process

To get the most reliable and up to date information about the projects and the projects procedures, semi structured interviews were used as a research tool. The persons that were interviewed were both different project representatives and members from the different companies involved with the projects.

The interviews are based on a qualitative approach. Qualitative interviews focus on gathering knowledge to be able to identify different quality to be measured unlike the quantitative interviews where the actual quality is measured (Bryman & Nilsson, 2011). Qualitative interviews are more liberal when it comes to structure compared to quantitative, that are usually very structured, and can give more information than is approached for.

Before the interviews were performed couple of questions were prepared to be asked. The questions were structured in that purpose to get the most information that corresponds to the study's goal. The interviews belong to the definition of semi structured interviews. That is when questions are used as a guide to approach relevant information according to the theme of the study but still gives the persons interviewed freedom to structure the answer to their own way (Bryman & Nilsson, 2011).

Two different question sheets were prepared, one that was only related to Mobility Management with the purpose to compare the Mobility Management actions between the Swedish Transport Administration and the City of Gothenburg. The other question sheet was structured for the representatives of each project, where the questions aimed for more detailed information about the project procedures, the traffic impacts they will entail and to which degree Mobility Management is used in the working procedures.

To be able to analyse the interviews, the questions regarding each project were categorized into three parts; Traffic impacts, Cooperation between projects and Mobility Management actions within each project. The three categories are all important when it comes to arranging the traffic. The question sheets can be seen in Appendix B.

Further definition of the three categories is described below:

- **Traffic impact** includes information about redirection of the traffic, which type of transport or traffic users will be affected and if traffic needs to be reduced and how this reduction will be made, if needed.
- **Cooperation** between projects includes information about existing cooperation between projects when it comes to redirecting the traffic and if the cooperation includes Mobility Management.
- The **Mobility Management** category includes information about how well project workers are aware or/and informed about Mobility Management and how this is insured. If project officials define Mobility Management in the same way and if, when and how Mobility Management is used during the construction phase.

In total twelve interviews were performed, including interviews with project representatives and Mobility Management Coordinators. Seven of them took place at the Swedish Transport Administration and five of them at the Traffic and Public Transport Authority including one telephone interview. Two Mobility Management Coordinators were interviewed, one at the Swedish Transport Administration and one at the Traffic and Public Transport Authority and both members were asked the same questions, based on question sheet one. The interviews regarding the projects were based on question sheet two. The time of the interviews varied between 20-65 minutes.

When it came to choosing the person for the interviews regarding the projects the project managers were contacted by email. The email contained the theme of the study and an idea of information approached. Either the project manager was willing to be interviewed or he/she suggested another person to be interviewed who was more versed in the part of the project that corresponds to the theme of this study, e.g. Mobility Management. There were even cases where both the project managers and the suggested person participated in the interview at the same time. All the participants, except the first interview performed, were recorded during the interviews. All the participants got the opportunities to read through the result and make comments before the study was published.

1.4.3 Analysis of the interviews

The interviews were documented for further analysis and to compare different information in chapter 6. The analysis relied on the three categories mentioned in 1.4.2. For a clear comparison between each project the analyses were carried out in a matrix that included all the different projects and a short version of the questions asked in the interview.

The discussion of the result can be followed in chapter 7. The chapter has been structured into uncertainties, differences in working policies and Mobility Management to make it easier to follow the context. When structuring the chapter 6 and 7 it was also kept in mind to make it easier to highlight to which extent the projects in Trafik 2016 are using Mobility Management during the construction phase.

1.4.4 Suggestions and recommendations

Possible suggestions and recommendations how to improve the Mobility Management during the construction phase, individually as well as in cooperation with other projects in Trafik 2016, are presented in chapter 8.

2 Mobility Management in theory

What is Mobility Management? To answer that question around twenty European countries contributed in the EU-project MAX, where the countries jointly defined the concept Mobility Management (Trafikverket, 2012). The definition reads as follows (Posch, 2009):

“Mobility Management (MM) is a concept to promote sustainable transport and manage the demand for car use by changing travellers’ attitudes and behaviour. At the core of Mobility Management are “soft” measures like information and communication, organising services and coordinating activities of different partners. “Soft” measures most often enhance the effectiveness of “hard” measures within urban transport (e.g., new tram lines, new roads and new bike lanes). Mobility Management measures (in comparison to “hard” measures) do not necessarily require large financial investments and may have a high benefit-cost ratio”.

Constructions and maintenance of traffic infrastructure might lead to disruptions due to the construction site (Trafikverket, 2012). To maintain the trafficability through the area the disruption, due to the construction, should be as small as possible. There are therefore three actions, old and new, to handle these type of disruption, see Figure 2.

| Interference management during the construction phase | | |
|--|---|---|
| Maintain the capacity | Move the traffic | Reduce the traffic |
| <ul style="list-style-type: none">▪ Build at other times▪ Construction logistic | <ul style="list-style-type: none">▪ Redirection▪ ITS | Mobility Management during the construction phase |

Figure 2 Interference management during construction phase [Inspired by (Trafikverket, 2013 (b))]

The first action is to maintain the capacity by adapting the construction site due to its given traffic situation (Trafikverket, 2013 (b)). This can be achieved if the construction hours are set to a time that will cause the traffic as minimal disturbance as possible or create good construction logistic. The second action is to redirect the traffic to another path alternative. The third action is, for Sweden, a quite new but an effective tool to minimize the disturbance around the construction sites, implementation of Mobility Management during the construction phase.

The concept of Mobility Management during the construction phase is to create sustainable travelling choices and encourage road users to utilize these choices when travelling from one point to another (Trafikverket, 2013 (b)). During the construction phase, Mobility Management is supposed to stimulate the road users’ behaviour and thereby reduce the number of vehicles in traffic by transferring motorists that are driving alone to public transport, carpooling, biking or walking (Trafikverket, 2012).

The construction phase often involves a deterioration of mobility for the road users (Trafikverket, 2012). Back in the days it was common to focus on actions to maintain the capacity for car users. As a result of that the trafficability for public transport, bicyclists and pedestrians has often been prioritize lower. It has for example been common to shut down a bicycle road without replacing it with another temporary road or letting the buses drive in the same lane as the cars and thereby be delayed because of queuing. If implementation of Mobility

Management should become successful it is necessary to offer competitive modes of travel that are attractive.

Earlier experience shows that people are open for changes when their external changes are affecting their lifestyle or travel habits (Trafikverket, 2012). It is therefore an advantage to implement Mobility Management during the construction phase. The reason is that the road users often are more motivated to change their traveling behaviours if the constructions affects their travels habits (Trafikverket, 2013 (b)).

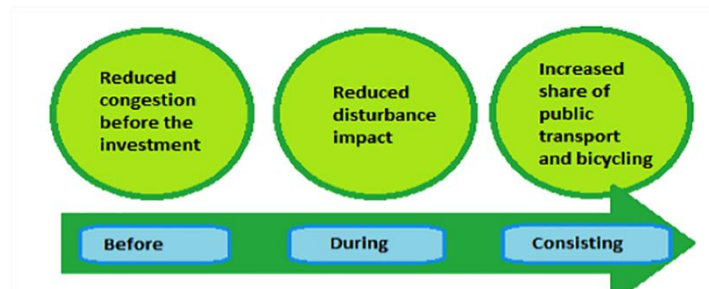


Figure 3 MM during the construction phase can give persistence effects [Inspired by (Trafikverket, 2012)]

Mobility Management can help the road users to find new ways to travel. If the road user's new way of travel is fast, smooth and secure there is a good chance that the road user will continue to travel like this, even after the construction is completed, see Figure 3 (Trafikverket, 2012). Experience also shows that travellers make greater sacrifices if disturbance is under a short time period. If the disturbance is lasting too long the motivation for changes among the travellers becomes more solid.

Mobility Management during the construction phase includes besides "soft" measures also "hard" measures (Trafikverket, 2012). The reduction of vehicles in traffic during a construction phase can either be reached by (see Figure 4):

1. Improvements of sustainable transportation choices by improved design and range.
2. Measures that affects the travellers behaviour i.e. guiding and information.

Both the improvement for sustainable transport and the behaviour-affecting measures are necessary for the Mobility Management to become successful.

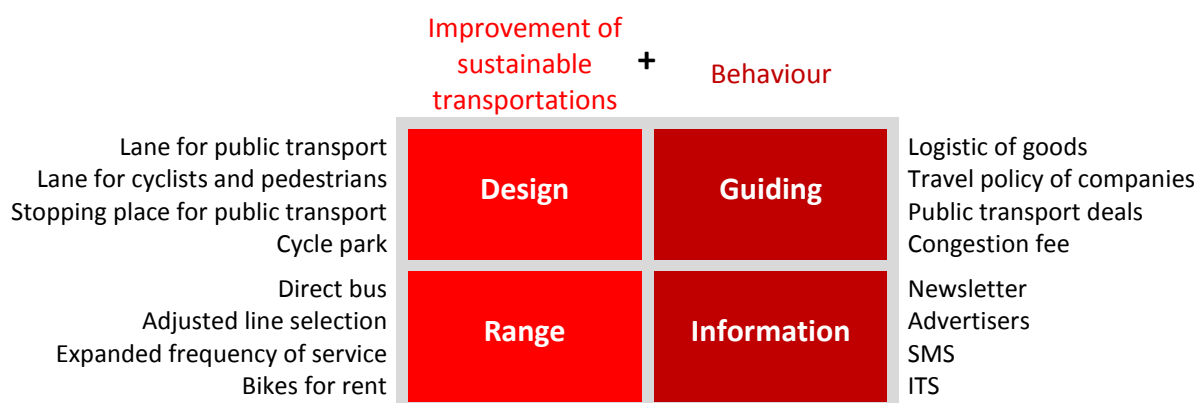


Figure 4 Mobility Management actions during the construction phase [Inspired by (Trafikverket, 2013 (b))]

2.1 Measures to improve the sustainable transportations

One of the two measure parts in Mobility Management during the construction phase is to improve the sustainable transportations. This is an important part since the second part, the behaviour-affecting measures, will be more efficient if the road users have good sustainable transportations to choose from. The improvement of the sustainable transportations can be divided into Design and improved Range.

2.1.1 Design

To be able to pass a construction site smoothly and effectively with as many different modes of transport as possible, it is important to have a good trafficability for pedestrians, bicyclists, public transport and carpoolers during the whole construction phase (Trafikverket, 2012). The public transport will not become attractive if it is stuck in a queue with other vehicles. An appropriate measure to solve this problem is to build separate lanes for the public transport and temporary, accessible, bus stops. In some cases this lane can also be used by carpoolers and trucks to encourage people to carpool. Another solution how to decrease the number of vehicles on the road during the construction phase is to construct temporary or permanent incentive parking or commuter parking for cars and bicycles. These parking spots will contribute to an increased accessibility for public transport.

As for the public transport the planning for the pedestrians and the bicyclists need to be made carefully (Trafikverket, 2012). To increase the attractiveness for these modes of transport, the capacity on the existing lanes needs to be maintained in the same time as the capacity is increased by keeping the lanes open for traffic or building new, temporary, lanes. Many of the trips that are made by cars can often be replaced by a walk or a bike trip. By increasing the capacity and accessibility of the local and the regional cycling routes the bikers can increase, even the long distance bikers. If the cycling route passes through more than one construction site, interaction between those projects involved is important to make the route attractive and easily oriented.

2.1.2 Range

The public transport range can be improved by e.g. adjusted line selection, offer buses that travel directly through or pass the construction area, increased frequency of bus/tram/train and enhanced connections to/by buses and rail traffic. Improvement of range can also be made in cooperation with companies that are located inside the construction influence area. An interaction with companies can lead to improved conditions for their employees. This can for example be carpooling, bicycle rental, telecommuting, meetings without travels, less parking spots and opportunities for bicycle commuting i.e. bicycle garage, dressing rooms, showers etc. All are measures to make the employees to commute less by car.

2.2 Behaviour-affecting measures

The second measure part in Mobility Management during the construction phase is to change the travellers' behaviour (Trafikverket, 2012). The measures are divided into two subgroups, Guiding and Information. Unlike the measures to improve the sustainable transportations the measures that influences the road users' behaviour do not necessarily require great financial investments and are characterized to have a positive net present value (Trafikverket, 2013 (b)).

What characterize the behaviour influencing measures is that they often improve the efficiency of the improvement of sustainable travelling measures (Trafikverket, 2013 (b)).

2.2.1 Guiding

The guiding measures are sometimes seen as “sticks and carrots”, meaning that the guiding measures can be both nice and punishing (Trafikverket, 2012). The “sticks” can for example be congestion fees or increased cost for parking tickets. These economic instruments can affect the road users’ choices and behaviours in great extent. There are also nicer ways to subsidize other modes of travels, called “carrots” (Trafikverket, 2012). It can for example be free or cheaper public transport during a period, possibilities to bring the bike on the train or offering bicycles to borrow, shuttle bus service to bus/train stations or incentive parking/commuter parking.

The guiding measures might have some initial cost or investment, as to put up a congestion fee system or to cover the cost of offering a free public transport travels for two weeks (Trafikverket, 2013 (b)). In the long term the money that has been invested in these type of measures will be generated back later. The congestion fee will generate in money every time a vehicle pass through the stations and the public transport will in the end generate in more travellers. If the guiding measures are backed up with information measures the Mobility Management result will be even more significant.

2.2.2 Information

To inform the road users about the upcoming situation is one of the most important things to do during a construction phase (Trafikverket, 2012). The information purpose is to make the road users conscious of when the construction is about to start and finish, which scope and disorders the construction site will have and which options there are to pass the construction site. When planning for this type of Mobility Management measure it is important to remember in which way the road users prioritize their actions because of disorders in the traffic system. Firstly the road users change their route, secondly travelling at a different time, for the third using another mode of transport for their travels and last the road users change their destination or cancel the trip. This might result in that all road users will not choose the most appropriate choice seen from the project manager’s perspective.

Different people travel differently and therefore different types of information measures are needed (Trafikverket, 2012). Information which is addressed to a specific audience is often more effective than general flow of information. What applies to all road users is that the information needs to reach its audience in advance of the upcoming changes. This is especially important when it comes to inform companies, public transport and trucking companies where changes in the daily basis need time.

There are many different ways to spread information e.g. through Internet, SMS, radio, television, newspaper etc. (Trafikverket, 2012). Intelligent Transportation System, ITS, solutions are a good way of giving the road users information for example during the trip. It can for instance be signs that warns the road users if an accident has occurred on the road they are driving on or monitors at the bus stop, informing the traveller when the next buss arrives

(Trafikverket, 2013 (c)). The ITS system can be used to both mass distribution and individually adapted information (Trafikverket, 2012).

2.3 Why Mobility Management is important

Mobility Management is not just about vehicles, it is about creating good opportunities and accessibility for all road users (Trafikverket, 2013 (b)). For example, Mobility Management does not just ensure that the bus or train can stop at certain places, it also ensures that the travellers can reach the bus stop in a safe, secure and conveniently way, including all road users, during a construction phase. This can be made by clear road directions, sophisticated solutions of redirected roads and maintenance of pedestrian and bicycle lanes. At the Swedish Transport Administration children have a specific audience in Mobility Management. It should be safe for children to walk to and from school during a construction phase. It is therefore important to support the parents with information that might be needed to ensure a safe for the children.

It is not always possible to travel with the public transportation the entire trip, Mobility Management is then to create opportunities for combined trips (Trafikverket, 2013 (b)). A combined trip is to travel with more than one type of vehicles, for example combining car with public transport (bus, tram or train) or bicycle with public transport. It is then important to create parking spots for the cars and bicycles that are left when the traveller is changing to public transport. These parking spots should be close to bus stops and train stations etc.

2.4 Examples of construction sites where Mobility Management has been used

This chapter is supposed to illustrate projects where Mobility Management has been used earlier during a construction phase, what measures were used and how successful the Mobility Management became related to the specific project. The chapter will give examples of Mobility Management work in both American and European countries.

2.4.1 Sweden: Älvsborgsbron, Gothenburg

The summer 2008 repair works were performed on Älvsborgsbron (Lundgren, et al., 2008). During the maintenance one lane in each direction, total two of six, were closed for traffic and long queues were expected during rush hours. To avoid long queues the Swedish Road Administration came up with strategies to make the daily 2500 commuters travel at different times, take another route or choose another mode of transport. Total four different types of strategies were made, physical measures, improved range of trafficability, guiding and information.

Physical measures that were used were both relocation and optimization of land, which prioritised the vehicles on the highway over vehicles on local access roads (Lundgren, et al., 2008). The trafficability for pedestrians and bicyclists was prioritized by having a combined pedestrian-bicycle road open during the entire construction phase. To improve the range of trafficability a new bus line, with a schedule adjusted to commuter trains and existing bus lines, was inserted between Mölndal and Volvo Torslanda/Arendal. A new regional webpage was also established to be able to match carpoolers. A ban for slow vehicles during rush hours was set up during the maintenance period. The Swedish Road Administration also had an information campaign so the road users could plan the travel. Information was given by signs

connected to the construction area, newspaper, radio and television, traffic information in dynamic real time etc.

The combination of traffic analysis, information in an early stage and interaction between stakeholders, the Swedish Road Administration, Västtrafik (Lundgren, et al., 2008), Port of Gothenburg and the City of Gothenburg generated in a reduced queuing time and reduced congestion during the construction phase. The travelling time to pass the bridge was even five to ten minutes shorter during rush hours under the maintenance period than before the maintenance started. The total cost for the repair work was about SEK 71 million which the Mobility Management measures accounted for SEK 4.3 million i.e. equivalent to about six percent of the total costs.

