

# CHALMERS



## Goal fulfilment during construction within the West Swedish Solution

-Investigation of planning and construction of initial measures by the Swedish Transport Administration

*Master of Science Thesis in the Master's Programme Geo and Water Engineering*

**GUSTAV SANDKVIST & RASMUS SUNDBERG**

Department of Civil and Environmental Engineering

*Division of GeoEngineering*

*Road and Traffic Research Group*

CHALMERS UNIVERSITY OF TECHNOLOGY

Göteborg, Sweden 2012

Master's Thesis 2012:81



MASTER'S THESIS 2012:81

# Goal fulfilment during construction within the West Swedish Solution

-Investigation of planning and construction of initial measures  
by the Swedish Transport Administration

*Master of Science Thesis in the Master's Programme Geo and Water Engineering*

GUSTAV SANDKVIST & RASMUS SUNDBERG

Department of Civil and Environmental Engineering  
*Division of GeoEngineering*  
*Road and Traffic Research Group*  
CHALMERS UNIVERSITY OF TECHNOLOGY  
Göteborg, Sweden 2012

Goal fulfilment during construction within the West Swedish Solution  
-Investigation of planning and construction of initial measures by the Swedish  
Transport Administration

*Master of Science Thesis in the Master's Programme Geo and Water Engineering*  
GUSTAV SANDKVIST & RASMUS SUNDBERG

© GUSTAV SANDKVIST, RASMUS SUNDBERG 2012

Examensarbete / Institutionen för bygg- och miljöteknik,  
Chalmers tekniska högskola 2012:81

Department of Civil and Environmental Engineering  
Division of GeoEngineering  
Road and Traffic Research Group  
Chalmers University of Technology  
SE-412 96 Göteborg  
Sweden  
Telephone: + 46 (0)31-772 1000

Cover: Photo of the construction site at Odinsgatan in central Gothenburg. The project is included in the West Swedish Solution which are further described in this thesis. The purpose with the photo is to illustrate the decreased accessibility for public transport during construction.

Reproservice / Department of Civil and Environmental Engineering  
Göteborg, Sweden 2010

Goal fulfilment during construction within the West Swedish Solution  
-Investigation of planning and construction of initial measures by the Swedish  
Transport Administration

*Master of Science Thesis in the Master's Programme Geo and Water Engineering*

GUSTAV SANDKVIST & RASMUS SUNDBERG  
Department of Civil and Environmental Engineering  
Division of GeoEngineering  
Road and Traffic Research Group  
Chalmers University of Technology

## ABSTRACT

The West Swedish Solution is an infrastructural investment concerning development of the region of Västra Götaland, and the involved organisations have formulated goals related to this development. The purpose with this thesis is to investigate how one of the organisations, The Swedish Transport Administration, aims for goal fulfilment according to these goals. The purpose is also to investigate if the concept of Mobility Management is implemented in order to reach the goals. Focus lies on the planning and construction of the initial measures, which are projects supposed to prepare the traffic system for the expected increase in demand of public transport due to the introduction of congestion charges. To identify shortages in the goal fulfilment process, a literature study and interviews with a number of involved officials are carried out. The outcome of the qualitative investigation method was that the goals can be interpreted in different ways which leads to difficulties when to prioritize goal fulfilling measures during construction. The outcome was also that steering documents concerning the goals and initial measures, were released late and therefore implementation of Mobility Management has been less considered. The concluding recommendation for this thesis is that the goals, their purpose and how to use them should be more emphasized. To simplify decision making, a model based on socio-economic effects for public transport travellers affected by construction, should be used. It is also recommended to increase knowledge of Mobility Management at The Swedish Transport Administration, in order to fulfil goals for the West Swedish Solution. An evaluation of the overall objectives of the Swedish transport policy has also been recommended due to different transport conditions and possibilities in different parts of the country, especially in the larger city regions.

Key words: West Swedish Solution, goal fulfilment, The Swedish Transport Administration, Mobility Management, construction phase.

## SAMMANDRAG

Västsvenska Paketet är en stor infrastruktursatsning som innefattar många stora infrastrukturprojekt i Göteborgsregionen. Flera avtalspartner delar på ansvaret för paketet där Trafikverket är huvudman. Ett antal mål har sammanställts för de projekt som ingår i satsningen baserat på avtalspartnerns egna mål. Dock har dessa mål publicerats sent vilket medför risk att de initiala åtgärderna i Västsvenska Paketet inte konstrueras enligt målbilden. De initiala åtgärderna i Västsvenska Paketet syftar till att förbereda trafiksystemet och kollektivtrafiken då andelen kollektivtrafikresor förväntas öka vid införandet av trängselskatt år 2013. Syftet med den här uppsatsen är att undersöka hur Trafikverket strävar mot uppfyllande av målen, speciellt i byggskedet för de initiala åtgärderna. Syftet är också att undersöka om Mobility Management används som ett verktyg för att nå de uppsatta målen. De projekt som har studerats mer ingående har varit byggnation av busskörfält både på det nationella vägnätet och på det kommunala vägnätet. För att finna brister i arbetet mot uppfyllande av målen har en både en litteraturstudie samt intervjuer med ett antal berörda tjänstemän genomförts. Resultatet av undersökningen är baserat på fakta som framkommit både genom litteraturstudien samt från intervjuerna. Resultaten har sedan analyserats med avseende på brister i arbetsmetoder och meningsskiljaktigheter inom olika avdelningar på Trafikverket. Resultatet av denna kvalitativa undersökning visade att de mål som har formulerats för det Västsvenska Paketet kan tolkas på olika sätt vilket leder till komplikationer hur man ska prioritera trafikslag i byggskedet. Det blev också klart att de styrande dokument gällande mål och projektformuleringar för Västsvenska paketet publicerades sent vilket medförde att det inte fanns något krav på Mobility Management för de initiala åtgärderna. En sammanfattande rekommendation är att syftet samt användningsområdet för målen behöver specificeras. För att underlätta beslut bör en modell skapas baserad på det samhällsekonomiska värdet för de kollektivtrafikresenärer som drabbas under byggskedet för projekten i Västsvenska Paketet. Det rekommenderas också att den samlade kompetensen gällande Mobility Management utökas på Trafikverket för att underlätta införandet av Mobility Management som i sin tur kan leda till en högre grad av måluppfyllelse. Slutligen rekommenderas det även att en utvärdering av de nationella transportmålen görs då det idag råder stora skillnader för trafiksituationen i storstadsregionerna kontra övriga vägnätet. En utveckling av funktionsmålet där tydligare riktlinjer ges om hur olika trafikslag bör prioriteras i olika områden kan bidra till ett mer hållbart trafiksystem över hela landet.

Nyckelord: Västsvenska Paketet, Mobility Management, Trafikverket, byggskede, måluppfyllnad

# Contents

ABSTRACT	I
SAMMANDRAG	II
CONTENTS	III
PREFACE	V
1 INTRODUCTION	1
1.1 Background	1
1.2 Purpose	1
1.3 Method	1
1.3.1 Literature study and background analysis	2
1.3.2 Planning and performing interviews	2
1.3.3 Analysis of interviews and illumination of shortages	4
1.3.4 Suggestions and recommendations	4
1.4 Limitations	4
2 THE WEST SWEDISH SOLUTION	5
2.1 Goals for the West Swedish Solution	6
2.2 Indicators and evaluation	7
2.3 Overall objectives of the Swedish Transport Policy	8
2.4 Congestion charge	9
2.5 Importance of the public transport	10
2.6 K2020	12
2.7 Investigated initial measures	13
2.7.1 Project Bäckebo	15
2.7.2 Project Road 158	16
2.7.3 Project Övre Husargatan	17
3 MOBILITY MANAGEMENT	18
3.1 Theory of the concept	18
3.2 Mobility Management during construction	19
3.3 The use of Mobility Management in The West Swedish Solution	21
3.4 Definition of Mobility Management in the West Swedish Solution	23
4 RESULTS	26
4.1 Formulation of the goals for the West Swedish Solution	27
4.2 Adaption of the goals for the West Swedish Solution	28

4.3	Internal ordering	29
4.4	Goal adaption for certain projects	29
4.5	How the goals are handled during construction	30
4.6	Fulfilment of the K2020 objective	31
4.7	Sufficiency of a regional transport policy	32
4.8	Definition of Mobility Management	33
4.9	Responsibility regarding the implementation of Mobility Management	33
4.10	Implementation of Mobility Management	34
5	DISCUSSION	36
5.1	Formulation of the goals for the West Swedish Solution	36
5.2	Adaption of the goals for the West Swedish Solution	36
5.3	Internal ordering	37
5.4	Goal adaption for certain projects	37
5.5	How the goals are handled during construction	38
5.6	Fulfilment of the K2020 objective	38
5.7	Sufficiency of a regional transport policy	39
5.8	Definition of Mobility Management	39
5.9	Responsibility regarding the implementation of Mobility Management	40
5.10	Implementation of Mobility Management	40
5.11	Internal discussion and further studies	41
6	CONCLUSION AND RECOMMENDATIONS	43
7	BIBLIOGRAPHY	
	ATTACHMENT I	
	ATTACHMENT II	



## **Preface**

The work with this thesis was initiated and financed by the Swedish Transport Administration region west. The thesis has been carried out at Trivector Traffic AB in the city of Gothenburg. In this study, interviews have been performed with persons involved in the work with measures within the West Swedish Solution. The interviews have been performed from February 2012 to April 2012.

This thesis has been carried out by Gustav Sandkvist and Rasmus Sundberg as authors and University Lecturer Gunnar Lannér as examiner at the Road and Traffic Research Group at Chalmers Technical University. Supervisor at the Swedish Transport Administration has been Susanne Planath and supervisors at Trivector Traffic have been PhD Eng. Helena Sjöstrand and Civ.Eng. Caroline Mattsson.

The authors would like to thank the interviewed persons, your participation in this study was of highest importance.

Finally, the authors would like to thank the employees of Trivector Göteborg for an inspiring spring and especially Helena and Caroline for your support. We would also like to thank Johan Petersson and Sofia Lander for review and opposition and wish them best luck in their careers.

Göteborg June 2012

Gustav Sandkvist & Rasmus Sundberg

## **Notations**

*Organisations in the West Swedish Solution:* The Swedish Transport Administration, the City of Gothenburg, the regions of Västra Götaland and Halland, The Göteborg Region Association of Local Authorities and Västtrafik.

Västtrafik is not one of the contractors responsible for the West Swedish Solution, but are a cooperation partner and therefore mentioned as an organisation in the West Swedish Solution.

## **Abbreviations**

WSS The West Swedish Solution

MM Mobility Management

ITS Intelligent Transport System

AADT Average Annual Daily Traffic

GR The Göteborg Region Association of Local Authorities

## **Swedish English wordlist**

Accessibility-Framkomlighet Tillgänglighet

Swedish Transport Administration-Trafikverket

Traffic and Public Transport Authority-Trafikkontoret Göteborgs Stad

# 1 Introduction

The City of Gothenburg and the region of Västra Götaland are facing the largest infrastructure investment in modern history. The project is named the West Swedish Solution and its purpose is to create a possibility for the urban society to grow in a sustainable manner. To reach a sustainable and rationalized infrastructure in the region, a lot of effort needs to be carried out, especially during the construction phase.