2.4.2 Sweden: Roundabout on route E65, Svedala

In the end of 2007 a new roundabout was constructed during one month on road E65 close to Malmö airport (Lundgren, et al., 2008). The constructions resulted in a shutdown of the exit to the airport, road 813, and the traffic to the airport was instead redirected through road 108. The redirection resulted in a detour up to 15 kilometres for the traffic that was driving towards the airport. The redirection also caused a risk of queuing during the rush hours.

To reduce the congestion in the construction area the Swedish Road Administration together with Skånetrafiken tried to get more people to travel with public transport, by offering 100 car-commuters free public transport rides (Lundgren, et al., 2008). Information signs, about the constructions and the test travellers, were put up three weeks before the construction start. Information was also given through radio, newspapers and the project's webpage. Together these measures decreased the traffic with about eight percent and 30-40 percent of the test travellers have continued to travel with public transport. The total cost of the roundabout construction was SEK 12 million. The Mobility Management measures accounted for SEK 240 000 of the total costs which is approximately two percent.

2.4.3 Holland: A10 Orbital motorway, A9 Gassperdammerweg

In the summer 2006 the motorway A9 Gassperdammerweg in the south-east part of Amsterdam underwent a major roadwork including shutdowns of several entrances and exits (Lundgren, et al., 2008). The area daily has over 55 000 employees and about 40 000 visitors. Around 60 percent of the 55 000 employees are car commuters. The Rijkswaterstaat's goal was to decrease the car traffic during rush hours with about 5000 cars by implementing Mobility Management measures.

In an attempt to reach the goal two new bus lines were implemented during the construction phase (Lundgren, et al., 2008). To make people to commute with each other 60 extra buses were used in a vanpool and local employers were urged to invest one hour salary per employee in Mobility Management measures. A webpage was established with information about the project, how to travel and traffic information. The project also had personal travel advice, free public transport (Zuidoost Pas), and free bicycle rental. During the construction phase more than half (about 17 000) of the car commuters used the Zuidoost Pas and about 3 700 car commuters daily travelled with public transport.

2.4.4 Ireland: Dublin Port Tunnel

Constructing of The Dublin Port Tunnel, 2001-2006, caused traffic disruption for the 32 000 vehicles per day on both the M1-Motorway and the Swords Road reservation-N1 (Lundgren, et al., 2008). Simulations showed that halving of lanes, from four to two, would cause more than three kilometres long queues and a 66-85 percent increased queuing time during rush hours. To minimize the congestion the planning of the tunnel, which started in 1996, included consultations with public stakeholders. Three month before the constructions started a Traffic Forum was formed to once a week to coordinate implementation of the plan and to executive the consultation meetings. During the constructions the group continued to meet once a month to discuss changes.

To prioritise the intercity buses, which normally traffics the roads by one bus per minute during rush hours, new “Quality Bus Corridors” were build or old corridors were expended (Lundgren, et al., 2008). The bus corridors were also prioritized on entrances and exits during rush hours and the public transport in the area was expended to become more accessible. The road users were informed about the situation, delays and alternative roads both through the projects official website and through radio, television and newspapers.

The investments in the public transport resulted in retention travelling times for the intercity buses and a 32 percent increase of public transport users (Lundgren, et al., 2008). The transfer to public transport also had a positive effect on the other vehicles. The travelling time for vehicles, excluding buses, only increased with approximately three minutes (25 percent) and the queues became around 1.1 kilometres long.

2.4.5 USA: Springfield Interchange, VA

Springfield Interchange is the place where the highways I-95, 395 and 495 meets and is known for one of the most trafficked nodes in USA (Lundgren, et al., 2008). Between 1999 and 2007 the Springfield Interchange was improved, a road construction which included more than 50 flyovers, 30 entrances and exits, 220 electronic signs, diversions and improvements of existing lanes. The project spent \$10 million of the projects total \$675 million on Mobility Management measures in order to reduce the traffic with 1 000 vehicles per hour during rush hours, total 2 500 vehicles during the entire rush hour.

To reach the goal some lanes were reserved for vehicles with two passengers or more during rush hours (Lundgren, et al., 2008). Some lanes also became reversible with a custom direction and were thereby increasing capacity during rush hours. To make the road users transfer to public transport, free commuter parking were expended in the same time as the capacity of the commuter train and bus system was improved. In the same time the public transport prices for both buses and trains were reduced. Buses were also used as shuttle buses from certain commuter parking. To help companies to establish or expand its program for telecommuting a Telework program was designed. The project informed the road users by campaigns in radio, television and newspapers. The projects also had an official website with information of disruption and public transport etc. Local shopping malls that sold public transport cards also gave personal travelling advices and advising for commuters and carpoolers.

The Mobility Management measures resulted in a changed travelling time with almost 60 percent, more than eight percent of the car users transferred to public transport and eight percent were telecommuting (Lundgren, et al., 2008). During the hardest working period eight out of ten road users were positive to the projects and its Mobility Management program.

3 The West Swedish Agreement

The Gothenburg Region is growing rapidly, with around 10 000 habitants per year (Västsvenska Paketet -en satsning som öppnar för framtiden, 2014). Many of those who move to the Gothenburg district will most likely live or work in the city area. This implies a huge challenge for the traffic system. Therefore the Gothenburg Region needs to emphasize on infrastructural investments to be able to become a modern conurbation and still manage the continuing population growth.

The West Swedish Agreement is a series of infrastructural initiatives on roads and railways for trains, buses, trams, bicycles, cars and pedestrians (Västsvenska paketet, 2012). The agreement will contribute to a sustainable development of the Region of Västra Götaland. The goal is to build a transportation system that can manage the future inhabitant growth at the same time as it creates conditions for Gothenburg to become an attractive kernel of the region (Västsvenska Paketet -en satsning som öppnar för framtiden, 2014).

The total cost for the West Swedish Agreement is SEK 34 billion (Västsvenska paketet, 2012). The state has agreed to invest SEK 17 billion. The remaining part of the investment is financed from Region of Västra Götaland, Region Halland and the City of Gothenburg along with the incoming congestion fee in Gothenburg. Besides being a part of the finances the congestion fee also contributes to less cars in the city area and thereby a healthier environment (Västsvenska Paketet -en satsning som öppnar för framtiden, 2014).

Together, the projects in the West Swedish Agreement, will become the largest infrastructural investment in modern times (Västsvenska Paketet -en satsning som öppnar för framtiden, 2014). All the investments, which are financed by the West Swedish Agreement, endeavour to create conditions to make Gothenburg to become an attractive city region.

The West Swedish Agreement contains both larger and smaller projects (Västsvenska paketet i ett större perspektiv, 2014). Below, in chapter 3.1 are a few examples of the projects, it is however important to have in mind that the Agreement contains more than the examples below.

3.1 Some of the projects in the West Swedish Agreement

One important part of the West Swedish Agreement is to increase number of travellers in public transport (Västsvenska Paketet -en satsning som öppnar för framtiden, 2014). If more people can travel together there will be less cars in the transport system, which is good for both the congestion on the roads and the environment. The goal is therefore to double the number of public transport passengers until year 2025¹. To achieve that, the public transport needs to become fast and reliable. Building separate bus lanes on the roads to and from Gothenburg city, is an example of approaches that already have been made (Västsvenska paketet, 2012). Another approach is to get new longer commuter trains. The new trains need longer platforms and therefore around twenty platforms in the region have been expanded (The dream of the good life, 2012). It is not always possible to travel the entire journey with one alternative mode of transport (Trafikverket, 2013 (b)). To encourage road user to travel with alternative modes

¹ Lisa Örberg, Strategist, Trafikverket, Meeting, January 22nd 2014

instead of the car, at least a part of the journey, bicycle paths, bicycle parking and commuter car parking areas are being built (Västsvenska paketet, 2012).

Travelling by train is both a green and a fast way of travel (Västsvenska paketet i ett större perspektiv, 2014). Today the Gothenburg Central is crowded with many disorders as a result. If the proportion of train passengers will increase as the goal comprises, the capacity of the Gothenburg Central needs to be more than doubled. This can be fulfilled by leading the trains into a train tunnel with new stations underground. In that way the trains do not have to turn around and the capacity at the Central Station increases.

The West Swedish Agreement also contains a new bridge and a new tunnel over the river Göta Älv (Västsvenska paketet, 2012). The new bridge will replace the old bridge, the Göta Älv Bridge, which is in poor condition and therefore must be replaced by year 2020. The bridge is important since it is the only crossing for trams. The new tunnel is supposed to reduce the traffic pressure at Tingstadstunneln where 120 000 vehicles are travelling through every day. An accident close to the tunnel area will generate in kilometre long queues. The new tunnel will be linked to all the major roads and will therefore be a contributing factor to reduce the traffic pressure in various parts of the city.

3.2 The Block 2 contract

In order to create good working relationships all projects within the West Swedish Agreement have signed contract called “Block contract” (Västsvenska paketet, 2013). The contract is updated periodically and the latest version, the Block 2 contract, was signed 2014. The contract requires that projects within the West Swedish Agreement are interacting with projects, who are considered necessary to interact with, to make the trafficability in the city a success. The contract also states that a project should take the trafficability for all modes of transport into account, but focus on the trafficability for pedestrians, bicyclists, public transport and freight traffic, when planning and performing the constructions. The Block 2 contract also requires projects to work actively with Mobility Management during the construction phase.

3.3 Trafik 2016

Since more projects than the projects included in the West Swedish Agreement will be constructed during the same time schedule, the Block 2 contract says that the parties of the West Swedish Agreement together with Västtrafik AB shall operate a traffic coordination work, called Trafik 2016 (Västsvenska paketet, 2013). The mission of Trafik 2016 is to improve the target achievement for the West Swedish Agreement’s outcomes and indications through coordinated planning and balanced actions¹.

To be able to do this Trafik 2016 needs to coordinate the planning for all projects in the Gothenburg Region between year 2015 and 2017. The goal of Trafik 2016 is to create a Mobility Management that prioritises the trafficability for goods, public transport, bicyclists and pedestrians from year 2015 and onwards. The work in Trafik 2016 is backed up by the group Nya Vägvanor (e. new travel habits) whose mission for example is to support the projects in reaching the road users that are hard to identify. In that way the projects become more likely to

¹ Karin Sandstedt, Traffic Coordinator, Trafikverket, Mail contact, November 28th 2013

manage to inform the majority of the road users about the upcoming traffic situation and new available travelling alternatives¹. Their mission is also to facilitate the communication between different projects and in that way ease the interaction between projects.

¹ Lisa Örberg, Strategist, Trafikverket, Meeting, April 29th 2014

4 Involved projects

Besides all projects in the West Swedish Agreement, Trafik 2016 also includes other projects at the Swedish Transport Administration, in City of Gothenburg and events¹. Not all projects in the Gothenburg Region are included in Trafik 2016, only those who will be constructed during the year 2016 or those being planned to be constructed during this time. For the moment Trafik 2016 includes nearly 50 projects, located in the Gothenburg Region. Below follows a short description of the projects that are included in this survey.

4.1 Marieholmsförbindelsen

The Marieholmsförbindelsen is an infrastructure project that both includes road and railroad, which consists of two parts (Trafikverket, 2014 (b)). Partihallsförbindelsen is the first part and was built during the years 2008-2011 (Trafikverket, 2014 (c)). Partihallsförbindelsen is a bridge that connects Ånäsmotet, at the highway E20, to a new junction on the highway E45 in Marieholm. The second part, which is included in Trafik 2016, contains two different projects, a bridge, Marieholmsbron, and a tunnel, Marieholmstunneln (Trafikverket, 2014 (d)). The plan is to build the tunnel under the river Göta Älv which will serve the vehicle traffic and a railway bridge over the river to serve the train traffic. An overview of the Marieholmsförbindelsen can be seen in Figure 5 below.

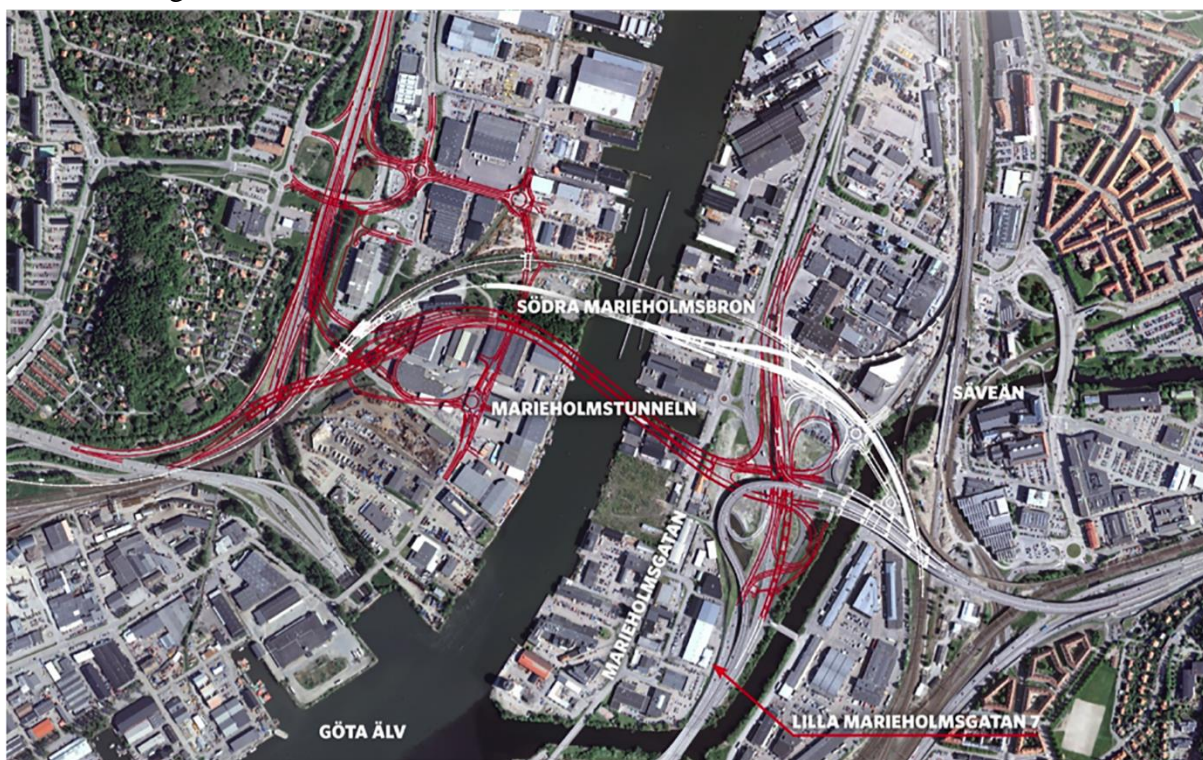


Figure 5 Overview of the Marieholmsförbindelsen which includes a new road tunnel and a new railway bridge [Taken from Eva Kraft, Marieholmsförbindelsen, Trafikverket, mail contact May 12th 2014]

4.1.1 Marieholmstunneln

As a part of the Marieholmsförbindelsen a 500 meter long tunnel, Marieholmstunneln, with three lanes in each direction will be built (Trafikverket, 2014 (e)). The tunnel is included in the West Swedish Agreement and is in a way a continuation of the Partihallsförbindelsen, a link to

¹ Karin Sandstedt, Traffic Coordinator, Trafikverket, Supervision meeting, January 23rd 2014

connect E45 Marieholm and Partihallsförbindelsen to the E6 highway. The construction of the tunnel has already started at the southern side of Göta Älv, where it connects to the highway E45, see Figure 6. The constructions at the northern side where it connects to the highway E6, is planned to start in the beginning of 2015. The whole projects is scheduled to be finished by the end of 2020.



Figure 6 The Marieholmstunneln connects to the E45 through a junction on the south side of the river, Göta Älv (Trafikverket, 2014 (e))

The tunnel will strengthen the road system to a great extent and at the same time increase the traffic safety and promote the environment and regional development (Trafikverket, 2014 (e)). It will also unburden the traffic load in the Tingstadstunneln that is becoming a problem in the traffic system. Subsequently the accessibility to the industrial area on the west side of Hisingen will improve and likewise the access to Norra Älvstranden and the Port of Gothenburg will improve.

4.1.2 Marieholmsbron

The Marieholmsbron is a single railway bridge over the Göta Älv which today is a bottleneck in the Gothenburg's train system (Banverket, 2006). The bridge is open able to let through sea traffic but when the bridge needs to be opened it affects the train capacity and causes delays in the train network. Today the bridge has maximum capacity of four commuter train and ten freight train per hour. That capacity can only be achieved if the bridge stays closed during the hour.



Figure 7 The new bridge will be located between the old railway bridge and the Marieholmstunneln (Taken from Eva Kraft, Marieholmsförbindelsen, Trafikverket, mail contact May 12th 2014)

To solve these capacity difficulties and make the train system more reliable, a new 1.5 km bridge, Marieholmsbron, will be built (Trafikverket, 2014 (g)). The new bridge will be built close to the old one on the west side and reaches from Olskroken to Kville, see Figure 7. The constructions started 2013 and the bridge will be open for traffic 2016/2017¹. The bridge will contain a double railway and also a path for cyclist and pedestrians (Trafikverket, 2014 (g)). The change from a single to a double railway will increase the capacity on the railroad towards the industry areas on Hisingen and Port of Gothenburg.

4.2 Västlänken

Västlänken is a tunnel for commuter train that will be built under central Gothenburg and is a part of the West Swedish Agreement (Trafikverket, 2014 (i)). Västlänken will become an eight kilometre long commuter train connection of which six kilometre constitutes of tunnel (Trafikverket, 2014 (j)). The project also includes three underground train stations, at the Central Station, north of the bus terminal Nils Ericsonterminalen, at Haga and at Korsvägen, see map with route and location of stations in Appendix A.