## 1.1 Background

The Swedish Transport Administration is responsible for planning, construction and maintenance of all national roads in Sweden. The work is performed with regards to the Swedish transport policy, formulated by the Swedish government. The policy aims to maintain accessibility and preserve a traffic system that should be equal for every user of the system. Meanwhile, the goals for the West Swedish Solution favour the use of public transport, which is considered essential to reach a sustainable transport system with adequate capacity.

To create finances for the measures in the West Swedish Solution and to decrease the congestion in the city of Gothenburg, congestion charges will be implemented in the beginning of 2013. The public transport needs to be upgraded to handle the increased amount of travellers and initial measures have to be performed to meet the new demand. The initial measures include for example extended bus lanes and longer commuter train stations.

## 1.2 Purpose

The purpose of this thesis is to investigate how the Swedish Transport Administration aims for goal fulfilment according to the goals for the West Swedish Solution. Focus lies on the planning and construction of projects aiming to increase the accessibility for buses. The purpose is also to investigate the use and knowledge of Mobility Management within projects included in the West Swedish Solution and to suggest improvements for detected shortages.

## 1.3 Method

The method used during the work is divided into four different steps. Initially, a literature study and a background analysis were made to provide proper knowledge of the West Swedish Solution and the concept of Mobility Management. The literature study has been performed during the spring of 2012. The second step included interviews with different officials within the Swedish Transport Administration and the Traffic and Public Transport Authority in the City of Gothenburg. The interviews has been planned and performed from February until April 2012. Step three includes the analytical part of this thesis, where shortages in the communication chain regarding the goals for the WSS were identified and illuminated. Finally, suggestions for future purpose have been presented. Step three and four has been performed in April and May 2012.

### **1.3.1 Literature study and background analysis**

The literature study is an important and necessary step in the methodology for this thesis. Initially, a literature study of the West Swedish Solution was performed, focusing on the background to the solution and its included measures. The structure and organization of the Swedish Transport Administration has also been studied. This was performed in order to understand the internal communication within the administration.

A major part of the literature study was dedicated to collect information regarding the general and effect goals for the WSS, the objective for the Swedish Transport policy and the goals compiled for the Swedish Transport Administration. The compiled goals for the WSS are based on the different goals valid for the different organisations involved in the West Swedish Solution and therefore it has been important to clarify the different sets of goals and more detailed objectives that affect the compiled goals for the WSS.

Three different projects included in the initial measures have been studied to investigate how such a project is planned. The objective for these projects is to build additional bus lanes both on the national and municipal road network to increase the accessibility for the public transport.

The concept of Mobility Management was also studied, both the official definition of the concept and how the concept can be implemented during construction. The official definition of Mobility Management is general to be useful in many areas and organizations within the business tend to have different definitions of how they adapt MM. Therefore, it was also necessary to define and clarify an approach of the concept that can be implemented to reach the objectives for the measures within the West Swedish Solution.

The theory of the West Swedish Solution and the different sets of goals that form the base for the compiled goals for the WSS can be read about in chapter 2-2.6. In chapter 2.4 is also the implementation of congestion charge described which constitute an essential part in the financing of the WSS. The three projects which have been studied are described in chapter 2.7. The theory of Mobility Management and how the concept can be applied are described in chapter 3.

### **1.3.2 Planning and performing interviews**

To extend the collection of information, interviews with different officials within the Swedish Transport Administration and the Traffic and Public Transport Authority in the City of Gothenburg were performed.

The methodology of this thesis is of qualitative nature with objective to identify different qualities that should be measured. It is about providing knowledge and understanding of what quality that should be measured rather than actually measure the quality. In a quantitative method, one or more quantifiable qualities are measured (Eneroth, 1984).

During the interviews, questions have been asked concerning how the goals for the WSS were formulated and how the goals were and are supposed to be carried out. There were also questions regarding how internal orders are formulated and communicated within the organisations, and how goals for the WSS are implemented

in the work at the Swedish Transport Administration. Further, there were also questions regarding how Mobility Management is used in different projects.

The interview questions were divided into different categories. Those questions that were asked to every interviewed person can be seen in Attachment II. The different categories of questions are described below.

- The goals for the WSS and how they are formulated and interpreted.
- How goals are implemented and broken down into objectives in specific projects and how the goals for the WSS are communicated in-between the officials of the Swedish Transport Administration.
- The Swedish transport policy and political incentives.
- How the concept of Mobility Management is used in different phases of the planning process in projects within the WSS.

Eight officials were interviewed, six at the Swedish Transport Administration and two at the Traffic & Public Transport Authority in the City of Gothenburg. The interview questions were modelled based on which official that was interviewed and what role the official had within a certain project and within the organisation. Although, the main structure of questions, presented in Attachment II, were used in every interview. The interviews lasted between 30 and 60 minutes, and they were performed by both of the authors and were also recorded.

The choice of officials that should be interviewed has been based on different aspects. The main reason was firstly based on the structure of The Swedish Transport Administration and how internal orders and specifications are handled. The purpose was to identify inadequacies in the communication chain between different departments within the administration. Secondly, the choice was based on different projects which in different ways concern The West Swedish Solution and where an implementation of the concept of Mobility Management might have been useful.

The choice of interviewing officials of the Traffic and Public Transport Authority for the City of Gothenburg was based on two aspects. Firstly, to provide knowledge of how the goals for the WSS are implemented in another organization and to get a proper comparison for the research during the work with this thesis. Secondly, to identify how a regional authority, where less consideration to the Swedish government's commission and the Swedish transport policy must be taken, handles prioritization of different policies and goals.

### **Interviewed officials at the Swedish Transport Administration**

- Three officials within the department *Investment*
- One official within the department *Society*
- Two official within the WSS secretariat and the department *Society*

### **Interviewed officials at the Traffic and Public Transport Authority**

- One official within the department *Traffic*
- One official within the department *Road and Track*

The results from the interviews are described in chapter 4 and divided into ten sub headings developed from the different categories of questions earlier described.

### **1.3.3 Analysis of interviews and illumination of shortages**

The analysis of the interviews was carried out with a matrix where the answers were shortened. Illuminated shortages adapted for improvement were sorted out and background and reason for shortages were discussed for further analysis.

The discussion regarding the result is described in chapter 5. Each subheading in this chapter corresponds to the same subheading in the result chapter in order to provide a discussion that is clear and easy to follow.

### **1.3.4 Suggestions and recommendations**

After identification and illumination of shortages, possible improvements have been discussed and finally presented in chapter 6. Suggestions that can be available today, but also suggestions taken with a future point of view are presented.

## **1.4 Limitations**

This thesis aims to investigate the construction of extended bus lanes within the Gothenburg region. Two organisations within the business are studied, the Swedish Transport Administration to meet the purpose of the thesis, and the Traffic and Public Transport Authority in the city of Gothenburg for a comparison. Three areas are included in the investigation, goals for the West Swedish Solution and the Swedish transport policy, internal ordering within the Swedish Transport Administration and the use of Mobility Management during construction. The interviews performed for this thesis are of qualitative nature in order to illuminate shortages and to suggest improvements.

## 2 The West Swedish Solution

Sweden is today affected of an urbanization taking place due to centralized labour markets. The region of western Sweden with the City of Gothenburg as a regional centre is expanding and to handle the increased amount of inhabitants in a sustainable way, large investments in the infrastructure has to be performed. The collecting name for this regional development is named The West Swedish Solution, WSS, which is a composition of the investments that need to be done to be able to handle the increase of traffic the following two decades. This chapter describes the West Swedish Solution, its goals and measures.

One of the most important steps in this developing process is to improve the capacity and quality of the infrastructure in the area (Trafikverket, et al., 2011(a)). Approximately SEK 34 billion will be invested where half of the cost will be founded by the state and the other half by local and regional capital. As a part of the West Swedish Solution, congestion charges will be implemented the 1<sup>st</sup> of January 2013, see chapter 2.4. As an effect of this, an increase of journeys done by public transport is expected and initial measures have to be done to meet an increased demand and to prepare the public transport system. The WSS includes among other things, a new commuter train tunnel under Gothenburg, new bridges, a tunnel across Göta Älv River and an extension of the public transport in the region, see Table 2.1 (Region Halland, 2012). The initial measures described in the table are planned to simplify for public transport and to increase the accessibility. This is necessary to be able to meet the increased demand, and several different projects take part under this category (Trafikverket, 2012(b)).

Table 2.1 Some of the measures included in the West Swedish Solution. (Franzén & Sott, 2012)

<b>Measures included in the West Swedish Solution</b>	
<b>Initial Measures</b>	<b>Objective</b>
<b>Extended bus lanes</b>	Increased accessibility for busses
<b>Extended platforms for commuter trains</b>	Increased capacity of commuter trains
<b>Additional parking lots for commutation traffic</b>	Increased capacity and flexibility for commuters
<b>Additional busses, trams and commuter trains</b>	Increased capacity and reliability for bus and commuter traffic
<b>Measures aiming to trim existing road network and overall maintenance</b>	Higher efficiency in existing traffic system
<b>ITS-measures</b>	Higher efficiency in existing and new traffic system
<b>2013</b>	
<b>Congestion charges</b>	Means of payment for the WSS
<b>After 2013</b>	
<b>The Marieholm Tunnel – Road tunnel under the Göta Älv River</b>	Increased accessibility and reduced vulnerability for the traffic system
<b>The Göta Älv Bridge - Co-funding of the new bridge over Göta Älv River</b>	Replacement of the existing Göta Älv bridge due to durability problems
<b>The West Link - Commuter train tunnel under Gothenburg</b>	Increased capacity of the commuter traffic and more efficient use of commuter trains and regional trains

## 2.1 Goals for the West Swedish Solution

A number of goals have been compiled for the West Swedish Solution by the organisations involved in the WSS. The organisations are the Swedish Transport Administration, the City of Gothenburg, the regions Västra Götaland and Halland, the Göteborg Region Association of Local Authorities (GR) and Västtrafik. The goals are aiming to create a sustainable region where the public transport is effective and where the infrastructure allows the region to expand. Five general goals supported by eight



effect goals cover areas of environment, public transport, labour market and regional development (Trafikverket, et al., 2011(a)).

The five general goals compiled by the organisations are described in the report *Västsvenska paketet, Sammanställning av målen*:

- ***Bigger labour market***  
*-The local labour market in Gothenburg shall consist of approximately 1.5 million inhabitants in 2020*
- ***An attractive core in the region and development along the five main routes***  
*-The centre shall be strengthened by 40 000 jobs and 30 000 inhabitants until 2020. The whole region shall be strengthened with additional 40 000 jobs and 90 000 inhabitants.*
- ***A competitive public transport***  
*- The public transport shall be able to handle 40 per cent of all travels made in the region of Gothenburg compared to hardly 25 per cent today.*
- ***A good living environment***  
*- The western part of Sweden shall be able to offer a good and healthy environment with clean air and water, limited noise and a high quality urban-outdoor- and daily life.*
- ***The quality for business transports shall be improved***  
*-With focus on the national and international transports, the vulnerability in the infrastructure must decrease, especially the passages over Göta Älv River.*

The eight effect goals follow below. They are defined to support the general goals and they should be valid both during construction and after completion (Trafikverket, et al., 2011(a)):

- ***An attractive public transport with increased capacity***
- ***A higher rate of travels done by public transport***
- ***A decrease of the car traffic to and within the centre of the region***
- ***Quick, safe and simple travels by bike and by foot***
- ***Increased quality for the business transports***
- ***A decrease of the emissions produced by transportations***
- ***A decrease of the noise produced by transportations***
- ***Open urban areas and a rich urban life***

## **2.2 Indicators and evaluation**

To be able to reach the compiled goals and to evaluate the effect of the measures performed in the WSS, a number of indicators have been defined. These indicators will give clear results and they will show if the measures result in fulfilled objectives.