With the tunnel it is possible for trains to pass through the city without turning around at the Central Station (Trafikverket, 2014 (i)). In this way the trip will become faster and easier and the travellers will need less changes of vehicles to reach its target. Västlänken will also contribute to a developed public transport since the tunnel itself will result in a higher capacity which means a higher frequency of commuter trains (Trafikverket, 2014 (j)).

Västlänken will have a double track through the tunnel (Banverket, 2007). The station at the Central Station will be a four track station while the other two stations, Haga and Korsvägen, only will have a double track with a future opportunities to be expanded to a four track station if needed (Trafikverket, 2014 (k); Banverket, 2007). The techniques that will be used for constructing the tunnel might be either cut and cover, TBM or drill and blast (Banverket, 2007). The cut and cover method is the one of the three methods that will cause a severe traffic disruption since it includes huge excavations. The preparatory work will start in 2016 and the construction start is set to 2018 and will be finished 2028^{2,3}. The Central Station are planned to be completed 2023/2024.

4.3 Hisingsbron

The Göta Älv Bridge, which crosses the river Göta Älv from Lilla Bommen over to Hisingen, opened in 1939 and is now in poor condition (Smederöd, 2012). A new bridge, Hisingsbron, will therefore be built to replace the old one and counts as a project in the West Swedish Agreement. The constructions will start in the beginning of 2015 and are estimated to be finished the summer 2020⁴. The Hisingsbron will be located east of Göta Älv Bridge and old bridge will be kept open during the constructions on the new bridge and will be demolished when the construction of the new bridge is completed. The Hisingsbron is estimated to be opened for car traffic by the autumn 2019 and for buses and trams by the autumn 2020.

¹ Stein Kleiven, Tunnel Project Manager, Marieholmsförbindelsen, Trafikverket, interview March 31st 2014

² Josefin Larking, Project Manager for MM, Västlänken, Trafikverket, interview March 17th 2014

³ Hanna Jonsson, Traffic Construction Manager, Västlänken, Trafikverket, interview March 17th 2014

⁴ Viveca Karlsson, Project Manager for Traffic, Hisingsbron, Trafikkontoret, interview April 10th 2014

The Hisingsbron has been designed to become more accessible for pedestrians and cyclists. It is also designed to be able to serve more public transport capacity than the old bridge, the Göta Älv Bridge (Adolfsson, 2013). The Hisingsbron will provide two lanes in both direction for regular car traffic and one lane in both directions for pedestrians and cyclists on each side of the bridge. The new bridge will also have special field in the middle of the bridge for public transport in both directions.

4.4 E45, Götaleden

In order to fit in the new bridge, Hisingsbron, which is lower than the old Göta Älv Bridge, the thoroughfare, E45 Götaleden, needs to be adjusted (Trafikverket, 2014 (a)). The City of Gothenburg is also planning to build Bangårdsförbindelsen, a bridge over the railyard to connect the parkway corridor, Alléstråket, with Gullbergsvass and thereby make the route Drottningtorget to Nils Ericsonsplatsen more available for pedestrians and bicyclists (Göteborgs Stad Stadsbyggnadskontoret, u.d.) (Göteborgs Stad, u.d. (a)). With two new bridges to fit in, the thoroughfare needs to be lowered and straightened up between Stadstjänarebron and Falutorget (Gasklockan), around 800 meters, see number one in Figure 8 (Trafikverket, 2014 (a)). The lowering of the E45 is a part of the West Swedish Agreement.

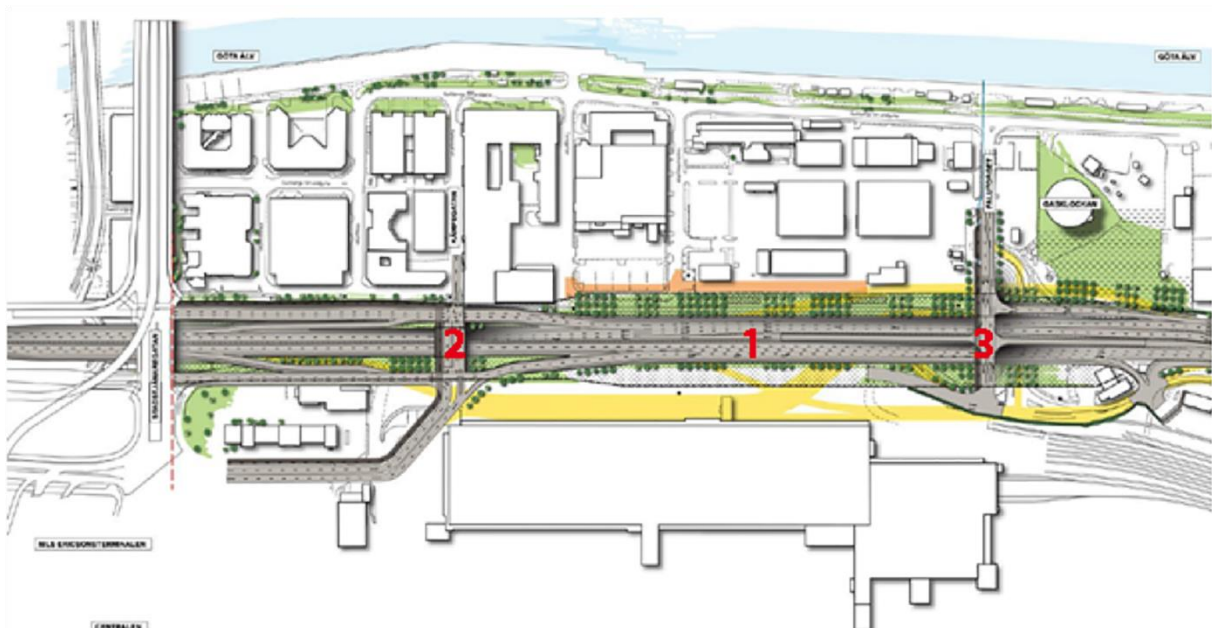


Figure 8 Illustrated Plan drawing. 1 Lowering of E45. 2 Junction at Kämpegatan. 3 Flyover at Falutorget. (Trafikverket, 2013 (c))

The lowering of the E45 has beyond the adaption of the new bridges, advantages in both safety perspectives and available perspectives (Trafikverket, 2013 (a)). The lowering of the thoroughfare will also have a positive impact in a health, noise and air quality perspective. In the future it is also possible to put a deck over the road and in that way make environment more available for pedestrians and opens up for a central urban development.

Associated with the lowering of the E45, the intersection at Falutorget is rebuilt (Trafikverket, 2013 (a)). The section at Falutorget will get an expansion in form of a flyover, see number three in Figure 8. The new flyover is not supposed to be seen as a complete traffic junction and road users that are coming from E45 driving in west direction, will not be able to turn right at the

junction¹. To compensate for this, an entire new junction will be built at Kämpegatan, see number two in Figure 8. The result of the expansion with a flyover, at Falutorget, will bring increased security for both vehicles, pedestrians and bicyclists (Trafikverket, 2013 (a)). It will also increase the accessibility for the vehicles that are driving on the thoroughfare E45. The lowering of the thoroughfare will start in 2015 and will be opened for traffic 2020².

4.5 Skeppsbron

Skeppsbron lies between Rosenlundskanalen and Stenpiren that is both central and close to the river Göta Älv (Älvstranden Utveckling, u.d. (a)). Today this area is not utilized very efficiently and is mainly use for parking places. For many years the traffic around the area has been a barrier to the river but with the opening of tunnel Götatunneln, 2006, possibilities to revive the area came along. It is on the agenda to make this area of the new Gothenburg's central meeting point by the river. It will be made to an attractive urban area where people meet and enjoys their spare time and will have exciting range of restaurants and shops and also have resident's apartments.

The project has been divided into two parts with one local plan each, local plan one and two. The first local plan, which is divided into three stages, stage A, B and C, is an important part of the project is to make Stenpiren to a node where people can change between the bus, tram or the ferry³ (Älvstranden Utveckling, u.d. (b)). A new tram link will be built between Järntorget and Lilla Torget. The link is important to strengthen the tram system especially since the capacity has increased because of the congestion fee that was established 2013 (Transportstyrelsen, 2014) (Älvstranden Utveckling, u.d. (b)). The construction on the new tram link started in March/April 2013 and is planned to be opened for traffic August 2015³.

The second part is to build 400-450 apartments and additionally about 30000 m² for restaurants, hotels, offices and shops (Älvstranden Utveckling, u.d. (b)). The goal is to make Skeppsbron area to a model for sustainable development. Skeppsbron will have clear environmental profile with both green walls and roofs as well as solar panels. Environmental technology will even be used to make the buildings energy efficient. When the constructions of the second local plan will start is not established, the local plan was approved by the Building Committee in September 2013 and is waiting to gain legal force (Göteborg Stad, u.d. (b)).

4.6 Älvsborgsbron

Between the years 2015 and 2018 the Swedish Transport Administration is planning to perform maintenance work on Älvsborgsbron⁴. The maintenance will be proceeded during the summer half-year, starting in April and end in October. The maintenance work means renewal of the edge beams and the bridge railings.

¹ Lennart Olsson, Subproject Manager, E45, Trafikverket, meeting February 11th 2014

² Per Eriksson, Project Manager, E45, Trafikverket, interview March 20th 2014

³ Emir Halalkic, Assistant Project Manager, Skeppsbron, Trafikkontoret, interview March 11th 2014

⁴ Per Thunstedt, Project Manager for Planning, Älvsborgsbron, Trafikverket, interview March 24th 2014

4.7 Lundbyleden, Kvillemotet

The thoroughfare Lundbyleden between Brantingsmotet and Ringömotet in the Hisingen area will be reconstructed (Trafikverket, 2014 (h)). The plan is to change it to a safer and a more easily oriented road. One important part of the reconstruction is the construction of the new junction, Kvillemotet, located between the two junctions Leråkersmotet and Brunnsbomotet. The reconstruction of Kvillemotet is one of the projects in the West Swedish Agreement.

One of the main reasons for constructing Kvillemotet is to replace Brunnsbomotet that has a high accident rate but also to emphasize on its function as a local and a regional road¹ (Trafikverket, 2014 (h)). Another reason for these reconstruction is to reduce the traffic density on Gustaf Dahléngsgatan, Hjalmar Brantingsgatan and the Göta Älv Bridge/Hisingenbron (Göteborgs Stad Stadsbyggnadskontoret, 2013). The new junction will make development possible in the areas around Backaplan and Brunnsbo and subsequently improve the connection to the local road system.

The feasibility study of Kvillemotet proposes a junction with two lanes in each direction for the traffic passing through and then additionally it will contain lanes and ramps that connects the junction to the local roads system, see Figure 9 (Trafikverket, 2014 (h)). The constructions will start in 2017 and is estimated to be opened for traffic the summer 2019.

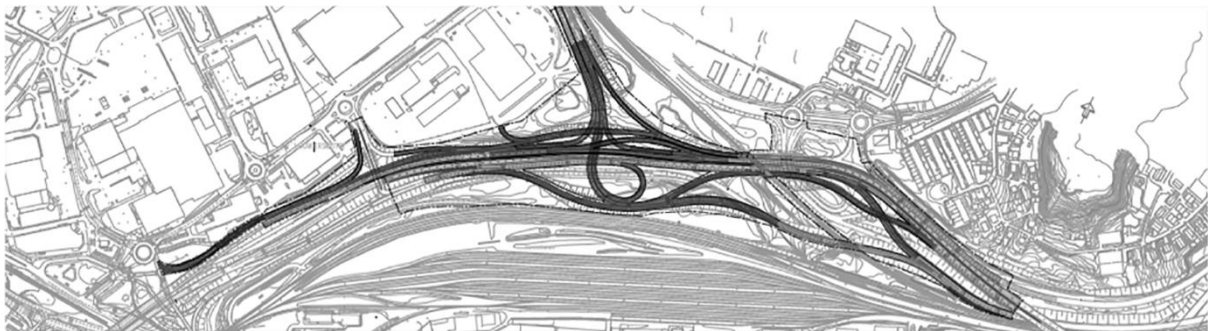


Figure 9 Drawing of Kvillemotet from the feasibility study with reservations of changes due to the work with the Development Consent Order (Trafikverket, 2014 (h))

4.8 Backaplan

Backaplan is a big area located not so far from Gothenburg central but still the area is not utilized efficiently (Älvstranden Utveckling, u.d. (c)). The area is a former industry area and still bears that look. The soil is poor and the area is mainly used for parking areas and traffic barriers. Although the area is popular for shopping it still lacks attraction for both people and vehicles. The shops are scattered over the area that makes it more suitable for car users².

Backaplan is a big area and is close to central and has good transportation connections to the central (Älvstranden Utveckling, u.d. (c)). Because of the size of the area it has a great potentials to meet the demanding need for more apartments in Gothenburg. The plan is to develop the area into an attractive residential and commercial area. It is estimated that around 4000-5000 new apartment can be built within 20 years. The plan is also to improve conditions for cyclists and pedestrians.

¹ Lennart Olsson, Project Manager, Kvillemotet, Trafikverket, meeting February 11th 2014

² Pär Sköld, In-house Consult at Trafikkontoret, COWI, Backaplan, interview March 20th 2014

It is required by Swedish law that a local plan of a proposed land use of an area has to be made before a construction can gain legal force¹. Because of the size of the area of Backaplan a more detailed comprehensive plan was made. Since the politics and the stakeholders, the dominant owners of the land, could not negotiate to an agreement the project was put on hold. When it turned out that the Marieholmsförbindelsen and Lundbyleden/Kvillemotet was on schedule the Backaplan project was forced to be taken up again. In order to be able to connect the Marieholmsförbindelsen to Lundbyleden the infrastructure on Backaplan and the junction Kvillemotet must be finished. That puts a pressure on the infrastructure on Backaplan so the constructions it were divided into two parts, each with one local plan, one for the infrastructure part and one for the housing part. This survey will only investigate the infrastructural part.

The local plan includes two railway flyovers, one at the crossing Minelundsvägen/Lillhagsvägen and another at the crossing Backavägen/Lillhagsvägen¹. The local plan will also include a new road with high capacity that connects the new flyovers to the new Kvillemotet. The local plan will promote a good access to public transport buses and a good standard condition for pedestrians and bicyclists. It is also structured so that a connection to trams and a train stop at Brunnsbo will be possible in the near future.

What distinguishes this project from other projects projected by a municipality is that the municipalities normally do not include railway in their constructions¹. The reason is that the Swedish Transport Administration has an order to take care of all constructions connected to railway embankments. The City of Gothenburg will therefore finance the planning and designing of the project while the Swedish Transport Administration will manage the construction part. The estimated construction time for the traffic part is three years and is the plan to start 2015 and be finished 2018, although it might be started one year later, 2016 and thereby be finished 2019.

4.9 Kville railyard

Train traffic will increase in the upcoming years because of the increased capacity that the new Marieholmsbron will supply but also because of the railway, Hamnbanan, will be doubled (Trafikverket, 2014 (l)). Hamnbanan is one of the most important railway in Sweden and its role is to make it possible to transport goods from all the Nordic countries to the Port of Gothenburg (Trafikverket, 2014 (f)).

The train traffic increase will result in higher requirements on the railyard Kville (Trafikverket, 2014 (l)). The Kville railyard therefore needs to be rebuilt to adjust to the upcoming changes and to be able to serve the increasing train capacity as well as to manage faster or longer trains in the future. The plan is also to replace several switches in the east and west switch-zones and to do appropriated adjustments to connect to the existing railways. Train traffic will be kept open while the constructions take place. The constructions will start 2015 and be finished 2016.

¹ Pär Sköld, In-house Consult at Trafikkontoret, COWI, Backaplan, interview March 20th 2014

5 Result

The result chapter has been divided into two parts, one that is presenting how Mobility Management during the construction phase is used in practise, chapter 5.1 and one that shows the result from the interviews of the nine selected projects, chapter 5.2.

5.1 Mobility Management in practise

To be able to compare the work with Mobility Management between state and municipal projects, interviews have been made with Mobility Management Coordinators at both the Swedish Transport Administration and the traffic and Public Transport Authority. Both the coordinators were asked the same questions, see question sheet one in Appendix B, and the answers are presented in chapter 5.1.1 and 5.1.2 below.

5.1.1 Mobility Management at the Swedish Transport Administration

Felicia Falk is a Mobility Management Coordinator at the Swedish Transport Administration's investment department¹. At the Swedish Transport Administration the Mobility Management Coordinator's role is to evaluate the needs for Mobility Management at an early stage in the construction phase and inform the project managers about the situation. The evaluation is done by reviewing the projects' needs assessment. If there is no existing needs assessment, the coordinator needs to create one and evaluate the need for Mobility Management according to the assessment. If the needs assessment shows needs for Mobility Management within the project a Mobility Management investigation is made, often by a consult. The entire Mobility Management process can be seen in Figure 10.

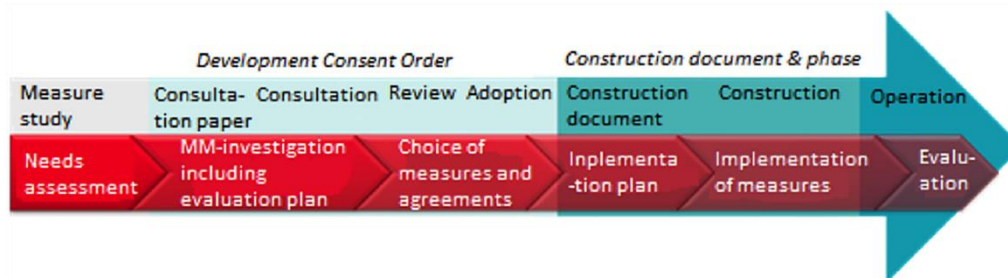


Figure 10 The Mobility Management process during a construction phase at the Swedish Transport Administration [Inspired by (Trafikverket, 2014)]

The Mobility Management Coordinator's task is to support the project in propulsion of Mobility Management under the construction phase and ensure the travellers perspective regarding transport during the construction phase¹. The coordinator's task is also, together with the project management and external parties, to consider the consultant's proposals. A part of the task is to have a holistic approach to the planning of Mobility Management measures for all the investment department's projects in the Gothenburg area.

According to Falk, Mobility Management during the construction phase can be divided into "soft" and "hard" measures¹. When it comes to Mobility Management in general the soft measures play the biggest role. The soft measures include information and communication. These actions encourage travellers to choose sustainable way of travelling and influence the

¹ Felicia Falk, Mobility Management Coordinator, Trafikverket, interview March 5th 2014

travellers to change their regular travelling behaviour to a more sustainable behaviour. The hard measures are more of a physical type of measures.

Mobility Management during the construction phase is in practice when both soft and hard measures are combined, describes Falk¹. It includes all the actions that are made to influence the travellers to choose sustainable ways of travelling in the surrounding of the specific construction area. Physical measures, like making separate lanes for public transport and car poolers to encourage people to choose trams, buses or travel together instead of travel alone in private cars are among these actions. The actions aim to make people change their travelling behaviour permanently.

In general everyone within the Swedish Transport Administration seems to be familiar with the term Mobility Management¹. The knowledge about Mobility Management is relative and changes have already been seen since Mobility Management was put into use. The Mobility Management has proved its usefulness in projects when it comes to time, cost and content and especially when it comes to more satisfied customers and project managers.

At Falk's section at the investment department, knowledge about Mobility Management, and the understanding why it is needed, is big¹. However Falk could not state that all the departments, inclusive the remaining parts of the investment department, at the Swedish Transport Administration have the same knowledge and understanding. Some might say that it is diffuse when to include Mobility Management in a project, e.g. Mobility Management might not be needed during a country road construction. It is also possible that some projects are working with Mobility Management without being aware of it.

When it comes to choose Mobility Management measures there are in fact no limitations¹. It is about being creative in every project dependent on the circumstances. Example of Mobility Management action is to offer free rides with public transports to encourage people to choose trams and buses instead of private cars. It can vary between projects where Mobility Management is applied in the construction phase. Usually it comes in pretty early in a form of needs assessment as described earlier in this chapter. Every project designed by the investment department, that has need for Mobility Management, have a template that needs to be filled out by a person that is most familiar with the project, the project manager in most cases. The template is filled out with information such as possible measures performed by the project and measures that other projects need to do. The template is later handed to the Mobility Management Coordinator that goes through it.

At the Swedish Transport Administration there are no special requirements of Mobility Management¹. However, according to the social department, that orders the projects, a project needs to do a needs assessment if the project might be in need of Mobility Management during the construction phase. All projects within the West Swedish Agreement, are also recommended to work actively with Mobility Management during the constructions according to the Block 2 contract.

¹ Felicia Falk, Mobility Management Coordinator, Trafikverket, interview March 5th 2014

If Mobility Management is needed, it is required that the entrepreneurs have knowledge about Mobility Management¹. Although, none of the projects at the investment department, which now are in the construction phase, have reached that stage, but when they do a Mobility Management knowledge will be required. Previous, now finished, projects at the investment department have though worked with Mobility Management during the construction phase before the technical handbook about Mobility Management and thereby Mobility Management investigations existed. There are plans to educate the entrepreneurs by making a folder in combination with a guide addressed to the entrepreneurs about what is expected on the construction site. The idea is that all projects, starting 2015 or later, should be educated. Education is important since working with Mobility Management within a project will not be effective if the entrepreneurs do not have understanding for it.

5.1.2 Mobility Management at the Traffic and Public Transport Authority

Anna-Karin Wikman is a coordinator for Mobility Management during the construction phase at the Traffic and Public Transport Authority². The coordinator for Mobility Management during the construction phase's role is to introduce and trigger a discussion about Mobility Management at an early stage of a project and to make plans as well as determine relevant measures. Unfortunately the theoretical description of the coordinator's role does not always work in practice since it is often hard to reach the project managers. Instead the coordinator's job often turns into chasing the project managers to get information about the projects status, which leads to investigations and arrangements on the accessibility are being performed in the last minute.

At the Traffic and Public Transport Authority "Mobility Management during the construction phase" is described as a "Quality during the construction phase"². This "quality" refers to how the construction is built by considering everyone that might be affected during the constructions when designing and planning the constructions. The aim is to start as soon as possible to plan and inform about constructions, to be able to provide alternative modes of travelling during the construction phase with a good standard. This alternative should even have potentials to be a permanent choice of travel.

For the Traffic and Public Transport Authority it is important to protect the image of their organization, Mobility Management is a part of that². Further inclusive of Mobility Management are the more complicated measures, as to encourage more people to use their bicycles for transport mode and controlling the travellers. Putting up signs and banners is an example of Mobility Management measures used during a construction phase. Prioritizing public transport, pedestrians and bicycles during the construction phase is also a typical Mobility Management measure. Orientation at the construction area is important to make it easy to get around and get the public to understand that the construction is a part of developing the city.

¹ Felicia Falk, Mobility Management Coordinator, Trafikverket, interview March 5th 2014

² Anna-Karin Wikman, Mobility Management Coordinator, Trafikkontoret, interview March 4th 2014

Despite having impact on travellers during a construction phase, restaurants, cafés and shops in the area can also be affected¹. As a part of the informing process the owners of the shops, cafés, restaurants or other activities in the area are informed with 6 – 12 months' notice. Mobility Management applies both when a road is constructed and also when a building is built. Below in Figure 11 it is shown where in the building process the Mobility Management work comes in. Although the figure is a draft of the desired building process with reservations of changes e.g. the Traffic and Public Transport Authority has not used needs assessment as a tool in their previous projects but the idea is to implement a requirement of needs assessment in future projects.

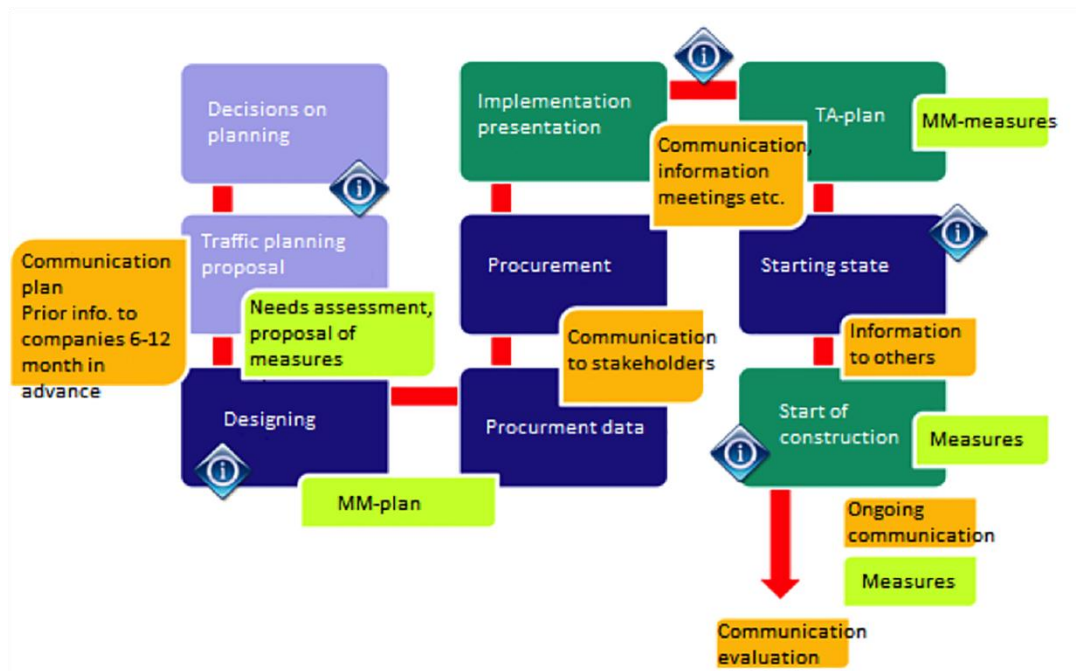


Figure 11 Draft of desired building process inclusive MM [Inspired by a PowerPoint presented during the interview with Wikman, 2014].

Wikman claims that the knowledge of Mobility Management is great within the organisation but she admits that not everyone understand why it is needed¹. The City of Gothenburg does not require usage of Mobility Management in their projects, unless it is a project within the West Swedish Agreement where Mobility Management is required for all projects. Although they have an organization called the “Joint Construction process” where they work with joint and quality assured construction process. It is desirable to implement Mobility Management under a construction into that process. The City of Gothenburg neither have any technical guide of how to work with Mobility Management.

Although the Traffic and Public Transport Authority does not require Mobility Management, functional requirements at construction sites are imposed i.e. accessibility for people with disabilities or place benches at the side for people in poor physical condition¹. No knowledge of Mobility Management is required of entrepreneurs or other people working at a project but they try to get everyone to understand the way of thinking.

¹ Anna-Karin Wikman, Mobility Management Coordinator, Trafikkontoret, interview March 4th 2014

5.2 Investigation of the projects

In chapter 5.2.1-5.2.9 below, the result from the interviews with representatives from the survey's selected projects is presented. The questions for the interview can be found in question sheet two in Appendix B.

5.2.1 Marieholmsförbindelsen

The tunnel Marieholmstunneln and the bridge Marieholmsbron is conducted as a one big project, Marieholmsförbindelsen¹. The Project Manager for the tunnel part, Stein Kleiven, was interviewed the March 31st 2014. At that moment the project was in the construction phase inclusive the preparatory work. During the constructions the traffic will need to be redirected and the proposal of how the traffic will be redirected is ready for the road E45, the proposal for the redirection is called "traffic proposal". The traffic proposal for road E6 is still being negotiated and is scheduled to be ready by the summer 2014.

The constructions will have an impact on every modes of transport except air force¹. Train traffic will be affected with a necessary shut downs on the railway due to a connection to the existing railway and realignment of the track. The impact on the vehicle traffic will mainly characterize in delays e.g. at the road E6 there will most likely be a delay of 15 minutes according to simulation. Although on the E6 there is a special lane for buses so the delay on the public transport will only be a minute or two. Half of the river will be closed which can affect the sea traffic, however there will not be any major disturbances. Solutions for the maritime have been regulated through agreements and traffic management system with the Swedish Maritime Administration. Traffic lights will also be put up for the sea traffic to avoid collisions. Pedestrians and bicyclists will be affected by redirections of bicycle roads and pathways in the area. For some travellers it might be quite a detour. The plan is to improve conditions for both pedestrians and bicyclists by making new permanent bicycle roads and pathways and renovate the existing ones. Despite direct impact on traffic the traffic will also need to be reduced during the constructions. How much it needs to be reduced can vary but preferably about 20 percent on the road E6.

Informing about the situation around the constructions is a part of traffic reduction actions¹. Road users will also be encouraged to use public transport and bicycles or choose travelling time when the traffic load is less. Considering the number of road users, the pedestrians and bicyclists have allocated the largest proportion of time and money when it comes to prioritizing mobility during the construction phase. Although, the dominant part of the travellers use private cars and public transport which is also important to prioritize.

When Kleiven was asked about the meaning of the concept Mobility Management he defines it to be about influencing road users to use other modes of transport, other roads and other travelling times¹. Mobility Management is also to minimize the disturbances that occur due to the constructions. The project has purchased service from the investment department to create a proposal of Mobility Management measures suitable for the project. They also have an appointed person, Eva Kraft, which takes care of the Mobility Management part. Advertisements and informing through the news and the radio is an example of Mobility

¹ Stein Kleiven, Tunnel Project Manager, Marieholmsförbindelsen, Trafikverket, interview March 31st 2014

Management measures that will be made in the project Marieholmsförbindelsen, along with open house for those who are active in the area. The largest target groups are the once who live in a longer distance and therefore are harder to identify. Social network and media will be used as the most efficient way to reach that group of road users. Soon a Mobility Management campaign will be launched. In the end of April 2014 there will be a press conference and in May the same year, information signs will be put up.

During the construction phase on the Marieholmsförbindelsen meetings will be held involving few other projects for a discussion and sharing information about each projects condition and future plans¹. The projects involved are the E45, Västlänken, Slakthusmotet, Kville railyard, Hamnbanan and Ställverken (e. the switchyard). When it comes to railway, the communicating with other projects also includes “buying” and “selling” services of each other. The interactions with other projects hardly include Mobility Management.

So far there has not been needed to consider how or if the Marieholmsförbindelsen will affect traffic at other construction areas¹. The reason is that no other projects have reached a stage to be able to determine what impact the Marieholmsförbindelsen will have. Although it has been discussed, a little, how other projects might affect the traffic in the Marieholm area.

Construction like this also concern many stakeholders¹. The Provincial Government, the Environmental Governance, emergency services, Västtrafik, the municipality of Gothenburg, the Region of Västra Götaland, the Real Estate Department, the Housing and Urban Development, the Management Cycle and Water, and the Traffic and Public Transport Authority are among companies and services that the Marieholmsförbindelsen interacts with. The interaction mostly goes through a lot of meetings, including discussions and negotiations, which lead to a results that is later discussed with the entrepreneurs. The entrepreneurs get a chance to develop or make suggestions of changes. To develop the cooperation with the entrepreneurs, a program called “developed collaboration” is used as a support.

Kleiven claims that the basic knowledge about Mobility Management is generally big within the project¹. However, there are no requirements that the employees within the project has a knowledge of Mobility Management. It would also be complicated since many of the entrepreneurs are from different countries. Instead the project has competence requirements e.g. the geotechnical engineer should have great experience in geotechnical work. To avoid the entrepreneurs to prevent the road users’ trafficability the project has high requirements to involve workers with knowledge about traffic in the entrepreneurs’ preparatory work, this will be observed by the project management department. Although they do not have any direct requirements of knowledge of Mobility Management, the project ensures that the work practices are according to Mobility Management by putting focus on the attitude. As an example a focus is on keeping a positive attitude regarding the travellers, since it is them they are building for. To reach a desired mobility during the construction phase the project has implemented a bonus system. Money values high when it comes to employees and the entrepreneur will get a chance of receiving an extra bonus payment for well-done job regarding Mobility Management.

¹ Stein Kleiven, Tunnel Project Manager, Marieholmsförbindelsen, Trafikverket, interview March 31st 2014

5.2.2 Västlänken

March 17th 2014 Josefin Larking, Project Manager for Mobility Management, and Hanna Jonsson, Traffic Construction Manager, were interviewed regarding the project Västlänken. At that time the project was in the late part of the designing process^{1,2}. This means that all plans, system documents and adjustments are being finalized in order to hand in the Development Consent Order in a near future. When the Development Consent Order has been delivered it will be reviewed and opened for comments before it can gain legal force.

The project has, in March 2014, virtually completed the traffic proposal for the construction phase and will be handed in April 15th the same year after some small adjustments^{1,2}. Constructing Västlänken will affect all road users including cars, goods, public transport (buses, trains and trams), bicyclists and pedestrians. It will also affect the boat traffic in the canals, the tourist boat Paddan among others. How the road users will be affected during the preparation work of the construction is still quite unknown. Until now the focus mainly have been on the overall picture of the project, to be able to do a realistic plan and design for the constructions. The main construction, unlike the preparatory work, needs to be covered by a Development Consent Order which requires a traffic proposal. Since the Development Consent Order for railway needs to be handed in with a two year notice the traffic proposal for the preparatory work has not started yet. However the Development Consent Order will soon be handed in and traffic proposal for the preparatory work will soon be on the schedule.

When it comes to the constructions of the Västlänken, it is known that roads will be closed in some areas¹. What roads that will be shut down, and when, will vary during the construction years, 2018-2028. In some places the road capacity will be reduced by closing a lane or close it entirely for car traffic. Bicycle roads will mainly be affected by big excavations due to constructions in clay. For public transport, some of the railroad tracks will be shut down during the summers, buses and trams will eventually be redirected. Traffic through Korsvägen and Nordstan will also be affected due to the construction of the new train stations.

The project has, so far, not investigated if and how much the traffic needs to be reduced in order to maintain the traffic flow during the construction phase^{1,2}. However the trafficability for pedestrians, cyclists and public transport will be prioritized by making sure that the bicycle roads are kept unbroken. In those cases redirection is needed, the redirection will have to be an unbroken cycle path with high quality and the shortest detour as possible. Since the public transport will be prioritized the road users will be encouraged to choose public transport rather than private cars. The capacity for public transport will be kept the same by redirecting the buses to avoid delays that might occur by driving through the construction areas.

Both Larking and Jonsson agree of the significance of the term Mobility Management. The work starts with a suggested traffic solution, if the traffic proposal result in a need for a capacity reduction through the construction site the Mobility Management work comes in². The Mobility Management work is a package of measures to encourage car users to choose another route, an alternative mode of transport or travel at different times of the day. The purpose is to maintain

¹ Hanna Jonsson, Traffic Construction Manager, Västlänken, Trafikverket, interview March 17th 2014

² Josefin Larking, Project Manager for MM, Västlänken, Trafikverket, interview March 17th 2014

the availability in the city core and ensure the trafficability for people and goods during the construction phase.

In Västlänken Mobility Management is applied by informing everyone within the project about the Mobility Management concept^{1,2}. They also have a person, Josefin Larking, responsible for the Mobility Management related work for the project. Intern workshop with the project managers among others in the project has been used to inform, learn and get the people involved to start to think about the concept Mobility Management. Various stakeholders require various actions and with a good understanding of Mobility Management, within the entire project crew, will facilitate the Mobility Management measures in the project. The choice of measures depends on capital amount provided for investments.