Together with the document describing the goals for the West Swedish Solution, an additional document has been released describing the follow-up of a number of indicators. Every organisation has responsibility for a number of follow-up measures and has to present results in a given period of time.

In the planning process, the goals should be broken down into objectives and concretized to set the direction of the investments. The indicators can then be used both during the construction phase and after completion of measures for evaluation.

One important definition of the goals for the WSS is that no measure shall have a negative effect on any of the indicators. This means that every aspect of the goals for the WSS must be considered when planning a measure (Trafikverket, et al., 2011(a)).

The indicators are compiled to evaluate the progress of the five general goals presented in chapter 2.1 and are divided into five different areas; society, attitudes, traffic, environment and revenue. A list of the organisations responsible for following up the indicators is presented in Attachment I.

The indicators are compiled to evaluate the effect of several infrastructural measures and they are designed to show the direction of the development. It is only the implementation of the congestion charges that can be evaluated properly as a single measure (Trafikverket, et al., 2011(b)).

### **2.3 Overall objectives of the Swedish Transport Policy**

The Swedish government has a general transport policy. The objective in this policy aims to *"ensure the economically efficient and sustainable provision of transport services for people and businesses throughout the country"* (Regeringskansliet, 2009).

The objectives are divided into a functional objective and an impact objective. By the functional aspects, the transport system should contribute to every citizen, men and women, and increase development. There should be an improvement of the accessibility within the transport system. The impact objective aspect is about preventing casualties and serious accidents with focus on human's health solved by environmental friendly solutions.

Infrastructure that enable good transport options increase work possibilities in a region which strengthen the regional growth, and by focusing on equality, this will attract people to live and manage businesses in the region. On the same time it is important that the transport demand is met by sustainable solutions which will inspire people to use climate friendly ways of transportation, both in the private sector and the labour market. The goals for The West Swedish Solution, described in chapter 2.1, are connected with the Swedish transport policy. The goals for The West Swedish Solution are focusing on larger labour market, to have an attractive core and development in the region. Further, there is focus on a competitive public transport, high quality of the living environment and improvements of the transportation possibilities for commercial actors (Trafikverket, et al., 2011(a)). These goals are an articulated extension of the Swedish transport policy.

Due to the fact that the Swedish Transport Administration is the buyer of a major part of the infrastructure assignments given by the national government, it is of great importance to review the specific goals formulated by the Swedish Transport Administration which are elaborated from the objectives in the Swedish transport policy.

As mentioned in chapter 2.1, the Swedish Transport Administration is one of the organisations responsible for the goals for the WSS. Every one of the organizations have their own goals for the WSS that are compiled in the report “Västsvenska Paketet, Sammanställning av målen” (Trafikverket, et al., 2011(a)).

## 2.4 Congestion charge

Large investments are necessary to finance The West Swedish Solution (Transportstyrelsen, 2010). The West Swedish Solution will cost approximately SEK 34 billion and half of the investments are funded by the Swedish government. The other half is divided into regional and local means where expected income revenue due to congestion charges is the major part (Trafikverket, 2010(b)).

The congestion charges are calculated with 2009's monetary value and are assumed to be SEK 14 billion during 25 years of usage (Trafikverket, 2011(a)). Besides the financial parts, the purpose with the congestion charge in the City of Gothenburg is to highly reduce the congestion and occupancy in the traffic system. As a result of the congestion charges, some road users will probably change their way of travelling and an increase of travelling with public transport are expected (Transportstyrelsen, 2010). The effects of congestion charge implementation can be visualized in a demand-supply curve, see *Figure 2.1*. The congestion charge implementation is symbolized by the thick red line.

Road users can be categorized into different groups due to willingness to pay for their travelling. Group1, (1) is the group that must take the car and has a very high willingness to pay for usage of the road. Group2, (2) is the group that will change their behaviour if the cost for road usage will be too high. Group3, (3), is the group that will not be affected in monetary forms by congestion charges since they do not use the car and instead already use public transport or other alternatives.

When the most optimal congestion charge is implemented the cost for using the road will increase. The triangle named (A) in the figure is the increased cost for group (2). The triangle named (B) in the figure is the net benefit for the society. As mentioned above, (2) is the group that will change behaviour if the price for usage of the road will increase and they are going to reduce their car travelling. The car traffic volume will therefore be reduced from  $X_0$  to  $X_1$  (Jansson, 2008).

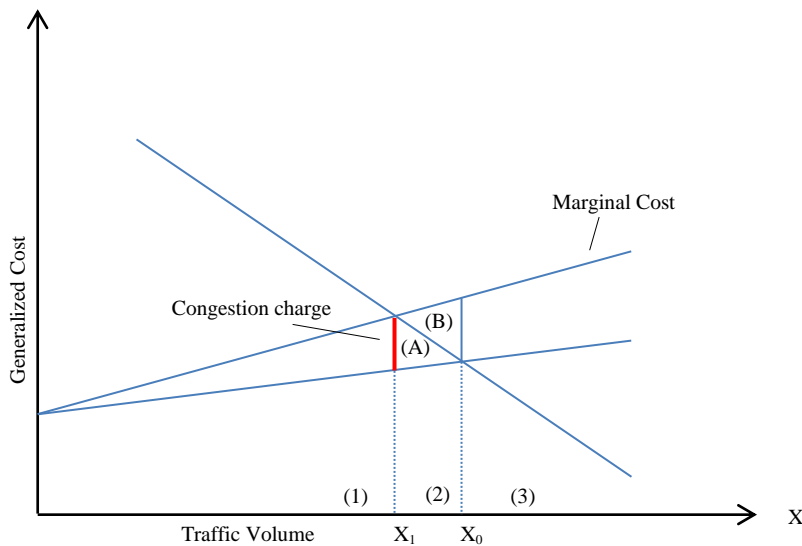


Figure 2.1. Net benefits of optimal road pricing.

Pay stations will be placed at different locations around the core of the city. 37 stations will register every Swedish car passing and different charges will be applied during different hours. The congestion charge will not be applied between 6:29 pm and 6 am on weekdays, during weekends, holidays and days before holidays. Motorcycles and emergency vehicles will not be concerned of the charge (Transportstyrelsen, 2010).

In 2003, congestion charge was introduced in London, UK, and in 2006, it was introduced in Stockholm. As an immediate effect of this, the traffic volume was reduced by over 20 % in London (Lucas, 2009), and 15 % in Stockholm (Carlsson, et al., 2006). The congestion charge was fixed and relative high ~60 SEK in London, while it was varying, and low ~20 SEK due to which hours car passages were made (Lucas, 2009). The same type of charging, time varying fees, as it is in Stockholm, will be used in the City of Gothenburg. However, the time periods and prices will differ between Stockholm and the City of Gothenburg where the cost will be between 8 and 18 SEK per passage.

## 2.5 Importance of the public transport

During the first half of the 20th century, major investments were made into public transport. As a direct consequence of the urbanization in the western part of the world, public transport was the only solution to handle the travel demand. The rail bound traffic with trains, trams and subways expanded and out conquered the old fashioned ways of traveling, by horses and boats. This development took a dramatic turn during post war era in the beginning of the fifties. Flight and car traffic increased significantly and started to dominate the market share (Lundin, 2008).

Today, many cities suffer from congestion and poor air quality. To convert this trend more focus on increased public transport is necessary. This correlates with one of the goals for the WSS, which is to increase the travels with public transport. The purpose with this goal is to create potential for the region to grow in a sustainable way. Statistic surveys during 2010 affirm that the use of cars in Sweden remains high but public transport gains market shares slowly. Between 2009 and 2010 the travels with public transport increased with 3 per cent and compared to 2000, the amount of

travels with public transport has increased with 19 per cent (Trafikanalys, 2011(b)). During 2010, six out of ten travels were made by car, passengers excluded, by men and five out of ten were made by women. On the other hand, travels made by public transport were hardly two out of ten. The most common reason for beginning a travel is related to work. One out of three travels was made back and forth to work and school. One important notice is that when the calculations were performed, bicycles, school busses, mobility service, flight travels and car ferries were excluded. The definition of public transport also includes travels made by taxi and the definition of private transport includes drivers and passengers by car, motorcycles and mopeds (Ipsos, 2011).

The market share for public transport was 23.8 per cent for the whole country but there is large difference within the city regions. In Stockholm the travels made by public transport had a market share of 47.1 per cent and in the Västra Götaland region, the usage was 23.7 per cent (Ipsos, 2011).

To be able to reach the K2020 objective described in chapter 2.6, the number of travels must increase until 2025. A fulfilment of this objective is important in the process to fulfil all general goals stated in chapter 2.1; Goals for the West Swedish Solution. Out of this perspective, the development of the public transport is highly prioritized in the WSS.

The City of Gothenburg is different compared to other cities in Sweden. The city is a mono-centric city which means that a great majority of the travels made due to work commuting has its destination within the city border. 85 per cent of the work commuting travels, both by car and public transport, have the city as destination in the morning and point of departure in the afternoon. The high share of one direction travels put an extra demand on the infrastructure in the region compared to the regions of Stockholm and Malmö. This problem cannot be solved only by building new roads and railway, a higher market share for the public transport is a necessity (Trafikanalys, 2011(a)).

The fact of limited accessibility and increased problem with congestion in urban areas are the main reason for a new era within urban and traffic planning. The idea is to create sustainable cities where the inhabitants are healthy and satisfied, but the developing process takes time.

In the City of Gothenburg and the surrounding region, the West Swedish Solution is the first major investment towards a sustainable, more attractive and urban area. One of the goals for WSS is to create bigger labour markets. To make this to a reality, a strengthened public transport and an adjusted attitude against a more sustainable transport system are necessary, both by urban and traffic planners as well as the public itself.

An example of this is presented in a newly delivered scientific report from VTI, the Swedish National Road and Transport Research Institute, in the report “*Public transport as a tool for regional development*” (VTI, 2012). The report describes the fact that transport economy is an important factor and is directly related to the benefit of salaried employment. The cost and time used for transportation affect the minimum salary acceptable to become employed. By starting to prioritize public transport ahead of private car, it will give people that today stand outside the labour market higher flexibility and a chance to an employment. Also people that already are established in the labour market may find it more profitable to work more and more effectively. This will lead to higher occupation in the region with growth as a direct result.