Interaction with other projects occurs with the projects that are closest to Västlänken, geographically by meetings^{1,2}. There are also meetings with the Swedish Transport Administration's investment department which informs about the entire department's projects. Although, cooperation with projects on the opposite side of the river does not yet exist, only with the projects that are on the same side of the river as them, Hisingsbron, E45 Götaleden and Marieholmsförbindelsen. The project also keeps contact with consults within the project that have connections to other projects. The cooperation with the other projects also includes Mobility Management, which is used as a tool that everybody are conscious about. The aim is to find sustainable and permanent solutions for the traffic while the construction is ongoing. However, sometimes the solution needed to achieve this is expensive. Therefore someone needs to take the decision if the solution is worth to implement.

Despite interacting with other projects Västlänken also cooperate with, Jernhusen, Västtrafik, Trafikcentralen (the traffic central), the Traffic and Public Transport Authority, the investment and social department within the Swedish Transport Administration and the emergency services^{1,2}. They also cooperate with organizations as the amusement park Liseberg and hotels etc. where the project manager keeps them informed about the constructions and the expected disturbances. This cooperation mostly takes place in form of meetings but it can also be just by informing.

The Västlänken project is conscious that their traffic proposal will affect the traffic that is passing the other projects in the Gothenburg area^{1,2}. They are also conscious that the other projects' traffic proposals will affect the traffic in their own construction site. However they just have thought of the projects that are closest to them geographically and not of how they will affect the traffic at projects on the opposite side of the river and how those projects will affect them.

It is believed that the knowledge about Mobility Management is good within the project². Larking states that people today have a conciseness about Mobility Management and sustainable travels, which has facilitate the work. The project has also discussed requirements

¹ Hanna Jonsson, Traffic Construction Manager, Västlänken, Trafikverket, interview March 17th 2014

² Josefin Larking, Project Manager for MM, Västlänken, Trafikverket, interview March 17th 2014

of knowledge about Mobility Management from the consults and entrepreneurs, but no decisions have been made. How to ensure that type of knowledge has not been discussed yet.

5.2.3 Hisingsbron

Eva Rhodin, an Infrastructural Communication Manager and Viveca Karlsson, a Project Manager for Traffic in the project Hisingsbron, where interviewed March 27th and April 10th 2014 regarding the project Hisingsbron. The constructions for the project Hisingsbron are now being designed and the traffic flow during the construction phase is being determined¹. The admission documents are being written that will later be handed in to the Building Committee. The designing will hopefully be finished by the summer 2014². The traffic proposal during the constructions on Hisingsbron is ready for the traffic driving over the Göta Älv Bridge, as well as for the north side of the bridge. The traffic proposal for the south side of the bridge is still not finished since it will depend on the constructions of E45 and Västlänken.

As long as the Göta Älv Bridge is intact it will be kept open during the constructions on the new bridge, and therefore the traffic capacity will remain the same and traffic reduction seems to be unnecessary². Although the traffic capacity will be remained on the bridge the constructions will affect the traffic. Car traffic, pedestrians, bicyclists and public transport are the modes of transport that will be affected during the constructions. The effects will arise partly from shut down of roads and will both Stadstjänaregatan and Gullbergs Strandgata be closed for traffic during the constructions. How the different modes of traffic will be affected will also depend on other constructions in the area. To be able to connect the new bridge, Hisingsbron, to the road system the Stadstjänarebron needs to be demolished because of the new bridge will have lower elevation than the old one. To be able to demolish the Stadstjänarebron a new junction at Kämpegatan, built by the project E45, must be finished.

The construction of the bridge itself will not have any significant impact on the traffic transporting goods traffic since the old bridge will be held open during the new bridge is being built². Although on the south side of the bridge the freight traffic will be affected, but mostly it is because of the constructions of the Västlänken. Since the old bridge is a moveable bridge, which is opened up to let through ships or larger boats, the sea traffic will be affected under shorter periods when the old bridge will be kept closed.

The public transport together with pedestrians and bicyclist will be prioritized during the construction phase². How these modes of transport will be prioritized has not been decided at this stage. However it has been planned to build a new bridge for bicyclists and pedestrians at the west side of Stadstjänarebron before the Stadstjänarebron will be demolished, to remain the accessibility for the pedestrians and bicyclists.

Karlsson describes the subject Mobility Management as keeping accessibility for travellers during the construction phase and make the traveller satisfied². How Mobility Management will be utilized within the project has not been decided yet at this point. Measures for the Hisingsbron project will depend partly on the measures made of the Västlänken project and the project E45. More information are needed from those projects to be able to decide the measures

¹ Eva Rhodin, Infrastructural Communicator Manager, Trafikkontoret, phone call March 27th 2014

² Viveca Karlsson, Project Manager for Traffic, Hisingsbron, Trafikkontoret, interview April 10th 2014

for the Hisingsbron¹. The aim is to be able to start utilizing Mobility Management measures in the end of the year 2014. There is no appointed person that is responsible for the Mobility Management measures in the project, but there is however a department at the Traffic and Public Transport Authority that takes care of everything related to Mobility Management.

Rhodin states that the knowledge about Mobility Management is big among the project workers coming from the Traffic and Public Transport Authority¹. Although there are also workers involved in the constructions that come from other organizations with variable knowledge of Mobility Management. At the Traffic and Public Transport Authority there are requirements that every worker is aware of the importance of quality during the construction phase, and are procurement documents being made, to ensure that quality during the construction phase is kept.

As mentioned before, the project Hisingsbron is partly dependent on the project E45 and the Västlänken, and the Hisingsbron will therefore have a great interaction with both these projects². The interaction will take place through meetings. There is also an appointed person with a more comprehensive view of the whole area, where those three projects are situated, that is responsible for the traffic during the construction phase. Despite interacting with the project E45 and Västlänken, the project Hisingsbron will also have meetings with stakeholders in the area as well as property owners and Västtrafik, to inform those parties about what is about to happen. Interaction is necessary to succeed with Mobility Management within each project¹. How the Mobility Management will be included in the interaction could not be answered since it is now being discussed.

The glance will be raced to see the project in a broader context to be able to determine if the project might have any impacts on the traffic at other construction areas². However the project has not analysed how the maintained bridge traffic might affect the traffic around the Central Station. The same goes for determining impacts that other construction areas might generate on the traffic in the construction area belonging to the Hisingsbron project. Simulations on macro and micro levels will be used to determine the impacts from street shut downs.

5.2.4 E45, Götaleden

Per Eriksson, Project Manager for the project E45 and Jenny Röström, Project Engineer, were interviewed the March 20th 2014. The project has been working with the Development Consent Order for over a year, around two thirds were ready when the interview was performed, and it will be handed in by the summer 2014^{3,4}. Traffic proposal of traffic during the construction phase is mostly ready with reservation of minor changes.

The constructions will affect public transport, freight- and vehicle traffic^{3,4}. It will also have impact on bicyclist and pedestrians. Two different redirections of traffic depending on in which phase the project is working in at the time. In the first stage of the construction the traffic will be redirected between Falutorget and Stadstjänaregatan. The capacity for the traffic heading

¹ Eva Rhodin, Infrastructural Communicator Manager, Trafikkontoret, phone call March 27th 2014

² Viveca Karlsson, Project Manager for Traffic, Hisingsbron, Trafikkontoret, interview April 10th 2014

³ Per Eriksson, Project Manager, E45 Götaleden, Trafikverket, interview March 20th 2014

⁴ Jenny Röström, Project Engineer, E45 Götaleden, Trafikverket, interview March 20th 2014

towards the central will be separated from the thoroughfare and will be reduced by one lane at Falutorget. This redirection, for the traffic heading west towards the central, includes also a left turn at Falutorget that creates a risk of queuing at the E45. The thoroughfare will contain two lanes in each direction so the capacity of the traffic into the tunnel, Götatunneln, will be kept constant.

At the second stage of the construction the number of lanes will be kept^{1,2}. The traffic from the north at E45, heading to the Central Station, will not be able to turn left at Falutorget. Between the Gullbergsmotet and Kämpegatan there will only be two lanes instead of four so there will be a capacity reduction. Besides a capacity reduction some limitations will also be made on the regular exits and entrances at Falutorget and the road users will have to choose another alternative, through Kämpegatan, to reach their destination.

The construction on E45 will not have a big impact on the bicycle roads and should not have a serious impact on the bicyclists^{1,2}. The bicyclists will however be affected since Marieholmsförbindelsen will disconnect the Marieholmsgatan, north of E45, both road and bicycle roads, and redirect the bicyclists south of E45 instead. That will either lead to increased bicycle traffic through Falutorget, which is undesirable in safety reasons, or the bicyclist will go through Kruthusgatan and end up in the construction area of Västlänken. How to solve the redirection for the bicyclists is still being discussed but a good standard and a high safety will be required.

During the constructions the traffic at E45 will need to be reduced about 10-15% and the same goes for the traffic on road E6, depending on which construction stage the project is in at that time^{1,2}. The traffic will be reduced with many different types of measures, such as Mobility Management measures. Some of these measures can be done by the project itself, other measures need to be done by other projects and organizations. When it comes to informing road users the group “Nya Vägvanor” needs to inform road users that commutes from a longer distance about the situation in Gothenburg. The project itself takes responsibility for local campaigns directed to companies and individuals in the Gothenburg area. A Mobility Management investigation for possible measures has been made. A list has also been made of failures in the surrounding and relative measures to tackle the failures and who should take care of it.

According to Eriksson all road users need to be able to reach their destination no matter which mode of transport used¹. Bicycles, pedestrians and public transport will although be prioritized, according to the West Swedish Agreement, but it is also important to prioritize the 60.000 vehicles that use the road E45. The shopping mall Nordstan is also in the area and needs to be accessible for goods transportation, so different modes of transport have different requirements.

As mentioned earlier Mobility Management is included in the project work. According to Eriksson and Röström, Mobility Management is both soft and hard measures that facilitate management of traffic during the construction phase^{1,2}. Mobility Management also includes measures that encourage commuters to change their travelling habits to become more

¹ Per Eriksson, Project Manager, E45 Götaleden, Trafikverket, interview March 20th 2014

² Jenny Röström, Project Engineer, E45 Götaleden, Trafikverket, interview March 20th 2014

sustainable. This can be made by informing travellers about the project and travelling alternatives. Example of Mobility Management measures that will be made in the project is inform the public about the situation, improve conditions for bicycles within the area and higher the safety standards at Falutorget. Mobility Management will be utilized continuously through the construction phase and critical measures are made in conjunction to the start of the constructions. Röström is the appointed person to be responsible for Mobility Management within the project and is supported by Felicia Falk, the Mobility Management Coordinator during constructions at the Swedish Transport Administration's investment department.

There will be an interaction with other construction projects regarding redirection of the traffic during the construction phase^{1,2}. The constructions on the bridge Hisingsbron, the project Marieholmsförbindelsen, Västlänken, construction on Lundbyleden and even projects nonrelated to infrastructure are among the projects that the E45 will interact with. They will also cooperate with the group KUP (s. Koordinering Utpekade Projekt) which is a group that coordinates specifically chosen projects in Gothenburg. The interaction and cooperation will go through meetings and discussions. When it comes to ensure the safety condition relating to pedestrians and bicycles at Stadstjänaregatan there will be a cooperation with Hisingsbron when considering when to demolish the bridge, Stadstjänarebröne, at Stadstjänaregatan. The cooperation with other projects will include Mobility Management where discussions of different measures are carried out and which measures can be done by us, what actions can be done by others and how can those actions be combined. Despite interacting with other construction projects there will be an interaction with the shopping mall Nordstan, emergency services and Västtrafik. Although Västtrafik does not see the constructions on the E45 as a big project since there are not many buses that go through road E45. Interaction will also be with companies in the Gullbergsvass area and the municipality of Gothenburg. The interaction will go through meetings.

When constructing the E45 it will be kept in mind how the construction might affect traffic not only in the surrounding but also traffic at other construction areas nearby^{1,2}. Likewise will it be kept in mind how constructions nearby might affect the traffic at the E45's construction site. Project further away will even be considered if it turns out that a project will be constructed during the same time period as the E45 and could affect. If the project E45 needs to be delayed or moved forward in time to serve a certain trafficability it is not up to the project's members to take that decision, the decision needs to be taken on an upper level with more view over the comprehensive situation.

A lot of work is put on Mobility Management and those interviewed believe that knowledge of Mobility Management is generally big within the project^{1,2}. Although there are no requirements that all members within the project have knowledge about Mobility Management. Earlier experience shows the entrepreneurs do often lack knowledge about Mobility Management so thoughts have arisen to educate the entrepreneurs about Mobility Management. To make sure that Mobility Management succeeds at the construction site there will be a resource which

¹ Per Eriksson, Project Manager, E45 Götaleden, Trafikverket, interview March 20th 2014

² Jenny Röström, Project Engineer, E45 Götaleden, Trafikverket, interview March 20th 2014

constantly looks over and grades the condition of the area with penalties if the construction area is not as required. They will also have incentives for pedestrians and bicycles.

5.2.5 Skeppsbron

When Emir Halalkic, Associated Project Manager, at the project Skeppsbron was interviewed March 11th 2014, the answers on the interview questions were only based on first step of the project¹. The reason is that the second local plan had not started yet, since it had not yet been approved at the city council, and it is therefore still unknown how this stage will affect the surrounding and the road users. In March the first local plan, including three stages A, B and C, was in the construction phase. At that time 35-40 percent of stage A was finished and stage C was planned to start within a couple of months. The stage B was under constructions but how far the process had reached did not emerge during the interview.

A comprehensive plan has been made in cooperation with entrepreneur, Skanska, which include a traffic proposal¹. Since the project is in the construction phase the traffic proposal is done but the entrepreneur can still propose suggestion of changes. Any changes in the traffic proposal need to be approved by the Traffic and Public Transport Authority. The traffic proposal is affecting all type of road traffic, cars, public transport and freight traffic but also pedestrians and bicyclists. The bicyclists are particularly vulnerable since a commuter bicycle road goes through the construction site. During the construction period some roads in the construction area will be temporarily closed, e.g. Södra Hamngatan and Stora Badhusgatan. Despite the shutdown of streets the project has not considered that the traffic needs to be reduced to maintain the traffic flow in the area. All modes of transport are considered to need the same trafficability and therefore is no trafficability for a certain mode of transport more prioritized than another².

According to Halalkic the concept Mobility Management is to take care of the traffic and to make it work and flow smoothly during the construction phase¹. In the project, Mobility Management constantly is utilized through the traffic arrangement solutions, TA-plans. The project Skeppsbron has a specific person that, together with the entrepreneur Skanska, is working with the TA-plans, hence also the Mobility Management.

To be able to get a full picture of the situation, Skeppsbron is cooperating with other projects within the Traffic and Public Transport Authority organization i.e. the constructions at Chalmers and Vasaplatsen¹. The cooperation consists of joined sessions where the projects explains what will be done in each project. However, it is unclear if the project are cooperating with projects outside the own organization. It is also unclear if this interaction also includes Mobility Management, even if Halalkic considers that Mobility Management should be included in such cooperation. The project is fully aware that their traffic solutions will affect the amount of traffic that is passing other projects. In the same way they also have been considering that other projects traffic solution can affect the traffic in their construction area. This is a must with the construction's central location.

¹ Emir Halalkic, Assistant Project Manager, Skeppsbron, Trafikkontoret, interview March 11th 2014

² Emir Halalkic, Assistant Project Manager, Skeppsbron, Trafikkontoret, phone call April 3rd 2014

Halalkic believes, with reservation to that Skeppsbron is his first project and therefore has nothing to compare with, that the knowledge about Mobility Management is good within the project¹. The project is actively working with these types of questions and everyone within the project are involved in some way. The project specifically does not require knowledge about Mobility Management of persons that are involved in the project. However, the Traffic and Public Transport Authority have requirements of orderliness and availability at the construction site in their contracts. If the entrepreneur stands up for these requirements is controlled by an organization on the construction site, consisting of six people. The control is made by three to four, of the total six, people that are walking around the area on daily basis.

5.2.6 Älvsborgsbron

Per Thunstedt, the Project Manager for the planning of the maintenance on the bridge Älvsborgsbron, was interviewed the March 24th 2014. The maintenance on the bridge Älvsborgsbron is now being planned and a preliminary traffic proposal is ready². While the maintenance undergoes the vehicle traffic will be affected, including private cars, public transports and goods traffic. Pedestrians and bicyclists will also be affected.

While working on the bridge, one lane will be shut down for vehicle traffic and the access for bicycles and pedestrians at one side of the bridge will be shut down, depending on which side is under a maintenance². The bicyclist and pedestrians will though still be able to pass the bridge by using the corresponding path on the other side of the bridge. The capacity for vehicles will reduce and can result in a delayed travel time and more tight conditions for the pedestrians and bicycles. To speed up the maintenance, greater shutdowns will take place during night hours besides that material for the maintenance will be transported during these hours. Since the traffic capacity will be reduce by closing one lane the traffic over the bridge will have to be reduced. How much the traffic will need to be reduced is unknown. Mobility Management measures in the form of information will be used with the purpose to reduce the traffic. During the maintenance public transport will in a way be prioritized by having a separate entrances for buses to the bridge. Although will the conditions be a poorer for every type of transport.

Thunstedt claims that general knowledge about Mobility Management is big within the project². His definition of Mobility Management is that it is to inform and evaluate different measures and cost. Compare the social cost with the maintenance cost and maybe valuating the money higher that is put on measures that prevent blocked accessibility. By spending time on making the traffic arrangement plan and giving the public and companies information about the coming situation will be deemed to Mobility Management in the project as well as working in shifts on the maintenance. All the Mobility Management work linked to the project is kept within The Swedish Transport Administration. The project has an appointed person, Jonas Nilsson, who is more versed in the Mobility Management work associated to the constructions.

The project will not interact or cooperate with other projects when it comes to redirecting the traffic². The reason is that the project believes that a cooperation only needs to occur if the project needs to rearrange the construction time. The maintenance work on the bridge

¹ Emir Halalkic, Assistant Project Manager, Skeppsbron, Trafikkontoret, interview March 11th 2014

² Per Thunstedt, Project Manager for the Planning, Älvsborgsbron, Trafikverket, interview March 24th 2014

Älvsborgsbron is counted among the projects within Trafik 2016 and Thunstedt says that they are aware of the other projects and assumes that the other projects are aware of their maintenance. How or if the maintenance on the bridge will affect the traffic in other constructions areas in the surroundings should be speculated by someone with more comprehensive view over the coming situation. The same goes for if other projects in the surroundings will affect the traffic at Älvsborgsbron. Although there will not be any interaction with other projects there will be interaction with Västtrafik when it comes to redirecting the traffic. There will also be an interaction with the emergency services, Volvo and the Port of Gothenburg through information and meetings.

5.2.7 Lundbyleden, Kvillemotet

Lennar Olsson, Project Manager for the project Kvillemotet was interviewed March 19th 2014. Kvillemotet has recently finished the needs assessment and started on the project's Development Consent Order¹. The traffic proposal has therefore not been finished since the Development Consent Order has to be finished before the work with the traffic proposal can start. Although, the project has a good idea which modes of transport will be affected during the constructions, bicyclists, public transport, goods and private cars. The area has just a few pedestrians so the project does not expect to have an impact on pedestrian. How the project will affect the modes of transport is still unsure, however they will try to keep the impact as low as possible.

As it looks today the amount of vehicles, at least the private cars, in the area needs to decrease during the construction phase if the trafficability should maintain as today's traffic¹. The more the car traffic can be reduced the less actions are needed to maintain the capacity. A maintained road capacity is important, especially for the goods. Exactly how much the car traffic needs to be reduced is still unknown, it depends on the traffic proposal which will give a realistic demand of reduction. To maintain the trafficability some of the projects, which are performed under the same time period, will be working together in a group called Nya Vägvanor. By making a Mobility Management investigation, each project can determine what the project can do and what needs to be done by other projects and organizations. A reduction of cars can also be reached by making it moderately hard for the car drivers while providing and informing about other modes of transport. The project will prioritize the trafficability for the most space efficient traffic, public transport and bicycled but also for freight traffic to the port. How these modes of transport will be prioritized is still unknown, eventually by building a bus lane and new bicycle roads.

According to Olsson, Mobility Management is to manage the traffic during the constructions¹. Notably by combining the hard and soft actions and thereby promote the travellers to choose more effective way to travel. The Mobility Management work, within Kvillemotet, started with a needs assessment, which was made at an early stage of the project. The needs assessment defines the needs for Mobility Management in the project. The Mobility Management work is proceeded at an early stage of the Development Consent Order process. In that way the soft Mobility Management measures can be adjusted to the construction process such as the

¹ Lennart Olsson, Project Manager, Kvillemotet, Trafikverket, interview March 19th 2014

planning of the temporary and the permanent roads. For the Mobility Management work the project is backed up by the Mobility Management Coordinator at the investment department. The project has also hired a consultants that are working with the technical part of the Mobility Management.

Regarding the project, Kvillemotet, there is so far no concrete solution how Mobility Management will be utilized¹. So far speculations have started of which actions and strategies should be used due to a document developed by Trafik 2016. Different kinds of measures are speculated dependent on which mode of transport is analysed. The possible solutions are speculated according to each type of traffic and the solution can either be done within the project or needs to be performed by other projects. The decision of actions is limited by capital amount. In some cases the actions can concern more than only one project and in these cases negotiation regarding the cost of actions need to be done between projects concerned. In the end the cost needs to be evaluated equally between societal cost and construction cost.

The project will have standard requirements on bicycle roads¹. Facilitate actions for the bicycles such as pumping stations at strategically selected places along the road have been discussed. The few pedestrians in the area need to be able to move through the construction site and an idea of making the bicycle roads wider, to make space for pedestrians along the bicycle road has been considered. A transfer from cars to public transport might be difficult seen to the design of the shopping area in Backaplan.

Kvillemotet cooperates with the project Backaplan¹. This is necessary since Kvillemotet's time schedule depends on the Backaplan project. The project will also interact with the project Marieholmsförbindelsen. The constructions will be performed at the same time and thereby intersect. To make the projects' local plans and Development Consent Orders match, the cooperation will also include Mobility Management. The interaction is carried out through participating in each other's meetings and in that way exchange opinions of the project plan processes.

Considerations regarding how the project's traffic proposal will affect the traffic around other construction is necessary¹. Normally the traffic is redirected around the construction site. For this project it will not be possible since they are not able to reroute the traffic to the local streets next to the construction area, because of constructions in that specific area. If the traffic on Lundbyleden is too dense due to the constructions, the traffic automatically will enter the local streets which will endanger the road users' safety. It is therefore important to maintain the capacity on the thoroughfare. The project is also aware that other projects' traffic proposals, especially Marieholmsförbindelsen, can affect the traffic in their project, both in a positive and a negative way. Exactly how the other project will affect the traffic is hard to say. Projects on the other side of the river can lead to a redirection of the public transport, which could result in an increased amount of bus traffic at Lundbyleden and thereby in the construction area. To be able to make increased bus traffic work appropriately interaction with Västtrafik and other projects is needed. Hence, both interaction and Mobility Management is important during the construction phase. Besides other projects, Kvillemotet is cooperating with Västtrafik, the

¹ Lennart Olsson, Project Manager, Kvillemotet, Trafikverket, interview March 19th 2014

Traffic and Public Transport Authority, the Housing and Urban Development and companies in the area including Backaplan. For example adjustments with the goods delivering schedule are made to ease the traffic flow.

Olsson considers that the people who are working with the project, including the project management, at the Swedish Transport Administration have a decent knowledge about Mobility Management¹. Regarding the level of knowledge among the consults within the project, Olsson could not certify. However the project has requirements that the consults should have knowledge about Mobility Management. The project will continue to require knowledge within the staff i.e. the entrepreneurs, especially when it comes to bicycle roads. The entrepreneurs should for example be aware of that vehicles and construction material should not be places on the bicycle paths. The project will therefore have an “education package” how to take care of bicycle traffic during the constructions. To secure that the education is followed the project have ideas to let the construction managers and the site manager bike through the area once a week.

5.2.8 Backaplan

March 20th 2014 Pär Sköld an In-house Consult at the Traffic and Public Transport Authority was interviewed regarding the road related project on Backaplan. At that time the local plan for the construction project Backaplan was planned to be handed in within a few weeks and the goal was that it would gain legal force by January 2015². A traffic proposal was already in process although the traffic proposal is normally done in the design process that has not started yet. According to their predictions the constructions will have impact on the majority of transport including pedestrians, bicycles, buses, trains, goods, cars. The impacts will be characterized by redirection of traffic and lowering of speed limit for the train traffic. Some roads will also be closed part of the time constructed and a rail road crossings will need to be shut down at some points. Although train track will not be shut down over a long period only during weekends to switch tracks. No estimations have been made yet on the need of traffic reduction and it is partly because more information about number of bicyclists and pedestrians is needed.

Sköld's definition of Mobility Management is attitude changes². More specifically to get people to change their travelling behaviour with the focus on the dominating travels, e.g. the daily travels as to and from work. There are many ways to do so and the first step should be to offer a public transport that is good enough both pricewise and timewise.

Mobility Management will be a part of the project Backaplan during the construction phase². Redirecting the public transport closer to the travellers and their destination points is an example of a Mobility Management measure that will be done during the construction phase. The streets will also be structured to be attractive and the pavements and bicycle roads will be kept in a good condition with good opportunities. An effort will also be made to keep the pavements and bicycle roads obstacle free and prevent car users to place their cars on them.

¹ Lennart Olsson, Project Manager, Kvillemotet, Trafikverket, interview March 19th 2014

² Pär Sköld, In-house Consult at Trafikkontoret, COWI, Backaplan, interview March 20th 2014

The public transport capacity will be increased and a part of it will be to make the public transports attractive by making it easy to change between different modes of public transport and even provide the alternative to borrow bicycles for a part of the travel¹. Information is also a part of the Mobility Management measures and will the public be informed through announcements i.e. in schools and churches.

There is no appointed person within the project that is responsible for the Mobility Management measures and there are no requirements that project workers should have knowledge about Mobility Management¹. The general knowledge of Mobility Management within the project can vary and in amongst are there people with old school ways of thinking where the construction itself is the most important.

During the constructions the project will interact with other parts of Backaplan¹. They will also interact with the project Lundbyleden and with a work team that is responsible for constructions made by the City of Gothenburg within the Frihamnen-, Ringön- and Backaplan area. Although the interaction will not include Mobility Management. Besides interacting with other construction projects they will also interact with other organization. The Swedish Transport Administration, Västtrafik, the Region of Västra Götaland, the City of Gothenburg and municipal administrations are amongst the organizations that Backaplan will interact with. All these interaction will take place through regular meetings. The interaction with the project Lundbyleden will include synchronized work adjusting the Backaplan's traffic proposal with respect to possible impacts on the traffic at the construction site at Lundbyleden. How the traffic at Backaplan might be affected by other constructions has not been analysed yet.

5.2.9 Kville railyard

March 14th 2014 Hanna Lundkvist, Project Engineer, was interviewed for the project, Kville railyard. The constructions on the railyard were in that time in the designing process and a suggestion for a new schedule for the train traffic had been handed in². The Development Consent Order has already been handed in since it has to be handed in with a two years notice before constructions on rail track can start. During the constructions it is mainly the freight trains that will be affected. The project could also affect other modes of transport when the material is transported to the construction site but this is still unknown, however it will not be any significant impact. The constructions might also have an impact on the passenger train traffic on Bohusbanan, the plan is however to perform the constructions that will affect the Bohusbanan during the nights to minimize the disturbances.

Several shutdowns will have to be made which includes complete shutdown of the rail track². Despite that, only few tracks will be closed at the same time to avoid total shutdown of the tracks unless it is absolutely necessary. The most traffic disturbance will go on during the year 2016. Whether the traffic within the area needs to be reduced is in a discussion with the traffic planners and it is still unclear how big this reductions needs to be. Kville railyard only has one type of traffic passing the railyard, freight trains, and that is therefore the only mode of transport that need to be prioritized.

¹ Pär Sköld, In-house Consult at Trafikkontoret, COWI, Backaplan, interview March 20th 2014

² Hanna Lundkvist, Project Engineer, Kville railyard, Trafikverket, interview March 14th 2014

According to Lundkvist, Mobility Management is the measures made at the first and second stage in the so called “four-stage principle”, where the stage one is to rethink the existing situation and the stage two is about optimizing¹. Mobility Management is used to make the flow pass and become smoothly, both inside and around the construction area. The project does not consider that Mobility Management needs to be applied at the moment. Kville railyard therefore neither use nor have someone that is responsible for these questions within the staff. Lundkvist does not believe that the knowledge about Mobility Management is big within the project and it does not have to be since Mobility Management is not considered needed in the project. Nor does the project require knowledge about Mobility Management within the staff.

Kville railyard is cooperating, through meeting once a month, with several other projects that are located next to the project such as Lundbyleden, Marieholmsförbindelsen and the remaining parts of Hamnbanan¹. Besides other projects Kville railyard also interacts with the Swedish Transport Administration’s maintenance department through regular meetings. Otherwise it is the traffic planners’ and track coordinators’ job to see the whole picture and coordinate with projects and organizations further away. Since Mobility Management is not applied in the Kville railyard project it will not either be included in the interactions with the other projects.

The project is conscious that their traffic proposal will affect other projects, at least the once that are closes to them¹. In the same way the project is also conscious that other projects will affect the traffic in Kville railyard. Reduced capacity elsewhere in the surrounding, for example at Marieholmsförbindelsen could lead to increased traffic during night hours at Bohusbanan. With a reduced capacity some traffic might need to be arranged differently and even during the nights.

¹ Hanna Lundkvist, Project Engineer, Kville railyard, Trafikverket, interview March 14th 2014

6 Analysis

The analysis chapter is divided into four parts. The first part analyses the traffic impact and the road users' trafficability due to the constructions, see chapter 6.1. The second, chapter 6.2, analyses how well the projects are cooperating with each other and the third part, chapter 6.3, analyses Mobility Management, both within the projects and the organizations. The last part, chapter 6.4, is a summarizing table, Table 2, over the analysis based on the result.

6.1 Traffic impact

All nine projects have either started on the traffic proposal during the construction phase or finished it. The Västlänken, E45 Götaleden, Skeppsbron, Älvsborgsbron and Kville railyard are the projects that have finished a traffic proposal for their constructions. Of these five projects Skeppsbron is the only project which already has started with the constructions. The Västlänken, the E45 and Kville railyard are all in the designing process and Älvsborgsbron is just in the planning process. The Kvillemotet was the only project that had not started to work actively with their traffic proposal but that is also the last project, of those included in the survey, to start their construction.

The Marieholmsförbindelsen, Hisingsbron and Backaplan are now working with their traffic proposal but are not finished yet. This is interesting since all these projects are all working in a different stage of the process. The project Marieholmsförbindelsen has started with the constructions on the south side of Göta Älv, close to the thoroughfare E45. The traffic proposal for the south side of the river is done but the traffic proposal for the opposite side of the river is not ready until the summer 2014. However the constructions on the north side of the river, close to the E6, will not start until next year.

Hisingsbron has not finished the traffic proposal for the south side of the river. On that side the construction collide with both the E45 and the Västlänken and the traffic proposal will depend on those projects' traffic proposals. Although the Västlänken and the E45 have completed their traffic proposal. The constructions of the Hisingsbron project are starting at the same time as the constructions on the E45, in the middle of 2015, but the Västlänken will not start constructing in that area until they start constructing the Central Station that is not until 2018 i.e. two and a half year later. It seems a little strange that the Hisingsbron project waits for the traffic proposal from the Västlänken project when the Västlänken is scheduled to be constructed much later. It also seems a bit strange that the Hisingsbron project states that their traffic proposal cannot be finished since it is dependent on the traffic proposal from E45 and Västlänken that already have done theirs.

Backaplan on the other hand has already started with their traffic proposal, even if it is usually done in the designing process. The reason is to speed up the process to be able to finish the project along with Kvillemotet before the opening of the Marieholmstunneln the year 2020. This shows that the traffic proposal is not necessarily made at a certain stage in the project process. Backaplan has proved that the traffic proposal can advantageously be made parallel to the planning process. The earlier the traffic proposal is done the more time is there to create good Mobility Management measures which will facilitate for the road users.

The constructions will without a doubt have a great impact on the traffic, usually through shutdowns, limited traffic capacity or redirections. Cars, goods, bicyclists, pedestrians and public transport are among the modes of transport that will be affected in almost every project. Västlänken and the Marieholmsförbindelsen are the projects that will affect the most mode of transports, everyone except air force. However this is not a surprise since the projects are two major projects where the Marieholmsförbindelsen is a construction combined of both a road tunnel and a railway bridge and the Västlänken is a eight kilometres long tunnel that influence a large area.

To maintain the trafficability during the construction phase the traffic might need to be reduced. The Marieholmsförbindelsen, E45, Älvsborgsbron and Kvillemotet have predicted that the traffic needs to be reduced during the constructions. No exact prediction of how much the traffic needs to be reduced have been made for the constructions on Kvillemotet, since it depends on the traffic proposal, but the other three projects have estimated a specific number of necessary reduction. In the projects Västlänken and Backaplan had so far not reflected if any reduction of the traffic is needed. Backaplan has just started to work on their traffic proposal which clarifies the uncertainties regarding the reduction of the traffic. Kville railyard will only affect the train traffic which will be seen as a planned changes in the schedule rather than disturbance. The Skeppsbron was the only project that did not seem to have considered any reduction of the traffic, although the construction has already started.

Those projects that already have predicted that the traffic needs to be reduced will be utilizing Mobility Management measures to succeed with the reduction, mostly through information. The E45 has though made a deeper Mobility Management investigation and is thereby the project that has gotten further when it comes to decide what Mobility Management measures will be used besides informing the public. Kvillemotet has also a greater idea, as the E45, of which Mobility Management measures will be used to reduce the traffic. Both the Kvillemotet and E45 have concluded that interaction between projects will be necessary to succeed with the trafficability during the construction phase. These two projects favours that the group, Nya Vägvanor, that has more overall view of the construction situation of the city, should take care of informing the road users that travel from longer distance and pass the construction area.

Although the traffic might need to be reduced there are modes of transport that needs to be prioritized to succeed with the trafficability. According to the West Swedish Agreement the trafficability for freight traffic, pedestrians, bicyclists and the public transport should be prioritized. Five of the nine projects included in the survey are included in the West Swedish Agreement. The Kvillemotet, included in the West Swedish Agreement, is the only project that had plans to prioritize all these modes of transport during the construction phase, despite the fact that there are no pedestrians in that area. The Västlänken, E45 and Hisingsbron, will prioritize the pedestrians, bicyclists and the public transport but did not mention the freight traffic in relation to prioritization. Although the E45 still sees it as an importance that the all road users should be able to reach their destination, including the private cars. The Marieholmsförbindelsen will prioritize the pedestrians and bicyclists but claims that it is also important to prioritize the dominant travellers that travel by private cars and public transport.