The conclusion is that a sustainable city must be planned from the perspective that the public transport is the main traffic system of the city. All other areas should be planned around the main routes in the region which is also one of the goals for the West Swedish Solution, see *Figure 2.2* (VTI, 2012).



*Figure 2.2. The five main routes in the region. Main nodes for each route are named clockwise from the top: Uddevalla, Trollhättan, Alingsås/Skövde, Borås and Varberg. (GR, 2012(a))*

## 2.6 K2020

The goals regarding public transport in the West Swedish Solution are a development from the project K2020 and the public transport development program which was presented in 2008. The idea with K2020 is to create a mutual vision for the public transport in the Gothenburg region until 2025. The overall objective with the project is that at least 40 per cent of all travels in the Gothenburg area shall be by the use of public transport. This means an increase of the daily number of travels by public transport by over 50 per cent, from 2008's level 450 000 to over a million.

To be able to reach the objective of minimum 40 per cent public transport in 2025, the overhead statement of a user have been considered "take me from location A to B quick and safely without time for waiting and let me be satisfied with the journey afterwards". From these perspective three areas has been in focus, the shape of the public transport and its services, incitement and marketing communication (Västtrafik, et al., 2009)

The shape of the development of the public transport is based on the "Go"-concept. The concept divides the system into six different levels, GoTo, GoClose, GoFrequent, GoFast, GoFar and GoAway, see *Figure 2.3*



Figure 2.3. The “Go” concept for public transport in the Gothenburg area. (GR, 2012(b))

The objective is that the public system shall offer fewer lines compared to today’s situation. Instead it shall offer a number of prioritized lines with many departures. This leads to a focus of those nodes that are required when to change between lines. The nodes will become the link between the regional and the local system and must be planned in such way that they invites to quick and easily accessed changes in between the systems in the “Go”-concept.

One of the first measures taken in K2020 and the West Swedish Solution is to locate the GoFast stops outside the absolute city core at three different locations. This will lead to increased space for the GoFrequent and GoTo travellers inside the city centre simultaneously as the GoFast travellers gets three main stop to choose from where the entire city centre can be reached by foot.

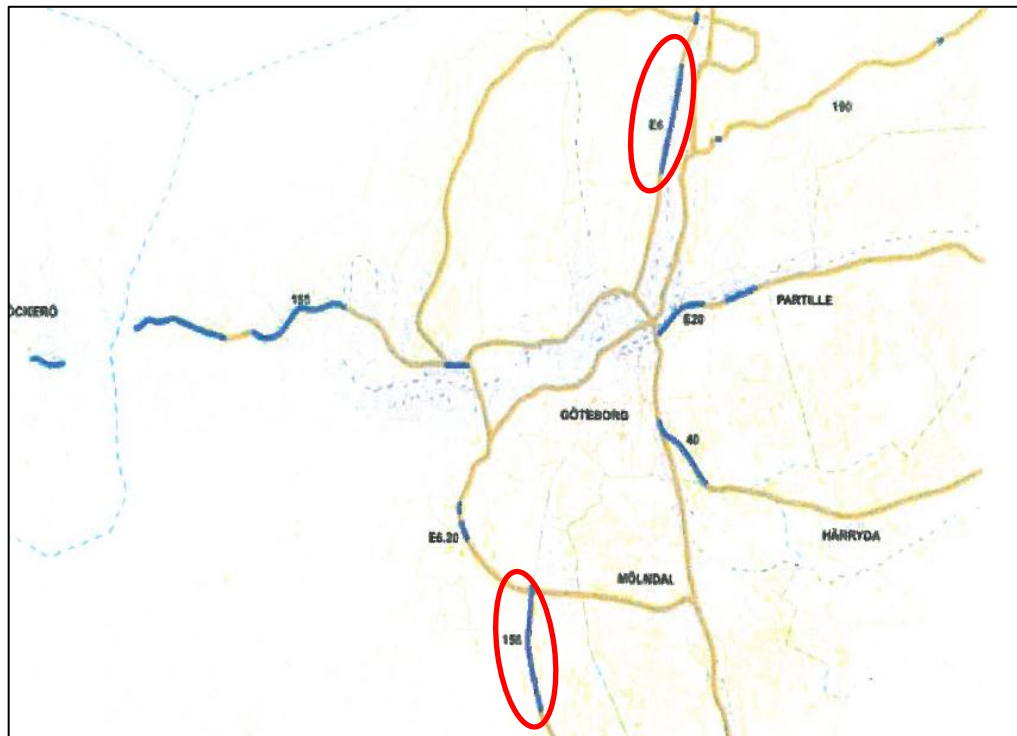
It is also of great importance that the public transport is understandable and easy to use. This interlocks with the focus areas of incitement and marketing communication, which are further described in chapter 3 and in particular Table 3.1 (Västtrafik, et al., 2009).

## 2.7 Investigated initial measures

As a part of the West Swedish Solution, congestion charge, see chapter 2.4, will be implemented the 1<sup>st</sup> of January 2013. As an effect of this, an increase of travels made by public transport is expected and initial measures have to be done. This is performed to be able to take care of the additional users.

There are two different organisations responsible for the road network in the region of Gothenburg. The national road network is handled by the Swedish Transport Administration, and the municipal road network is handled by the Traffic and public Transport Authority. Since these organisations have a different structure of organization and their planning process differs, a comparison is highly interesting.

The three concerned projects which have been investigated focus on measures that will improve the accessibility, punctuality and dependability for busses. Two concerned projects on the national road network, see *Figure 2.4*, and one project in the municipal road network, see *Figure 2.5*, have been investigated. There will be a number of similar measures on the national road network and the two cases are selected due to the difference in size and amount of traffic (Trafikverket, 2012(b)).



*Figure 2.4. Map where the public transport measures on the national road network are marked with blue lines. Project “E6 Bäckebo” and project “Road 158” are marked with red circles. (Trafikverket.region.väst, et al., 2011)*

The municipal road network in Gothenburg is also facing public transport improvements. The Traffic and Public Transport Authority in Gothenburg have allocated four main public transport routes around the city centre. The purpose with these routes is to move the GoFast traffic from the main bus stops within the most central area to new or reinforced bus stops along the parkways. One route, Övre Husargatan, has been studied in this thesis. Övre Husargatan was chosen due to the fact that the street not is used by public transport today, but will become an important public transport route.





Figure 2.5. Map over the city of Gothenburg. The four routes planned for “GoFast” buses are marked with dark blue lines. Project “Övre Husargatan” is marked with a red circle. (Trafikverket.region.väst, et al., 2011)

### 2.7.1 Project Bäckebo

The first investigated project for this thesis is the project at E6 Bäckebo with the purpose to extend existing bus fields on the highway. The case concerns the highway E6, just north of the city centre of Gothenburg. The stretch is 4.5 km long and the addition of bus lanes concerns both directions. The construction work will be performed step by step and the width of the existing lanes will be reduced and the speed limit will be reduced from 90 to 70 km/h. During night hours only one of the two lanes will be held open to create more space for the construction work.

Two bicycle and walking tunnels cross the stretch. During the construction phase, the tunnels will be closed due to risk of falling objects, but not simultaneously (Trafikverket, 2012(a)).

The project objective is to increase the accessibility for the public transport. During max hour traffic there are 24 buses passing the section in one direction and that number of buses is planned to be increased until the introduction of congestion charge.

The annual average daily traffic, AADT is calculated due to 90% of an average weekday. Present AADT between Bäckebolsmotet and Klarebergsmotet varies between 62300 and 53560 vehicles where 10-11% consists of heavy traffic.

A traffic flow prognosis has been performed in the pre study for the actual case of Bäckebol due to present situation at the location of the planned road extension. According to the prognosis, the traffic flow will be reduced due to the introduction of congestion charges. Between 7 am and 8 am for the southern direction, and between 4 pm and 5 pm in the northern direction, the so called max hour traffic flow is predicted. Present max hour flow is 3400 vehicles for both northern and southern direction, and is predicted to be reduced to 2800 and 2580 vehicles respectively after the implementation of the congestion charge (Trafikverket, 2010(a)).



Figure 2.6. The picture to the left demonstrate the present situation. On the right hand side it is demonstrated how the additional bus lane will look. (Google Maps, 2009)

## 2.7.2 Project Road 158

Another project under the category of initial measures is road 158, where an extension of the road width is going to take place where an addition of bus lanes is included. The concerned road is located in the southern parts of Gothenburg and the section is about 3.7 km. The speed limit is 70 km/h with two lanes in each direction, separated from each other (Trafikverket, 2011(c)).

Road 158 is used by many commuters which result in congestion during max hours. A traffic prognosis for 2013 has been performed and a calculated AADT is 30100 vehicles after the introduction of congestion charges (Trafikverket, 2011(b)).

The area has already a well-developed system adapted for foot and bicycle traffic and is connected to the bicycle system in the central parts of the City of Gothenburg. Bus

lanes are at some parts already existing, but during max hour traffic, the system is sensitive and the accessibility for the public transport gets affected in a negative way.

Road 158 is used by several bus routes, local, regional and express routes. Along the road there are a couple of bus stops in the bus lane, which the local bus routes use. The regional and express buses do not use all of these bus stops and during max hour traffic they cannot pass the local buses in the bus lane.

The overall objective of the project of road 158 is to increase the accessibility for public transport and as a result of that get more people to use public transport. The project will take almost 10 months. The planned measures are, as mentioned above, to widen the existing road for addition of bus lanes. Three bus stops will be removed to the outside of the bus lane to remove the risk of blocked regional and express buses. A couple of small bridges will be relocated during the project (Trafikverket, 2011(b)).

### **2.7.3 Project Övre Husargatan**

As mentioned earlier, several projects are under construction on the municipal road network as well. This project consists of creating two bus lanes along Övre Husargatan at the expense of two car lanes. This will reduce the number of cars and also create an attractive node at Linnéplatsen where transfers can be done. This is to meet the GoFast and GoFrequent travellers, see chapter 2.6.

Övre Husargatan has two lanes in both directions, an AADT of 20 000 and the risk for congestion on the road take place during max hours. The congestion during this time is due to that the cars must make way for pedestrians and bicyclists, which have priority in the intersections. Measurements on air quality have been made and the level of nitrogen dioxide is remarkable high compared to other streets in the city. There are many residents along the street and there have been lot of complaints from people living in the area due to noise.

The idea is to create the same type of street room as on Linnégatan, with bus lanes in the middle and car lanes, trees and wide pedestrian and bicycle lanes on the sides. With the new route of public transport lane on Övre Husargatan, it will be possible to move the route for some bus lanes from Linnégatan to Övre Husargatan. This will open up for less vulnerability for the traffic at Linnégatan where the number of busses and trams today has reached the limit for maximum capacity.

The overall objective is to increase and guarantee the accessibility for public transport and in this case especially for buses. At some parts of the street, signals will direct the traffic, and buses will be prioritized.

There will only be one bus stop at Övre Husargatan, which will result in high velocity for the buses. Because of this, there is focus on increasing safety for pedestrians by having elevated crosswalks and also trees planted along the road. These measures are supposed to have an effect of velocity reduction for both cars and buses.

During construction, one lane in each direction will be closed to get the required space for machinery and workers. It is assumed that this leads to congestion, especially during max hours (Trafikkontoret; Göteborgs Stad, 2011).