The Kvillemotet and Hisingsbron have not yet decided exact how the prioritization will be performed except from couple of ideas that have been mentioned in chapter 5.2.7 and 5.2.3. Seen to all five projects included in the West Swedish Agreement it is noticed that a big effort is put in keeping the bicycle condition remained and undisturbed.

The project outside of the West Swedish Agreement, the Skeppsbron, Älvsborgsbron, Backaplan and Kville railyard did not put any special emphasis on prioritizing of pedestrians or bicyclists and freight transport. Although the Kville railyard differs from the other projects since only freight trains pass through the construction area and the consult interviewed for the project Backaplan did not know if or which mode of transport would be prioritized.

Seven of the nine projects have thought of how their traffic proposal will affect the traffic at other construction areas, at least for the projects in the nearest surrounding. Too remain the traffic capacity in the city the project must synchronize their traffic proposal to succeed avoiding major disturbances in the traffic system. During the construction on the Hisingsbron the old Göta Älv Bridge will be open for traffic so the traffic capacity will be kept remained. Although the traffic going through the bridge, heading south, will end up in the area where Västlänken is constructing. This might affect the traffic around the Central Station.

The project that have not thought about how their traffic proposal will affect the traffic at other project's construction site are the Marieholmsförbindelsen and the Älvsborgsbron. The Marieholmsförbindelsen has not seen a reason to speculate the impact on other projects since no other projects have reached a stage that is possible to determine a potential impact. This is understandable since it is hard to make predictions due to a project that has not gained a legal force and thereby with an unknown construction start. However the Marieholmsförbindelsen is a part of the West Swedish Agreement and should therefore be fully aware of the upcoming situation even if the project has gotten further than the others. The project has although discussed how other projects' traffic proposal might affect the traffic at the Marieholm's construction site. Älvsborgsbron on the other hand sees it as someone else's job, with a more comprehensive view, to analyse the traffic impacts. Since Älvsborgsbron is the only maintenance project of those projects investigated in the survey, it is unknown if it is the general way of thinking.

All the projects who had thought about how their traffic proposal will affect the traffic at other construction areas had also thought about how other projects traffic proposal might affect their traffic, except for Backaplan that still is in the planning phase. By comparing the projects' answers to question nine and ten in question sheet two in Appendix B it was quite obvious that more effort is put in to analysing the possible traffic impact on their project than on possible impact caused by their project.

6.2 Cooperation

All of the projects except the maintenance on Älvsborgsbron will at least cooperate with some other projects. In most cases the projects cooperate with the projects that they conflict with geographically. However it was noticeable that in some cases the cooperation included only project that belonged to mutual organization. For some of the projects it were relevant due to the geographical interference but for others not e.g. Skeppsbron will only cooperate with

projects belonging to the Traffic and Public Transport Authority. Although Skeppsbron is not included in the West Swedish Agreement and therefore is not bounded to the same cooperation requirements as the projects included in the West Swedish Agreement. What also could be noticeable was that some projects claimed to cooperate with a specific project, which did not mention them conversely in relation to cooperation. Either there is a weakness in the cooperation or a project was forgotten when listing the cooperating projects during the interview.

Älvsborgsbron does not cooperate with any other project just as they do not analyse the traffic impacts on or from other projects, mentioned earlier. The Älvsborgsbron claims to be aware of all the other projects and assumes that the other projects are aware of their maintenance on the bridge. The project seemed to interpret cooperation as it only will occur if the project will need to be moved in time. However a cooperation should in fact promote the projects' preliminary time schedule but if a project is forced to move in time to ensure the trafficability, the decision should be taken of someone with more comprehensive view over the situation.

In the West Swedish Agreement it is required to include Mobility Management in the cooperation. All of those projects, in this survey, that are within the West Swedish Agreement claim that Mobility Management is included in the cooperation, although some projects have less focus on the Mobility Management. Those projects that are not included in the West Swedish Agreement do not include Mobility Management in their cooperation. However in some cases a project, included in the West Swedish Agreement, cooperates with a project, not included in the West Swedish Agreement, which makes their statements contradictory. Either the cooperation that includes Mobility Management only applies for the project within the West Swedish Agreement or the projects adjust their statements to a more simplified answer suiting the question asked. It might also be that a project interacting with another is not aware of the inclusion of Mobility Management but that rather indicates a weakness in the cooperation.

All the projects stated that there is or will be a cooperation of some kind with relevant organizations and stakeholders. All the projects have in common, that they are cooperating with organizations within the region and stakeholders nearby the particular construction area. The cooperation mainly takes place locally which seems relevant since stakeholders in a further distance are harder to identify and probably will be less affected. Cooperation with a support from the group Nya Vägvanor could make it easier to identify these stakeholders and support them with more aggregated information.

6.3 Mobility Management

The coordinators' definition of the Mobility Management during a construction phase is quite similar between the Traffic and Public Transport Authority and the Swedish Transport Administration. Although it seems like the focusing of different Mobility Management issues is emphasized differently according to how the projects utilize Mobility Management, earlier stated in the results, chapter 5.1. For instance at the Traffic and Public Transport Authority more focus is laid on reaching a good quality at the construction site and in that way protect their image. At the Swedish and Transport Administration the focus is more on combining the soft and hard measures to stimulate greener transport systems with a success.

At the Swedish Transport Administration there is a requirement to make a needs assessment if it is considered that Mobility Management is needed within the project. It implies that Mobility Management is implemented at an early stage of a project. The project is supported by the Mobility Management Coordinator, which has a great knowledge about Mobility Management, regarding Mobility Management questions if needed. A project has responsibilities to procure a consult that does a Mobility Management investigation that is later reviewed by the Mobility Management Coordinator.

The Traffic and Public Transport Authority has not worked with Mobility Management during the construction phase as long as the Swedish Transport Administration and is therefore a little behind in the Mobility Management procedures. However the organization seems to have a clear vision and goals of desirable working approaches. Their goal is to implement requirements of needs assessment where it is needed that will ease the Mobility Management work for the coordinators and thereby promote a better success with their work.

At the moment the Mobility Management Coordinators at the two different organization do not work similarly. At the Swedish Transport Administration the coordinator is available for providing a support if a project is in need of a support with Mobility Management since it is up to the project to decide if it is a need for utilizing Mobility Management. At the Traffic and Public Transport Authority the Mobility Management Coordinator first needs to approach information about current project and subsequently the Mobility Management work begins. By implementing requirements of a needs assessment in every project the Mobility Management work could start earlier and the opportunities to succeed with Mobility Management will increase.

In both organization everybody seems to be aware of the importance of Mobility Management thoughts although there is a sign of lack of acceptance and understanding why Mobility Management needs to be utilized. If knowledge or understanding about Mobility Management should be required from the entrepreneurs it is important that the higher positioned employees have understanding of Mobility Management to be able to forward the message to the entrepreneurs. A lack of acceptance and understanding among the entrepreneurs can lead to a deterioration in the Mobility Management work.

Every project was asked to explain the Mobility Management concept. Although the European Project MAX has published a definition of Mobility Management for the entire Europe, the definitions by the different projects varied a lot. Even though the different definitions were dissimilar the main difference was between the definitions from the two organization. The answer from the Swedish Transport Administration characterized mainly of encouraging travellers to change their travellers and thereby increase the trafficability in the city during a construction phase. The answers from the Traffic and Public Transport Authority on the other hand characterized more by maintaining the traffic flow and keeping a good quality for accessibility during a construction phase. Backaplan was although an exception from the projects represented by the City of Gothenburg where the representative's definition characterized of attitude changes. The reason for that might be because the representative for the Backaplan project is an in-house consult and belongs to another company, COWI. His definition could thereby be based on his former experiences. Each project's definition reflects

its company's Mobility Management policy according to the company's Mobility Management Coordinator. The two companies seem to be aware of that they have different definitions of Mobility Management but are not exactly aware of what the difference comprises.

It is obvious that Mobility Management measures have no limits according to the interviews. The most common Mobility Management measure was to inform the public about the situation during the constructions, so called soft measures, but otherwise the proposed plans of measures varied accordingly to each specific project. Hard measures are more expensive than the soft and the number of hard measures within the projects are limited by capital provided for Mobility Management measures. The projects that have performed a Mobility Management investigation had the largest range of measures and more comprehensive image of what can and needs to be done. No special pattern was found in the timing of implementation of Mobility Management in the projects. Some projects work with Mobility Management through the whole construction process but some are only active with Mobility Management at different stages in the project process. What also has been noticed is that more experienced project managers, work according to former experience regarding Mobility Management during the construction phase.

Six of nine project representatives claim that the general knowledge about the Mobility Management concept is big within their project and organization. What is noticeable is that all these six representatives are either project managers for the project or the Mobility Management part of the project. The projects represented by a person with a lower title considered the knowledge low or were uncertain about how widespread the knowledge is within the project or organization.

All the projects that belong to the Swedish Transport Administration have a special appointed person that is responsible for the Mobility Management work within each project, excluding Kville railyard since it does not include Mobility Management at all. Usually, at the Traffic and Public Transport Authority, a special Mobility Management department takes care of all the work, regarding Mobility Management, within each project. Although the Skeppsbron has a special appointed person that is responsible for the Mobility Management during the construction phase, however that person only takes care of the traffic arrangements which also reflects their definition of Mobility Management. What both Hisingsbron and Skeppsbron have in common, both belonging to the Traffic and Public Transport Authority, are that the handover of the Mobility Management questions, to the department or person, have brought ignorance of the Mobility Management work within the project. At the same time Hisingsbron argued that the knowledge about Mobility Management is big within the project.

Hisingsbron and Skeppsbron together with Kvillemotet are the only projects that have special requirements of general knowledge about Mobility Management among all employees involved with the project. The Västlänken has had a discussion about similar requirement but no decision has been taken yet. The E45 and Marieholmsförbindelsen has no specific requirements but will in some way ensure that the entrepreneurs do not lack knowledge about Mobility Management. The Marieholmsförbindelsen, Skeppsbron, Kvillemotet and E45 seem to agree that the best way to verify that the constructions follow the Mobility Management requests is to regularly reviewing the construction site. Marieholmsförbindelsen also mentioned that it is important to keep a positive attitude regarding the travellers among the entire staff. The bonus system that

will be implemented for the entrepreneurs with the purpose to promote a success with respect to Mobility Management will also contribute to a good attitude and hopefully succeed in good trafficability.

6.4 Summarizing table

Table 2 on the following page shows a summary of the result. The table is, as the former parts of the analysis chapter, divided into three categories; traffic impact, cooperation and mobility management. Public transport, Mobility Management and Development Consent Order has in the table been abbreviated as PT, MM and DCO. What should be taken into account is that the table only is a short summary of the result and thereby excludes more detailed information.

Table 2 Summary of the result

| PROJECT/ SUBJECT | Marieholms- förbindelsen | Västlänken | Hisingrsbron | E45 - Götaleden | Skeppsbron | Älvsborgs- bron | Kvillemotet | Backaplan | Kville railway |
|---|--|--|---|---|---|---|---|--|--|
| Present stage | Construction phase | Designing process | Planning and designing process | Designing process | Construction phase | Planning process | Designing process | Planning process | Designing process |
| TRAFFIC IMPACT | | | | | | | | | |
| Redirecting plan completed | Yes for the E45 but not for the E6. | Yes, small adjustments left | Only for the bridge | Yes with reservation of minor changes | Yes | Yes, preliminary traffic proposal | No, first the DCO will be handed in | They have started | Yes |
| Affected modes of transport | PT (including trains), cars, bicyclists, pedestrians, goods, boats | PT, cars, bicyclists, pedestrians, goods, Paddan (boat) | PT, cars, bicyclists, pedestrians, boats | PT, cars, bicyclists, pedestrians, goods | PT, cars, bicyclists, pedestrians, goods | PT, cars, bicyclists, pedestrians, goods | PT, cars, bicyclists, pedestrians, goods | PT (including trains), cars, bicyclists, pedestrians, goods | Trains, mostly freight trains but also passanger traintraffic at Bohusbanan |
| Reduction of traffic | Yes, up to 20% | Yes, how much is unknown | No | Yes about 10- 15% | Unclear | Yes, one lane will be shut down | Yes, how much is not known | No estimations have been made | That is in a discussion |
| Prioritization | Pedestrians, bicyclists, private cars, public transport | Pedestrians, bicyclists and public transport | Pedestrians, bicyclists and public transport | Pedestrians, bicyclists and public transport | All modes of transport are prioritized equally | Public transport | Public transport, bicyclists, goods | Could not be answered | They only has one type of traffic |
| Thoughts of traffic impact on other projects caused by the project | No | Yes, but only for projects on their side of the river | Yes | Yes | Yes, only the projects within the organization | No | Yes | Yes | Yes (for the projects that are closest) |
| Thoughts of traffic impact on the project from other projects | Yes has been discussed | Yes, but only for projects on their side of the river | Yes with simulations | Yes | Yes | No | Yes | Had not been analyzed yet | Yes |
| COOPERATION | | | | | | | | | |
| With other projects | Yes | Yes, projects closes by | Yes, E45 and VL | Yes | Yes, only the projects within the organization | No | Yes | Yes | Yes |
| Including MM | Poorly | Yes | Yes | Yes | Not known | - | Yes | No | No |
| With other companies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| MOBILITY MANAGEMENT | | | | | | | | | |
| Definition of MM during the construction phase? | Influencing road users, minimize disturbances | Influencing road users, minimize disturbances | Maintaining accessibility for travellers | Soft and hard measures, influencing road users | Maintaining the traffic flow | Information and evaluating different measures and cost | Influencing road users, minimize disturbances | Influencing road users | Influencing road users, minimize disturbances |
| Application of MM in the project | Information through advertisements and media | Information, measures will depend on capital | Not decided yet | According to MM investigation, inclusive safety improvements | Traffic Arrangement- plans (TA- plan) | Information, work in shifts, careful TA-plan | Not fully decided yet, standard conditions for bicyclists with additional facilities | Information, attractive public transport close to travelers, opportunities for bicyclist | MM has not been needed yet |
| Application stage | May | - | The end of 2014 | Continuously | Continuously | - | At a early stage in the project planning | simultaneously with the local plan | - |
| Appointed MM person | Yes | Yes | No | Yes | Yes | Yes | Yes | No | No |
| Is the knowledge great about MM among the project members | Yes | Yes | Yes | Yes | Yes with reservations | Yes | Yes | No | No |
| Requirement of knowledge within the project | No | It has been in a discussion | Yes although it is known as "quality" instead of "MM" | No | Yes although it is known as "quality" instead of "MM" | No | Yes | No | No |

7 Discussion

In the following chapter a discussion will be carried out based on the literature study, the result and the analysis chapter. To obtain the desirable goal of the survey the chapter will be divided into three subchapters. The first chapter, 7.1, will point out the uncertainties of the study. In the second chapter, 7.2, the differences in working policies both between the projects and the two organizations will be discussed, followed by the third chapter, 7.3, that focuses on the Mobility Management concept and how to utilize it efficiently.

7.1 Uncertainties of the study

When a study is based on interviews the result will automatically include uncertainties due to interpretations. Since the result from the interviews is based on structured questions there is a chance that information is missing due to limitations of the questions. In a qualitative interview the person interviewed gets a chance to have the questions explained, it also allows the dialogue to develop beyond the specific issue. Although the result can be affected by misinterpretations of the questions or even the answers could be misinterpreted by the investigators. The projects representatives did not get an opportunity to prepare their answers since they did not get the questions in advance. A result from a prepared interview differs from an unprepared interview where information unconsciously can be left out in an unprepared interview.

The result is also characterized by the perspective that the person interviewed has, since different persons in different positions can have different perspective on the project. It has for instance been noticeable that persons that pose another position than the project managers have in some cases different ideas about the general knowledge about Mobility Management among the project employees. That implies that the knowledge about Mobility Management might not be as stated in the result, although it is impossible to say since most cases there was only one person interviewed as a representative for a whole project. What also can affect the result is that a project is only asked to answer questions concerning its own project, meaning that the survey does not take other projects' opinions into account. What others, outside a certain project, might find as a problem can easily be looked past by that certain project, since it is easy to overlook a problem of its own.

The survey only takes few of the projects that will be constructed during the years 2015-2018 into account, so the situation regarding trafficability will at least not be easier to assess. Even if a project does not intersect geographically with those projects included in this survey it might still affect the traffic situation taken into account in the survey. Resting projects, such as Regionens Hus, might become relevant during those years, if decision will be taken to take up those resting projects and start the constructions. It might also be that new projects will show up, that also might intersect geographically.

7.2 Differences in working policies

The interpretation on cooperation can differ between projects. What might be considered to be a good cooperation from one project's view, might not be so good seen from another project's view. According to the analysis there were cases where a project stated a cooperation with another project but that project did not mention the other project conversely. Although, that might be caused by an uncertainty, that information can be left out, as mentioned above. The

West Swedish Agreement only requires that projects within the Agreement interact where an interaction is considered necessary. Necessity of interaction can be doubtful and can lead to insufficient interaction. It can be questionable way interaction is not required for projects intersecting, whether they are included in the West Swedish Agreement or not, since interaction forces projects to expand their view and become more aware of other projects and the trafficability situation.

All the projects seemed to cooperate with stakeholders and relevant organizations in some way but with an overall perspective the cooperation can be improved with the local companies. Construction can have severe impact on the local companies, partly the employees' accessibility and partly the demand of employees needed during a high season, for example at cafés during summer time. None of the project mentioned cooperation outside of the region. However a cooperation with organizations outside the region e.g. other cities that might have dealt with similar situation, could be helpful to succeed with the traffic situation during the years 2015-2018 in Gothenburg.