### 3 Mobility Management

The goals described in chapter 2.1, can only be reached if the attitude towards traveling is changed among the region inhabitants. If a comparison is made between the three largest cities in Sweden; Stockholm, Gothenburg and Malmö, the rate of travels made by public transport are low in Gothenburg, see chapter 2.5. The municipality of Gothenburg differs from Stockholm when it comes to population density. In Gothenburg, the population density is 1162 inhabitants per km<sup>2</sup> and in Stockholm 4618 inhabitants per km<sup>2</sup> (Statistiska Centralbyrån, 2011). The difference in population density is one reason to the difference in the public transport market share. The measures planned in the West Swedish Solution must be of such character that they on a long time perspective increase the use of public transport in order to shape a sustainable system of transportation. One way to affect travellers' attitude and habits is to use the concept of Mobility Management.

#### 3.1 Theory of the concept

The concept of Mobility Management is about making the use of the infrastructure and transportation more effective. By this comes the idea of influencing the way of travelling before the travel has begun. It can also be used to evaluate if a travel has to be done at all. The purpose with Mobility Management is to reduce congestion, negative emissions and to increase possibilities for public transport, bicycle and pedestrian traffic (Vägverket, 2008). A good use of Mobility Management is collaboration between traffic, environment and information and by this changing the demand instead of infrastructural measures and improvements. The definition (EPOMM, 2012(b)) of Mobility Management follows below:

*“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”.*

Hard measures are in this case improvements of existing transport systems such as roads, tram and railway system, but also an extended infrastructure that demands costly actions (mobilitymanagement, 2012). The development of new tram lines, railways, roads and bicycle lanes are not MM, since these actions only answer to the demand. In some countries, these actions are restricted since MM must be considered in the planning phase. This is to investigate if the travel behaviour can be affected instead of measures aiming to meet the travel demand. This is why the concept name Travel Demand Management instead of Mobility Management, is used in for example USA and Canada (EPOMM, 2012(b)).

The soft measures are often of organizational character and include campaigns and information which offer travel solutions instead of using the car. Campaigns for car



pools and free public transport for a month are examples of MM (mobilitymanagement, 2012).

Contained in MM, there are direct measures which are actions that directly reduce the demand of travelling and usage of car. Regulations and economical management control measures can be used as a direct measure. Another example is tax legislations to encourage more public transport where it is more beneficial, both in an employers' and employee's point of view when using public transport. Information measures where education and marketing of mobility are also included within this limitation. For example, campaigns of "Car Free Days" and mobile phone applications that simplify public transport can be seen as soft measures. There are limitations within the concept of Mobility Management. As mentioned above, the main idea is to influence the travel demand instead of the supply. Meanwhile, there are measures that are not MM although they support or integrate within the concept of MM which naturally is referred to as supportive or integrating measures.

Also contained in MM, there are integrating measures. For example, extended platforms by the railways, bus shuttle service and bicycle parking areas are integrating measures. These measures support MM, since they make public transport more attractive and decrease the demand of car travelling, but are not, if they stand by themselves, direct measures within the concept of MM (EPOMM, 2012(b)).

Implementation of congestion charges is not a direct Mobility Management measure. It integrates with the main purpose of MM, and it is therefore an integrating measure. The measure contributes to the purpose with MM but it is not a direct MM measure if it stands for itself (EPOMM, 2012(b)).

### **3.2 Mobility Management during construction**

During road constructions there is a certain order to handle the existing traffic to minimize the disturbance and raise the safety for the construction workers and the road users. The first alternative is to keep the capacity on the affected road. This can be done if the construction work requires smaller interference on the capacity of the road. One alternative can be to arrange the working procedure to hours with lower traffic and to avoid the peak hours. Logistics and planning of the construction site are other important measures if the capacity needs to remain the same as when no construction process takes place (Appeltofft, et al., 2012).

The second alternative is to redirect the traffic to surrounding or temporary roads. This alternative allows the construction workers to work safe and efficient without disturbance of surrounding traffic. At the same time, this measure demands a surrounding infrastructure that can handle larger quantities of traffic. It is often necessary to construct temporary roads which will add extra aspects as costs and need of available area. Signs and information must be carefully located to inform the travellers in time to make a sufficient decision of where to go (Appeltofft, et al., 2012).

If none of the previous alternatives are possible, a reduction of the amount of traffic needs to be carried out. This is preferably done by the use of MM. As mentioned earlier, information directly to the road user, that describes the situation and gives recommendations of alternative ways, is effective to redirect the traffic from the construction site. At the site, the idea of prioritizing public transport and keep the

traveling time for buses as low as possible is a tool to increase the attraction of the public transport. This measure can with advantage be combined with campaigns for public transport such as “try one month for free”-traveller card (Appeltofft, et al., 2012).

During the construction phase of new or existing roads, congestion is the most important issue. By using MM, congestion can be reduced by influencing road users to take other routes, travel at different times or changing the way of travelling.

Mobility Management has been implemented during several major road constructions in Sweden, which have resulted in less congestion. The benefit for those who cannot change their travel routine is less congestion and their travel time is reduced. The time of construction can be reduced and a more safe and efficient construction work can be performed as a result of less traffic. The benefits for the responsible road holders are less traffic jam and reduced costs meanwhile business gain due to increased accessibility for transportation of personnel and goods.

In the long time perspective, the society as a whole benefits since less hard and costly measures must be performed. To implement MM during major constructions, it is possible people will change their travelling routines in a permanent way, for example public transport instead of car travelling (Vägverket, 2008). It is more likely that people will change their behaviour if other parts of their daily routine are changed for example a major road construction. By this it is important to stress the MM implementation to influence people to change their daily travel routines (Appeltofft, et al., 2012).

In Sweden, intensive work with MM actions during a couple of major road constructions have resulted in reduced traffic congestion. For the City of Gothenburg, the links to the island Hisingen are sensitive. During maintenance of for example the Tingstad tunnel, MM was implemented. Information campaigns with signs along the affected road were installed months before the actual work and advertisements in newspapers and in radio also informed citizens of upcoming traffic situation. Larger companies with lots of concerned employees were informed and alternative routes were recommended. The whole project cost SEK 80 million and 4 per cent of the cost were used for the information campaign. The campaign resulted in less congestion than expected (Vägverket, 2008).

Available MM measures are presented in Table 3.1.

Table 3.1. Mobility Management measures that can be used during the construction phase of an infrastructure project

<b>Mobility Management measures</b>
• Campaigns directly to travellers i.e. free bus cards, consultation and offers
• Campaigns in mass media
• Information directly to travellers i.e. mails, e-mails and information available at a smartphone application
• Information in mass media
• Information to concerned companies regarding measures to offer the employments in order to decrease congestion
• Project web site with updated information
• Information meetings for concerned parties
• Prioritization of public transport i.e. lanes designated for public transport and/or goods traffic and car pools
• Strengthened public transport capacity in the affected area
• Commuter parking lots and infrastructure for carpools
• Redirection of traffic by signs and signals
• Congestion charges and other regulations
• Parking lot regulations
• Demands on construction permits
• Tax regulations
• Integrated and multifunctional tickets

### 3.3 The use of Mobility Management in The West Swedish Solution

Several of the defined indicators presented in Attachment I, are based on the theory of Mobility Management regarding attitude and changing of behaviour. For example, three indicators show if the travel pattern has changed due to the performed measures. As mentioned earlier, the indicators must be pushed in a positive direction both during the construction as well as afterwards completion. For example, congestion due to a construction site leads to increased amount of emissions and the indicator will be

pushed in a negative direction. Because of this, it is important to include a lifecycle planning and the use of MM measures from the beginning of a project. It is also of great importance not to affect the attitude to public transport in a negative manner during the construction phase (Trafikverket, et al., 2011(a)).

To reach the first of the effect goals, *an attractive public transport with increased capacity*, several integrating and direct measures based on MM must be used.

- Disturbance during the construction phase must be minimized for public transport, biking and pedestrian traffic.
- Improvement of the information reaching the travellers must be done and increased in extent. The information shall be easy to reach and easy to understand but still informative enough to describe the best alternative for the traveller.
- The attractiveness of the public transport must increase by performance of a number of supporting measures. E.g. a decrease of the traveling time, increased number of departures, prioritization of bicycle lanes and sidewalks.

To reach the next effect goal, *a higher rate of travels done by public transport*, the previous goal needs to be reached. Without an attractive and competitive public transport it will not be possible to reach an increase of travels done by public transport.

The effect goal, *a decrease of the car traffic to and inside the centre of the region*, is connected to earlier described goals. Without an attractive and competitive public transport, private car travels will still be the choice of transportation for the majority of travels within the centre of the region. However, it is not enough to only offer an effective public transport to decrease the number of cars inside the centre of the region.

- Congestion charges, see 2.4, are necessary to influence some of those that usually travel by cars to choose alternative ways of travel. Before congestion charges are implemented, it is important to invest in the public transport so that new travellers can be taken care of without a decrease of quality for those that already use public transport.
- An increase of the occupancy in every car is an effective way to reduce the total amount of cars within the centre of the region. Hard measures such as parking lots outside the centre combined with soft MM measures as carpool campaigns can be combined in order to increase the occupancy.

Next effect goal is *quick, safe and simple travels by bike and by foot*. It is believed that many of the travels made by car every day are short and could be made by foot or by bike but this demands high safety and accessibility for bicyclists and pedestrians. In terms of MM, disturbance during the construction phase must be minimized especially for unprotected travellers.



To reach *increased quality for the business transports*, communication and information is the most effective way to reach the effect goal. The transport companies must receive accurate and update information to be able to plan the routes as effective as possible.

Finally, if all of the effect goals described above are accomplished it will lead to fulfilment of the last three effect goals as well. The emissions and noise will generally decrease due to less traffic, and more space is created in the city centres to be used for recreation and improvement of the urban life (Trafikverket, et al., 2011(a)).

For the measures included in the West Swedish Solution, the document “*Joint formulations*” shall be used during internal ordering (Trafikverket, et al., 2012). It is described how the use of Mobility Management during construction shall be formulated;

*“The project task also includes an active work with Mobility Management during construction, [...]. The importance of coordination especially concern measures that are performed along the same commuter route or commuter node and can for example involve time planning, information regarding disturbance and information to road users and operations”*

The text quoted above also refers to an appendix where following definition clarifies when to use Mobility Management:

*“Projects that are assumed to result in relatively large disturbance for relatively many road users shall establish a Mobility Management plan for the construction phase as early as possible in the project and also reserve resources for the implementation [...] if it is assumed that a project do not needs a Mobility Management plan it shall be motivated”*

### **3.4 Definition of Mobility Management in the West Swedish Solution**

The official definition of Mobility Management is described in chapter 3.1 and is generalized to be useful in a number of areas. Although, due to the subject of this thesis it was necessary to define and clarify how to approach MM for the WSS and the measures included. The following definitions are the foundation of how the authors of this thesis aim to adapt MM to reach the goals for the WSS.

The following three sentences describe the authors’ point of view of how to generally adapt MM within West Swedish Solution.

- *“Mobility Management should be used as a tool to rationalize the measures adopted in the West Swedish Solution in order to reach the goals”*

New roads and extended public transport are not the overall solution to handle the growth of traffic in the West Swedish region. The traffic system must be

used wisely and optimized if a sustainable traffic system shall be reached and to allow growth.

- *“Mobility Management should be used to enhance the awareness among the inhabitants in the West Swedish region about the purpose with the West Swedish Solution”*

Even if there is a majority among the politicians supporting the West Swedish Solution and the financial plan with congestion charges, the public opinion seem to be more doubtful to the investments. A very important factor for success is to convince the public opinion that the WSS is performed to allow the region to grow in a sustainable way. Information is here the most important tool and Mobility Management can be used to distribute information to the public.

- *“Mobility Management should be used as a concept by all actors involved in the West Swedish Solution”*

Mobility Management shall be used by government, municipals, planning and construction actors and companies whose business are depending of the local infrastructure. The use of MM can also be a tool for companies who have got employees using the traffic system, to meet demands on sustainable and environmental effective strategies.

When it comes to the construction phase of the measures adapted in the WSS, the authors have formulated three sentences that define how Mobility Management shall be used during the construction phase.

- *“Mobility Management during construction should be used as a tool to maintain highest possible flow in the traffic system and especially in the area with on-going construction work”*

It is common that the origin capacity of the road is decreased during the construction phase. If there is no possibility to redirect the traffic flow, Mobility Management can be used to reduce the existing traffic in order to reduce congestion.

- *“Mobility Management during construction should be used to influence the behaviour of travellers and to support an increment of the usage of public transport”*

The willingness of a road user to change behaviour increases when there is a modification in the daily life that decreases the accessibility in the regular travel pattern. Mobility Management measures during this phase that aiming to increase the usage of public transport, can be a very effective way to change the daily habit of the road users. This will contribute to the K2020 objective, a market share of 40 per cent public transportation.

- *“Mobility Management during construction should be used by planners and other actors involved in the construction of the measures adapted in the West Swedish Solution”*

It is the responsibility of actors involved in the planning- and construction process to implement Mobility Management during the construction phase. A Mobility Management plan should be introduced into the planning process at an early stage. The Mobility Management plan should then be evaluated and revised in every stage of the construction process.

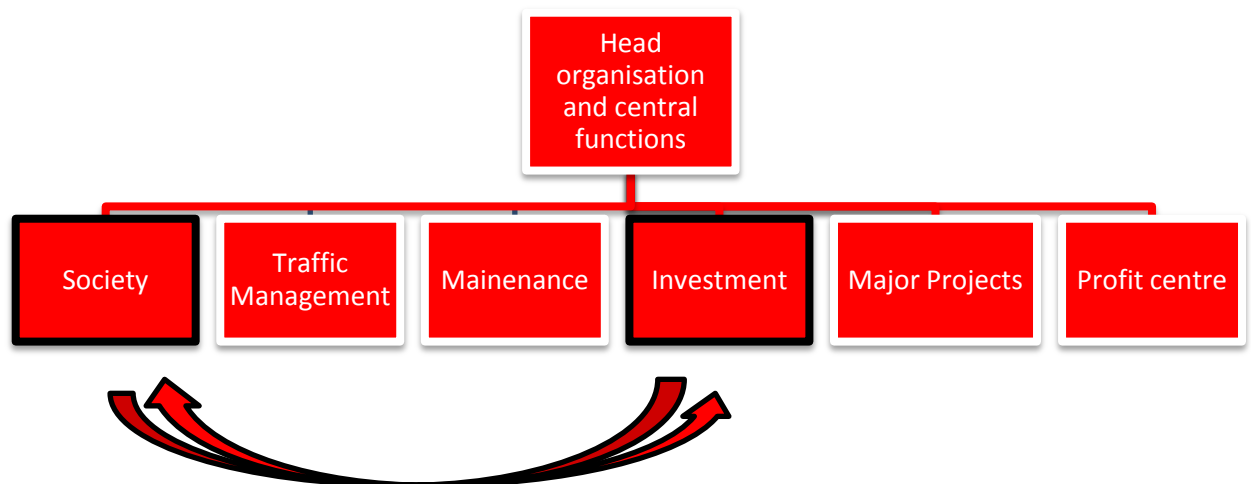
This report will from now on use this definition for the concept of Mobility Management during construction as a base for the interviews and conclusions.

## 4 Results

The results from the interviews are presented in the following chapter. Each subtitle represents a subject discussed during the interviews.

Overall results, for example, the structure of the Swedish Transport Administration and the Traffic and Public Transport Authority became clear during the interviews.

The Swedish Transport Administration consists of different departments, see *Figure 4.1*. For the projects studied in this thesis, it is the department *Society* who formulates project orders to the department *Investment*. The planners within the department *Society* consider transport demand and the overall objectives of the Swedish transport policy when project orders and project descriptions are formulated. It is the department *Investment* who receives the orders and project leaders are then responsible for project budgets and completion of the projects. During construction and after completion of certain project, *Society* is responsible for evaluation of the objective fulfilment.



*Figure 4.1. A simplified organisation map for the Swedish Transport Administration*

At the Traffic and Public Transport Authority, different departments are collaborating as well, see *Figure 4.2*. The department *Traffic* is the planning organ, and constitutes suggestions for improvements of the transport system. The department *Road and Track*, administers the maintenance and projection of new and existing roads and tracks.

There is also a department named *Mobility and ITS*, which is responsible for sustainable solutions for the road users, projects involving Mobility Management and ITS.



Figure 4.2. Map over the Organisation of the Traffic and Public Transport Authority

Regarding the West Swedish Solution, the interviews also resulted in information of the secretariat of the WSS. The secretariat consists of officials within the different organisations responsible for the WSS. It is the secretariat of the WSS that formulated the goals and the indicators for the West Swedish Solution.

#### 4.1 Formulation of the goals for the West Swedish Solution

The interviews indicated that the formulations of the goals for the West Swedish Solution can be interpreted in different ways. The goals for the WSS, which are formulated by the secretariat of the WSS, are a compilation of already existing goals among the WSS organisations. The goals are formulated with terms such as “should” and “promote” instead of “shall” terms. According to the interviews, officials at the WSS secretariat claim that a more soft approach is better when goals are formulated since the idea is to change direction and behaviour. If goals tend to be reached, a positive feeling is associated with the measure, and that the certain project is moving in the right direction. With a specified approach involving “shall” terms and quantifiable objectives, it is more likely that focus only lies on reaching the specific objective than seeing the whole perspective. If a quantifiable objective is not reached, the feeling of failure is more likely to be associated with the project.

*“Clear and detailed objectives are easier to follow-up, but in this case you want to create a change of attitude [...] if you have not reached a clear objective you have failed”.*

Official within the secretariat of WSS

The department *Traffic* at the Traffic and Public Transport Authority shares the opinion above. Soft formulations of goals tend to increase the flexibility meanwhile projects that are govern due to specified and quantifiable objectives result in negative fixation.

Officials that are supposed to handle the goals in a more practical way, have on the other hand, different opinions. Their collective opinion is that the goals are clear but not detailed and that it would be better with objectives that are more subverted for the certain projects. There are also indications from the interviews that it is easier to follow-up if goals are fulfilled with specified and more detailed formulations.

*“The goals are clear but not detailed [...] the goals should be followed-up, it would have been better if they were more concrete”.*

Official within the Swedish Transport Administration department *Investment*

## 4.2 Adaption of the goals for the West Swedish Solution

It was necessary to identify whether the goals for the WSS are adapted by the employees at the Swedish Transport Administration or not. According to the interviews, the goals are adapted on a high level within the Swedish Transport Administration and the formal statement is that the Swedish Transport Administration has adapted the goals in the whole organisation. The overall opinion is though, that the goals only are adapted by the management at the Swedish Transport Administration and in the secretariat of the West Swedish Solution, but not by every single employee. The Swedish Transport Administration is a large organisation, and when changes are decided on a high level, it takes time to adapt it in the whole organisation.

The interviews indicate that this is a problem, especially for the project leaders, who are responsible for project budgets. It seems like it is very difficult for the project leader to decide an optimal economic level on measures promoting public transport during construction.

*“The goals are not adapted by every employee, and it is possible that a project leader has difficulties when to decide how much money a certain standard during construction should cost”*

Official within the Swedish Transport Administration department *Society*

At the same time, there are indications that officials within *Investment* assume that planners within *Society* have taken the goals into consideration when a project order has been formulated. There is no questioning on an internal level whether the goals have been taken into consideration or not.

*“We assume that Society has regarded the goals when they formulate a project order”.*

*“You have to consider the goals before a certain measure [...] it is Society’s responsibility to evaluate whether a measure is correlated with the goals or not.”*

Officials within the Swedish Transport Administration department *Investment*

At the Traffic and Public Transport Authority, a short version of the goals has been composed. It describes how the goals should be interpreted in the internal work at the Authority which should be used for the projects concerned in the WSS. This short version and the goals were unknown for officials within the *Road and Track* department within the Traffic and Public Transport Authority.

### 4.3 Internal ordering

The internal ordering within the Swedish Transport Administration was also covered during the interviews. This provided knowledge of how the planners within *Society* create project orders to project leaders within *Investment*.

The idea is that interactions between planners and project leaders should lead to the most optimal solutions. After the WSS was decided, project orders are supposed to be formulated due to goals for the WSS and the document “*Joint formulations*”. The project leader’s work though, is based on the project description. The orders are also put together in a database, which sometimes, according to the interviews, result in limitations and miscommunications.

*“The project leaders are supposed to do what is said in the project order. If something is missing, we try to discuss it between Society and Investment, but everything has to be formulated in the orders [...] investment does not start from scratch when they receive the order though”.*

Official within the secretariat of WSS

For the initial measures, the planning and construction had to be performed in a very short time period. The document “*Joint formulations*” did not exist when the project orders were made for the initial measures.

*“It is Society’s responsibility to evaluate whether a measure is correlated with the goals or not. When we get started, the idea is “a road from A to B”. You have to consider the goals before a certain measure”.*

Official within the Swedish Transport Administration department *Investment*

### 4.4 Goal adaption for certain projects

Objectives for specific projects shall from the decision of the WSS be based on the document “*Joint formulations*”. The document takes a clear statement of how the accessibility for public transport should not be affected during construction and that a

certain Mobility Management investigation should be carried out for projects resulting in larger disturbance.

The goals for the WSS should be used as a tool at every level. From the interviews, it is clear that the secretariat of the WSS have a certain idea of how the goals should be broken down into objectives for each specific project.

*“When you translate the goals to specific project objectives, you simplify them and balance them”.*

Official within the secretariat of WSS

According to some of the interviews, it is *Investment’s* responsibility to create objectives that refers to the goals for the WSS. Every measure should contribute to fulfilment of as many of the goals as possible. After the WSS was decided, measures that prioritize public transport have increased.

On the other hand, interviews with officials within *Investment* cleared out that creating a project objective referring to the goals for the WSS is *Society’s* responsibility. Those interviews indicate that if a certain project objective is constituted due to the goals or not, is an issue for *Society*. A desire of higher transparency and clearer project descriptions and orders are also expressed.