Regarding cooperation some projects only cooperated with projects within the same organization. It can be assumed that making a success in building a city, the two organizations need to be aware of each other's work and work together rather than competing. Cooperation between the organizations can promote the projects with a better information access and avoid repetition work and thereby facilitate the preparations. A decent interaction between the two organizations can also promote similarity in the Mobility Management work, which today differs significantly.

The significant difference regarding Mobility Management between the organizations related to the Mobility Management Coordinator's role. At the Swedish Transport Administration a support is offered by the Mobility Management Coordinator if a project feels the urge for a need of Mobility Management. At the Traffic and Public Transport Authority the project is chased by the Mobility Management Coordinator in case to implement Mobility Management. Both working approaches have their advantages and disadvantages. To always have the chance to get a support by the Mobility Management Coordinator, which even makes the needs assessment if none already exists, is certainly an advantage. The disadvantage is that the project decides on its own if Mobility Management should be included. As it is at the Traffic and Public Transport Authority the projects do not get the chance to decide whether a need for Mobility Management is needed, instead the Mobility Management Coordinator tries to be involved in every project, which is a great advantage. The disadvantages on the other hand is how much energy is needed to approach information about a project's status and reach the project in a decent time. If a needs assessment would be made as a requirement for every project, no project will be able to ignore the need for Mobility Management as well as it will facilitate the coordinator's job at the Traffic and Public Transport Authority.

Overall a general defect is that it seemed to be difficult for some projects to look up from its own project, which makes it harder to get a broad vision over the situation. Many of the projects are in a different phase of the constructions and in some cases it has been used as an excuse for not taking another's project into account. However, even if the projects lie in a different phase it should not have to be an obstacle to interact since all the projects seem to be aware of each

other, at least the projects within the West Swedish Agreement. Then there is Trafik 2016 which should make all the projects constructed during the years 2015-2017 aware of each other so in fact it should not be anything preventing an interaction at an early stage.

7.3 Mobility Management

Eight of nine project states that Mobility Management is or will be utilized during the construction phase. The majority of the projects mentioned Mobility Management before it was taken up in a question, which is very positive since it shows that those projects account Mobility Management as an important part when assessing the constructions. In all those cases where Mobility Management was mentioned it related to how the traffic will be reduced at the construction site. Five of the projects are included in the West Swedish Agreement and thereby have obligations to work actively with Mobility Management during the constructions phase, according to the Block 2 contract. These requirements can be misinterpreted since in fact the construction phase does not include the designing phase, and the designing phase is maybe the most important phase to work with Mobility Management.

Even if a projects states that West Swedish Agreement's requirements about Mobility Management are fulfilled it does not necessarily mean that the Mobility Management work is implemented in time. By starting early with Mobility Management work it is more likely that it will do a success since the flexibility for making actions decreases with time. As an example the project Hisingsbron, included in the West Swedish Agreement, will start with their Mobility Management work in the end of year 2014 and the constructions will start in the beginning of 2015. This fulfils the requirements of the Block 2 contract but there is a risk that some Mobility Management measures might be left out because it is too late to implement those or if the measures prove to be too time consuming.

It is very positive that all the projects will trigger an information campaign as a part of their Mobility Management measures, but are the information campaigns as efficient as possible? Whether the information campaigns will only include information about the projects themselves separately or together with other projects is quite unclear. According to the result it seems like most of the projects only provide information about project separately, although some projects mentioned that they will get assistance from the group Nya Vägvanor to inform the public. Nya Vägvanor has the tendency to combine separate information and make it relevant for a certain target group. What also is unclear is if the travellers will need to figure out how to pass the construction sites on their own or will the information include a guidance how to pass by the construction site.

To try to reduce the traffic around the construction sites and facilitate the trafficability during the constructions it is important to offer good attractive transport alternatives. A reduced traffic capacity on the roads will certainly also have impact in making people choose other roads or choose other alternatives. With combination of reduced trafficability for cars and good travel alternatives the goal of making people change their traveling habits might succeed but the most important thing to succeed with that is to inform about those alternatives. The general way of the informing the public is through radio, television, official websites and by putting up signs. Nowadays on the time of download and smartphones the radio and television might not be as efficient information tool as it used to be. Although radio might still be efficient to reach the

car drivers since many people might listen to radio while driving. The best way of how to inform is always dependent on the target group and to choose the most efficient information tool can be very complicated.

In the end the trafficability will depend on how the construction site is managed. If the builders do not have appropriated understanding of Mobility Management e.g. by parking their vehicles on the bicycle road, some of the Mobility Management work might be wasted. However this can probably be prevented if the knowledge about Mobility Management is transmitted to all workers within the project.

8 Conclusion and recommendations

The investigation has shown that the methods of working with Mobility Management are quite different between the Swedish Transport Administration and the Traffic and Public Transport Authority. The difference can be related to the difference in interpreting the concept Mobility Management during a construction phase. It is therefore recommended to harmonize the working methods and the definition of Mobility Management to make it easier for the two organizations to cooperate and understand each other's working situations. That will also promote a more coherent Mobility Management work. Needs assessment is neither required at the Swedish Transport Administration nor at the Traffic and Public Transport Authority. Needs assessment should in fact be required for every project to avoid ignorance of the need for Mobility Management as well as it would facilitate the coordinator's job at the Traffic and Public Transport Authority.

What has been noticeable is that the concept "Mobility Management during the construction phase" has been interpreted differently due to misinterpretation of the phrase "construction phase". In fact the Mobility Management work that is referred to in the concept "Mobility Management during the construction phase" relates to the work that is linked to the whole construction itself and not only the construction phase as often has been interpreted. The Block 2 contract's requirement of Mobility Management during the construction phase, does not make it easier for the projects within the West Swedish Agreement to interpret the concept in a decent way, since it only requires that the projects should work actively with Mobility Management during the construction phase, where the planning and designing phases are not included. The misinterpretation is understandable and it would be more appropriated to phrase the concept as the "Mobility Management during a construction" to avoid misunderstanding. The formulation of the requirements should advantageously be reformulated to become more accurate. Although the Mobility Management work should be required to be active during the whole construction including the planning and designing phase and not only during the construction phase. It is therefore recommended to add that to the requirements in the Block contract.

It is also important that everyone within the project have knowledge about the concept Mobility Management, project managers as well as builders, since understanding of the concept plays a key role to succeed with the Mobility Management work. If a good knowledge about Mobility Management and a good attitude towards travellers is kept within the project management the Mobility Management will be more likely to do a success. It is therefore recommended that knowledge about the concept will be required among the employees or at least an education about Mobility Management will be provided in some way.

It is positive that the West Swedish Agreement exists and establishes requirements to the projects included in the Agreement and thereby keeps a certain control over those projects. The West Swedish Agreement has for example requirements that relates to cooperation, where it is demanded to cooperate if it is considered necessary. What is considered necessary can vary and it has been shown that in many cases the cooperation between projects can be improved to a greater extent. Interaction is in fact always necessary for projects intersecting, whether they are included in the West Swedish Agreement or not. In that way projects are forced to expand their

view and become more aware of other projects and the trafficability situation. It is therefore recommended to require interaction between every intersecting projects independent of organization or involvement in the West Swedish Agreement.

It is positive that all the projects seemed to cooperate with stakeholders and relevant organizations at some level but what could be recommended is to improve the cooperation with the local companies. What also can be recommended is to move the interaction outside the region and search for a similar construction projects or similar situations in other regions/cities and get a support or advice to succeed in arranging the traffic. To facilitate with the cooperation, especially when it relates to informing the public about the situation, the projects have the opportunity to be supported by the group Nya Vägvanor. The group has the tendency to combine separate information and make it relevant for a certain target group. It is therefore recommended that the projects take advantage of the group Nya Vägvanor, especially when so many projects are being constructed at the same time, to ensure that the travellers get informed in the most convenient way.

How to inform in the most efficient way is although very complex. The information methods must be adjusted to the right target group. To reach the most target groups at once it could be a great idea to gather all information at one place that is reachable by the public. To have to search for information can be unattractive and often seems complicated so the information should be gathered at obvious places that does not require effort to find. The authors suggest to put up a Facebook page with gathered information about the projects since nowadays Facebook seems to be the largest social network. The Facebook page could be advertised in the advertisement column on Facebook where the advertisement appears on the peoples' Facebook pages that are relevant due to hometown. For more detailed information and for those who do not have Facebook, a homepage could be established where all information about different projects are gathered with a possibility of selecting a certain road to check for disturbances. Advertisements at bus stops could then be used for spreading the word about the information pages. To make it as convenient as possible for the smartphone users the advertisement could include a QR-code which makes it possible to access the page direct by using a QR-reader on the smartphone.

The survey only takes on few of the projects that will be constructed during the years 2015-2018 into account. The situation related to trafficability is already complicated when looked at those selected projects for this survey, which means that the situation only will get more complicated, with a greater traffic impact, when looking at all the projects that will be constructed. Even if a project does not intersect with any other project geographically it might still affect the traffic situation. To estimate the traffic situation and determine solutions for the overall traffic system during those years can be very complicated. The more projects that are being constructed during the same period of time, the more complicated will it be to see the comprehensive trafficability situation. It looks like it is about time to take advantage of the technique and it can therefore be recommended to create a system where every projects are required to hand in their traffic proposals for a simulation. The simulator should simulate each traffic proposal with the situation at a relevant time so that every project that are being constructed at the same time are simulated together. The simulation should then be able to show if the traffic proposal will work out or point out the most troubled areas and require another

alternative solution or reduction of traffic to be approved. In order to make this system work it needs to be easy to use and flexible for adjustments if changes occur.

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List of figures and tables

| | |
|--|----|
| Figure 1 Location of the projects. 1 Marieholmsförbindelsen, 2 Västlänken, 3 Hisingsbron, 4 E45 Götaleden, 5 Skeppsbron, 6 Älvsborgsbron, 7 Kvillemotet, 8 Backaplan, 9 Kville railyard (Made by information from the representatives of the projects). | 3 |
| Figure 2 Interference management during construction phase [Inspired by (Trafikverket, 2013 (b))]. | 7 |
| Figure 3 MM during the construction phase can give persistence effects [Inspired by (Trafikverket, 2012)]. | 8 |
| Figure 4 Mobility Management actions during the construction phase [Inspired by (Trafikverket, 2013 (b))]. | 8 |
| Figure 5 Overview of the Marieholmsförbindelsen which includes a new road tunnel and a new railway bridge [Taken from Eva Kraft, Marieholmsförbindelsen, Trafikverket, mail contact May 12 th 2014]. | 18 |
| Figure 6 The Marieholmstunneln connects to the E45 through a junction on the south side of the river, Göta Älv (Trafikverket, 2014 (e)). | 19 |
| Figure 7 The new bridge will be located between the old railway bridge and the Marieholmstunneln (Taken from Eva Kraft, Marieholmsförbindelsen, Trafikverket, mail contact May 12 th 2014). | 19 |
| Figure 8 Illustrated Plan drawing. 1 Lowering of E45. 2 Junction at Kämpegatan. 3 Flyover at Falutorget. (Trafikverket, 2013 (c)) | 21 |
| Figure 9 Drawing of Kvillemotet from the feasibility study with reservations of changes due to the work with the Development Consent Order (Trafikverket, 2014 (h)) | 23 |
| Figure 10 The Mobility Management process during a construction phase at the Swedish Transport Administration [Inspired by (Trafikverket, 2012)]. | 25 |
| Figure 11 Draft of desired building process inclusive MM [Inspired by a PowerPoint presented during the interview with Wikman, 2014]. | 28 |
| Figure 12 The tunnel route of Västlänken and three new stations (Trafikverket, 2014 (j)).... | A6 |
| Table 1 The projects with respect to construction time | 2 |
| Table 2 Summary of the result | 51 |

Appendix A

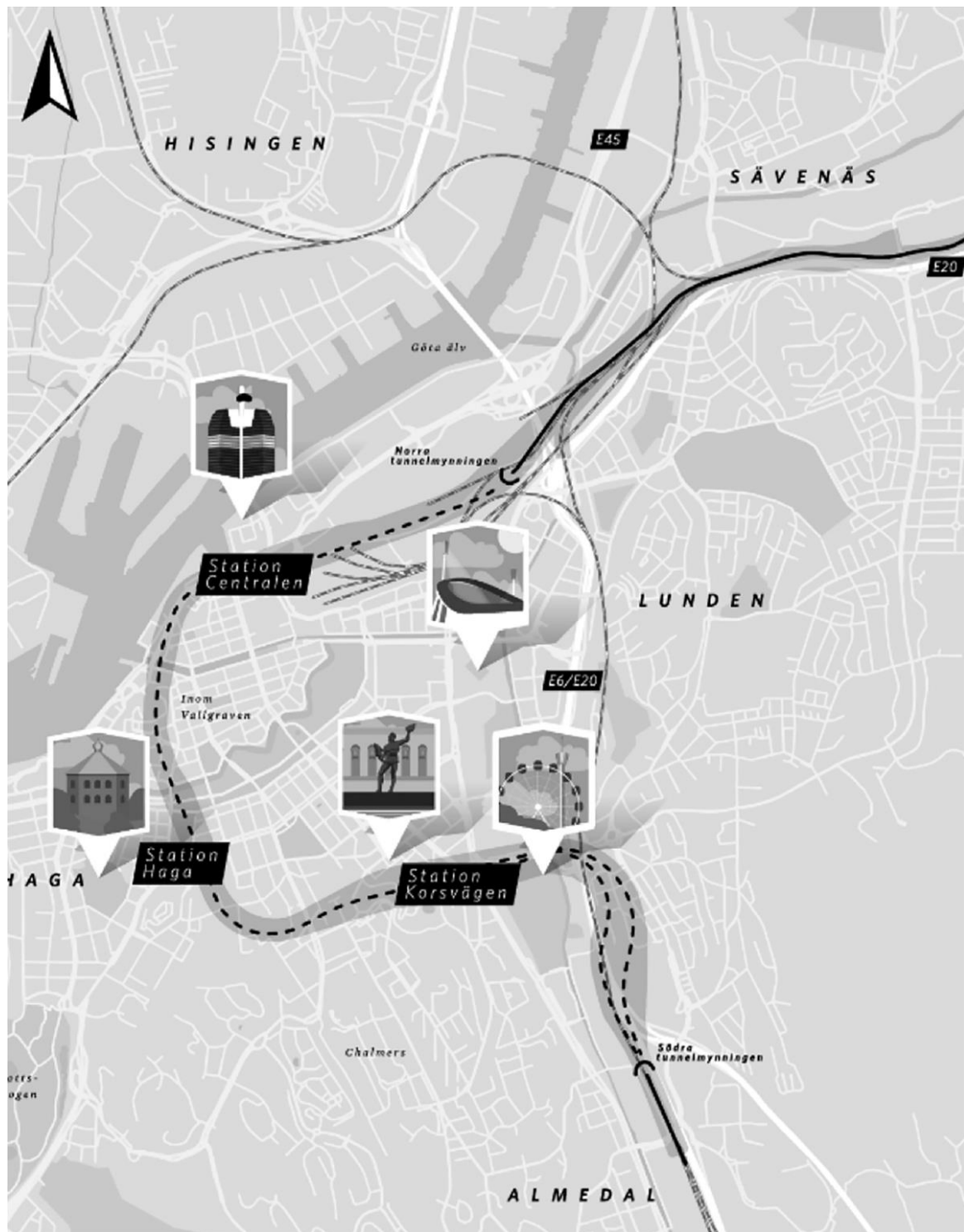


Figure 12 The tunnel route of Västlänken and three new stations (Trafikverket, 2014 (j))

Appendix B

Interview sheet number one

1. How would you define Mobility Management?
2. What is your role as a Mobility Management Coordinator?
3. Is the knowledge about MM big within your organization?
4. How do you utilize MM during the construction phase and at what stage?
5. Is it a requirement that projects within your organization utilizes Mobility Management as a tool during the construction phase?
6. Do you require that people involved with your project, project managers within the organization as well as entrepreneur in all levels, have knowledge about MM?

Interview sheet number two

TITEL OF THE PROJECT REPRESENTATIVE

START OF CONSTRUCTION

OPENING FOR TRAFFIC

- 1) Can you shortly describe the project?
- 2) At which stage do you define the project at the moment?
- 3) Have you finished the traffic proposal (redirection plan) for your project?
 - a) Which type of road users are/will be affected during the construction phase?
 - b) In which way are/will they be affected?
- 4) Will the traffic need to be reduced?
 - a) How much? (e.g. in percentage)
 - b) If reduction of traffic is necessary what actions will you use to do so?
- 5) Are you prioritizing the trafficability for any certain modes of transport?
 - a) Which modes of transport?
 - b) How?
- 6) How would you define Mobility Management?
- 7) How do you utilize MM during the construction phase and at what stage?
 - a) Have you appointed a person to be responsible for MM in your project?
- 8) Do you cooperate/interact with other projects, within and outside of the organization, when it comes to redirection of traffic?
IF YES:
 - a) With which projects?
 - b) How do you cooperate/interact?
 - c) Does the cooperation/interaction include MM?
 - d) In which way?IF NO:
 - a. Why not?
 - b. Is anything preventing you from performing your traffic proposal and MM actions parallel your current stage?
 - c. Will cooperation like this be take place/occur in near future?IF YES:
Will it include MM?

- 9) Have you considered how your traffic proposal will affect the traffic in other projects area?
- 10) Have you considered how traffic proposals from other projects will affect your project?
- 11) Despite interaction with other projects, are there any other organizations you interact with?
- 12) Is the knowledge about MM big within your project?
- 13) Do you require that people involved with your project, project managers within the organization as well as entrepreneur in all levels, have knowledge about MM?
 - a) How do you guarantee that?