*“It is always good with transparency and guiding. The goals should be simplified for every single project”.*

Official within the Swedish Transport Administration department *Investment*

## 4.5 How the goals are handled during construction

The main issue of how goals are handled during construction is how certain goals should be ranked and compared to each other. The time of construction is of importance for the complete West Swedish Solution since there will be several interferences in the traffic system for a long time period. In many cases, it is possible that some goals have to stand back in favour of other goals to actually complete a measure.

Within the Traffic and Public Transport Authority the approach is that acceptance is necessary, since the WSS are compiled by different organisations with different goals. However, when a measure is completed, the result shall be satisfactory. This is expressed at the Swedish Transport Administration as well.

*“Maybe you fulfil 7 out of 8 goals during construction of a certain measure, something you have to accept. But you cannot ignore the goals during construction, when the goal image is framed”*

Official within the secretariat of WSS



The role as project leader is expressed as very exposed, and the ranking of objectives together with important factors like restricted time and budget makes it hard to take initiative to promote public transport.

*“We aim for not decreasing the accessibility for both cars and busses during construction. A public transport prioritization would result in a large decrease for the accessibility for the cars”*

Official within the Swedish Transport Administration department *Investment*

It was clear, according to the interviews, that the ranking of objectives is an issue. For some of the initial measures, e.g. Project Bäckebol, see chapter 2.7.1, two tunnels for bicycle and pedestrian traffic, had to be closed. This affected the bicyclists and pedestrian in a negative way, which according to the effect goals, see chapter 2.1, should be avoided. The tunnels were not closed simultaneously, and this was something that was a necessity, but it is these kinds of conflicts that may arise during construction.

Negative effects for bicyclists and pedestrian, seems to be an issue also during construction on the regional road network. Public transport is in focus at Project Övre Husargatan, see 2.7.3, but safety for bicyclists and pedestrian have been reduced. During the work with this thesis, a bicyclist died of severe injuries due to a collision with a truck at the construction site.

## 4.6 Fulfilment of the K2020 objective

Included in the goals for the WSS, is the K2020 objective aiming to double the public transport in the region. Besides the general goal, *an attractive core in the region and development along the five main routes*, see chapter 2.1, this main objective alone state a clear level to target, 40 per cent public transport. Several of the interviewed officials point out that this objective will be hard to fulfil until the year of 2025.

*“It is doubtful to reach the objective until 2025. Many believe it is more like a vision than an actual objective. More like the zero vision aiming to avoid deaths and severe injuries in the traffic”*

Official within the Swedish Transport Administration department *Society*

*“I think it will be hard, I will not say impossible but I can't say that I actually believe in it”*

Two of the interviewed officials accentuate that the measures included in the WSS will not be enough to reach the objective with a doubling of the public transport and that more measures aiming on public transport are necessary. There were mainly spread opinions about the possibility to reach the objective for K2020, and some of the interviewed officials were positive to a fulfilment of the objective until the year of 2025.

*“Why not, a lot of what we do in the initial measures accord to K2020. But it is important that every organisation fulfil their commitment”*

Official within the Swedish Transport Administration department *Investment*

The cost of increased public transport was also brought up. Due to the fact that public transport is financed both by taxes and charges, it is an important factor to consider. If travels made by public transport shall be doubled, the financial model must be determined.

#### **4.7 Sufficiency of a regional transport policy**

The Swedish transport policy consists of one functional objective and one impact objective. The Swedish Transport Administration acts on commitment from the government and are bound to work for fulfilment of the objectives. The Swedish Transport Administration shall also “contribute in the regional work for region expansion” according to the Swedish transport policy.

The Swedish Transport Administration is one of the organisations for the WSS and is thereby contributing to the regional work for expansion. To enable such expansion, the goals for the WSS clearly state that public transport must increase. However, the objectives for the Swedish transport policy are general and take no side for a certain type of traffic. It is written under the functional objective that the possibility to travel by public transport shall be improved but it also state that the transport system shall be effective in a socio-economic point of view.

It was brought up during the interviews if the Swedish transport policy must take side for prioritizing different types of traffic in the large city regions due to congestion on the road network. The answers differed clearly among the interviewed officials. It was mentioned that the objectives for the Swedish transport policy must be interpreted differently depending on the size of the region.

*“I don’t believe you can have different objectives, on the other hand the operative work will differ, you can’t have the same grade of objective fulfilment everywhere”*

Official within the secretariat of WSS

Although, several officials claimed it would be useful to design the objectives of the Swedish transport policy so they would give more guidance of how to prioritize the traffic in the larger city regions.

*“We should prioritize different types of traffic depending on location, goods to the harbour, cars on the countryside and public transport along the main routes and within the cities”*

Official within the Swedish Transport Administration department *Investment*

One suggestion that came up was to use the same impact objective, but to have a special appendix valid for larger city regions. It should be more clearly stated that in order to reach a sustainable traffic system in these regions where public transport must be prioritized.

*“My personal opinion is that it will be a good idea, they would contain the same base of safety and environmental objective but the condition differs a lot in between the large city regions and smaller cities”*

Official within the Traffic and Public Transport Authority

#### **4.8 Definition of Mobility Management**

The definition of Mobility Management and especially Mobility Management during construction, are important to define clearly. For a large organisation like the Swedish Transport Administration it is useful in order to rationalize and to avoid misunderstandings among the personnel. It was mentioned that Mobility Management during construction is an expression from the former Swedish Road Administration, and not valid among persons from other companies and organisations. This was believed to be a problem. During the time of this thesis the Swedish Transport Administration was planning to educate project leaders within the concept of Mobility Management and to clearly define the definition. The report quoted earlier in this thesis, *“Handbook for planning of Mobility Management Measures during the construction phase”*, has been released during the spring of 2012, with the purpose to educate employees within the Swedish Transport Administration of how to use Mobility Management during construction.

During the interviews, different views of Mobility Management were revealed and the meaning was that Mobility Management shall be used to ease the project and reduce congestion during the time of construction.

*“Mobility Management means in my world the lowest possible negative impact or even a positive impact for some of the goals of the WSS during the construction phase”*

*“Mobility Management during construction is about to ease the construction of a project due to less congestion”*

Officials within the secretariat of WSS

#### **4.9 Responsibility regarding the implementation of Mobility Management**

Knowledge of Mobility Management is spread over a few officials in every region within The Swedish Transport Administration. The department *Investment* and the department *Society* have one official each responsible for Mobility Management. According to the interviews, it is stated that an implementation of an MM-plan shall not be the project leaders' responsibility. It is the official with MM competence that

most often suggest MM measures, but in the end the project leaders decides if project financial means shall be used for such measures.

During the interviews, several officials clarified that the collaboration between the project leaders and the official responsible for Mobility Management was decent. It was also mentioned that MM measures is an important mandated area within the projects.

*“It feels good with the support from a MM coordinator. We have a very good communication and the coordinator is very good to have around”*

Project leader within the Swedish Transport Administration department Investment

Answers from interviews point on the importance to let consultants handle the Mobility Management investigation due to the lack of MM knowledge among the Swedish Transport Administration.

It is also believed among the interviewed officials that the benefits with Mobility Management during construction will increase the willingness among the actors to use MM in projects. This is due to saved time and resources in earlier projects. However, it is believed that the benefit is correlated to the size of the projects.

At the Traffic and Public Transport Authority, there is a special organ, *Mobility & ITS*, working with questions regarding MM and projects concerning unprotected road users.

During the work with this thesis it has come to the authors' attention that the Mobility Management coordinator within the Swedish Transport Administration department *Investment* has changed post. The post will not be replaced until the early fall of 2012.

#### **4.10 Implementation of Mobility Management**

From now on the document described in chapter 3.3, concerning joint formulations, shall be used in the internal ordering, according to the interviews. However, the initial measures included in the WSS have an extremely short time period, both for the planning and the construction phase. This fact was illuminated during several interviews and it became obvious that there were no demands on Mobility Management measures during constructions for the studied objects in this thesis.

*“A lot of things are already decided when it comes to the construction phase due to the choice made according to the budget for the project. Mobility Management should be implemented earlier, but how early?”*

Officials within the secretariat of the WSS

It was also mentioned that in the internal ordering, Mobility Management measures where ordered more frequently for larger projects. It was mentioned that a Mobility Management investigation is most suitable to use in the land acquisition plan. It was also mentioned though, that not all projects require a land acquisition plan due to no

extra claim of land. If an MM plan is necessary, it shall then be described more in detail in the construction document.

Finally, the interviewed officials agreed that the work with Mobility Management during construction will be more present in following measures within the WSS, but also that it will take time before all actors will use MM measures during construction.

## 5 Discussion

Following chapter discusses the results from interviews and literature study during the thesis work. The result and eventual improvements are here discussed.

### 5.1 Formulation of the goals for the West Swedish Solution

The interviews are clearly indicating different opinions regarding the formulation of the goals for the WSS. The opinions differ especially whether you are working within *Society* or *Investment*. It is *Society* and the officials within the secretariat of the WSS, who are responsible for the formulation of the goals and how they are supposed to be handled. Their idea is that the goals should be perceived and handled in a way resulting in an attitude change.

This is a proper way of how to formulate goals. It can, just like officials within the secretariat of the WSS say, lead to negative fixation with concrete objectives. The result will be such as if objectives are not completely fulfilled it can be seen as a failure. The problem with soft formulations is that it can lead to disorientation of how much focus each objective should have. There might also lead to difficulties of the extent of a certain measure.

The interviews have indicated that officials within *Investment* request more specified project formulations. The problem here though, seems to be that a presentation of the goals from the secretariat of the WSS, to *Society* and *Investment*, and how they should be handled, has been missing. This has led to misunderstanding of how the goals should be applied. A more detailed presentation of how the goals for the WSS should be perceived and handled would have been adequate.

### 5.2 Adaption of the goals for the West Swedish Solution

Since The Swedish Transport Administration is a large organisation, the implementation of the goals in the organization is difficult. A formal statement is that the whole organisation is working and aiming against the goals but this is not the reality. This stresses the importance of presenting the goals and their purpose in an adequate way, for every employee involved in the work with the WSS.

The Swedish Transport Administration seems to have changed direction regarding the prioritizing of public transport over car traffic. This is positive but there are still differences in how each employee handles the prioritization. Therefore, the management at the Swedish Transport Administration should stress the education of the goals. This may reduce misunderstandings and can lead to that every employee works after similar objectives which will give a more efficient organisation.

The interviews also indicate that officials within *Investment* assume that planners and officials within *Society* have taken the goals into consideration. By that, no responsibility is taken whether a measure is correlated to the goals or not. This is something that surely can be improved if the goals are communicated within the administration in a better way and the goals can by this influence the operative work.

The same pattern seems to be present at the Traffic and Public Transport Authority, where a short version of the goals, and how they should be handled, are compiled.

The management at the authority seems to have a clear idea, but further down in the hierarchy it seems like the goals are not communicated in a proper way. A communication improvement is therefore relevant also at the Traffic and Public Transport since an improvement in the operative work surely result in more efficiency.

### 5.3 Internal ordering

It is the Swedish Transport Administration department *Society* who formulates project orders to the department *Investment*. According to the interviews, the most optimal procedure for this includes interactions between the planner within *Society* and the project leader within *Investment*. Most of the issues are discussed on meetings under the process but it was clear that the data base that handles the project orders is limited and is reducing the information in the orders. It is possible that this type of data base can be improved to reduce misunderstandings and limitations in the internal work.

The planner and the project leader have meetings and as mentioned above, issues are discussed, but it seems like the project leader in the end follow the written project description based on the project order. Since the project leader is responsible for project budgets, issues that are costly and for some reason are miscommunicated in the orders will probably be left behind. Therefore can a change in the procedure be suitable. A more framed process where planners and project leaders can write and formulate orders together to reduce limitations and misunderstandings can be an efficient improvement. Since the WSS have been decided, a different kind of focus may be introduced within the Swedish Transport Administration. If the management communicates goals and visions better, a strongly restricted internal interaction between planners and project leaders might be unnecessary.

### 5.4 Goal adaption for certain projects

During the investigation for this thesis, it has been clear that the document regarding the joint formulations, quoted in chapter 3.3, was missing when the planning process of the initial measures was started. This document is from now on supposed to be the base of projects included in the WSS. The document takes a clear statement of how the accessibility for public transport should not be affected during construction and that a certain Mobility Management investigation should be carried when a project is assumed to create larger disturbances.

The time frame for the planning process was limited for the initial measures due to the introduction of the congestion charges, and how this could have been prevented is unclear. But it is important that the Swedish Transport Administration inform politicians and decision makers that this type of limited time frame is unsuitable for the planning process and can lead to unnecessary reduction of socio-economic benefits. To simplify similar investments like the WSS, efficiency in the planning process is relevant for better fulfilment of the goals.

## 5.5 How the goals are handled during construction

In the results it is visible that the goals for the WSS sometimes need to be ranked due to limitations in time and budget. This report has its focus on the initial measures with the objective to increase the capacity and strength the reliability of the public transport before the congestion charge is implemented. Therefore, the goal aiming for an increased rate of public transport is highly interesting. The completion date for the initial measures is set to the first of January 2013. This gives a span of at least twelve years before the K2020 objective to double the travels made by public transport shall be reached. It is likely that the benefits of the initial measures are going to be fully used during those years.

On the other hand, the theory of Mobility Management during construction claims that it is just when a traveller faces differences in the daily travel path, he or she are most likely to change behaviour. For example, if a traveller can see that busses are a better alternative during the construction phase, he might try to do his travels by public transport. Afterwards, when the construction phase has expired and the measure is completed, the traveller might have realized the benefits with public transport and tend to continue to use public transport in the daily travels.

Another improvement that might be suitable for the Swedish Transport Administration is a model which can be used for evaluating socio-economic effects. For example, if a bus stop or a pedestrian tunnel has to be closed during the construction period, this kind of model can help the decision maker whether a temporary bus stop or a bridge shall be built. The model could for example evaluate if a number of persons that daily will be affected of a closed bus stop for a certain time period will cost more in a socio-economical point of view compare to the construction of a temporary bus stop. This can ease the project leaders' work to make a sufficient decision of how to prioritize public transport.

Prioritization of public transport must be balanced and realistic though. If an unrealistic advantage is given to public transport at the expense of car traffic, a movement of the congestion might take place and block the public transport somewhere else in the system. It is also important not to create more space for public transport than demanded, and it can be seen as a provocative act to build bus lanes that will be seldom used.

However, if all the measures implemented in the WSS are concerned, there will be several construction sites at the same time for many years ahead. A total construction phase on-going for up to twenty years might demand actions not only to minimize disturbance for the overall traffic system, but even actions that will create advantages for the public transport at the expense of car traffic.

## 5.6 Fulfilment of the K2020 objective

The K2020 objective to double the travels made by public transport, seems to contribute to different opinions among the interviewed officials. On one hand, officials involved in the business believe it is possible to reach the objective until 2025 if every organisation takes their responsibility. On the other hand, there are officials claiming that the objective are more like a vision and that it would be both too expensive and that it would demand too much resources to reach the objective in such a short period of time. However, the project K2020 involves several measures



that are not included in the WSS. The designers behind the K2020 objective calculated with all these measures when they set the objective. If those measures can be financed and projected within the following ten years the objective might then be possible to reach.

Regarding the WSS, measures strengthening the public transport are basically constructed before the implementation of congestion charges, the West Link excluded. It is assumed that the travels made by public transport, bicycles and by walking will increase apparent following year. To maintain a growth, new investments have to be performed following years.

It is also important to find a sustainable method of how to finance the increased public transport. Increased ticket price result in less willingness to pay by the users, and lead to decreased usage. Politicians can decide that more tax money can finance this type of investments, but that is of course a political issue.

## **5.7 Sufficiency of a regional transport policy**

The Swedish transport policy treats all kind of traffic equal. But the policy also states that the accessibility in the large city regions shall be secured. It is possible that an interpretation of the objectives for the Swedish transport policy be easier if there was a special section in the Swedish transport policy suited for the large city regions. Since there are different conditions for the different kind of traffic in different types of regions in Sweden, it might be suitable to have different types of objectives.

In the countryside, public transport might be underdeveloped due to low population density. Prioritizing public transport might be uneconomical in those areas. For important goods routes, e.g. in harbour areas, goods transports should be prioritized. In the larger city regions, Stockholm, The City of Gothenburg and Malmö, the conditions are very different from the rest of the country, and there is a large demand for public transport. For a sustainable future, more concrete objectives for these areas might be a good start. The impact objective should be the same but the functional objective, accessibility, should be adapted and have a different order of prioritization. The public transport should then be prioritized along the commuter routes and in the city centres.

During the investigation for this thesis it has become clear that people working with goal formulations and objectives daily see no problem to adapt the Swedish transport policy after situation and type of traffic. It has also been clear that people that seldom look at the objective feel that they need to be adjusted to be more adapted to larger city regions.

## **5.8 Definition of Mobility Management**

There are different definitions of what Mobility Management really refers to. The European Platform of Mobility Management, EUPOMM, has stated a general definition regarding the concept quoted in chapter 3.1. There is also a definition made by the former Swedish Road Administration regarding Mobility Management during construction, see chapter 3.2. Due to these different definitions of how to use Mobility Management during construction, the authors found it necessary to define a definition valid for this thesis and its result and recommendations, see chapter 3.4.

The general point of view of Mobility Management is to affect the travel demand. Within the Swedish Transport Administration, the concept is used to reduce congestion during construction periods in order to ease the construction process. Positive effects of this are that the same definition is used within the organization and by this reduce misunderstanding.

## 5.9 Responsibility regarding the implementation of Mobility Management

Mobility Management has been known within the business for several years, but the process with implementing MM in traffic organizations is an on-going process. Due to the results, the knowledge of Mobility Management seems to be limited at the Swedish Transport Administration, region West. It was clear that project leaders within the department *Investment* appreciated support by an MM coordinator. Therefore, the fact that the only official with sufficient knowledge of MM has changed post during the work with this thesis increases the risk that on-going and planned projects suffer from less support in the Mobility Management area. Those initial projects that need to be finished before the implementation of the congestion charge are very sensitive for disturbance which might affect the positive benefits from the congestion charge. Even though Mobility Management has low influence in those projects, adequate support and suggestion is believed to maintain the possibility to finish the projects on time.

It was also brought up in the result that the project leaders shall not be responsible for implementing Mobility Management in their projects. It can be assumed that if whose responsibility for the implementation was regulated in the internal ordering there would be a higher rate of suitable projects that contains an MM plan.

As mentioned in the results, officials within the business tend to believe that once sufficient MM measures clearly indicates that a project work smoother, the demand after such measures will be more requested. It is also highly believable that if MM measures can ease disturbance the public opinion will get a more positive attitude towards the measures within the WSS.

The concept to let consultants handle the MM investigation and the creation of an MM plan seems to be a reasoned path due to few officials with MM competence at the Swedish Transport Administration. The Swedish Transport Administration attends to educate their project leaders in a short coming future, which also will lead to an increased implementation and understanding of the concept. To educate project leaders is good, but it is surely relevant also to educate planners and other officials involved in earlier stages of projects, since Mobility Management is an important concept which should contribute to fulfilment of goals and to rationalize projects and make them more efficient.

## 5.10 Implementation of Mobility Management

Regarding the measures included in the WSS, the organisations have developed a steering document containing formulations meant to be used as an initiation of each individual measure. As mentioned in the results, this document suggests an MM plan as early as possible in the project. The interviews and the literature study shows that a

Mobility Management plan is most suitable implemented in the internal ordering for the land acquisition plan. When the ordering reaches the department *Investment* it is most suitable to order the MM investigation from an external consultant in order to reach the sufficient level of MM competence.

If an MM investigation is included in the land acquisition plan, it can be located according to the chapter called “Consequences of the suggestion” under the subchapter “Disturbance during construction”.

Although, in projects that not requires a land acquisition plan it might be necessary to clarify when a MM plan needs to be implemented. As mentioned in the results, an MM plan is seldom used in smaller projects where no land acquisition plan is necessary due to no extra land will be claimed. Regarding larger projects such as new roads and significant reconstructions, it is already suggested to implement an MM plan.

## 5.11 Internal discussion and further studies

As mentioned earlier, the study in this thesis has been of qualitative methodology. A qualitative method was chosen since a detected problem, even if it is brought up by only one official might affect the internal work procedure at the Swedish Transport Administration.

Due to the limitations in time and resources it was essential to focus on a few officials at every level within the Swedish Transport Administration. It is believed that the result of a study including an extended amount of interviewed officials would indicate similar pattern as the presented result. Although, such result would have been more statistic established.

To extend the interview process at the Traffic and Public Transport Authority would also been more statistic established, and more comparable to the study within the Swedish Transport Administration. This was not relevant according to the purpose with this thesis, even though it would have provided more knowledge.

The choice of interviewed officials has been carried out individually from person to person. Recommendations and suggestions of officials with leading positions or with great knowledge have led to the selection of additional officials to interview. It can always be questioned if the interviewed officials were optimal for this thesis. Still, the authors believe this is the case, and opinions from different departments and organizations have been considered.

There is also of great importance that the interviews have been carried out in a similar way. For this study there has been a base of similar questions given to each of the interviewed officials. However, for each interview some additional questions have been added in order to create a greater understanding of the organization and how the work is carried out. This was a necessity for the authors to understand the processes within the Swedish Transport Administration and the Traffic and Public Transport Authority.

Recommendations presented in chapter 6 takes less regard to economy and practicability. Some recommendations are with purpose suggested to be available in the future.

This thesis has been carried out with a WSS-acceptance point of view. No consideration has been taken to whether the certain measures included in the WSS are optimal in a socio-economic point of view. On the other hand, there seem to be a substantially part of the public opinion opposes the WSS in general and the congestion charge particularly. Also the construction of extended bus lanes has been debated during the production of this thesis. Due to the political majority that led to the decision to implement congestion charge, the authors has focused on this alternative, but due to this it is even more important to use Mobility Management measures to inform the public and explain estimated benefits.

This thesis focuses on construction of extended bus lanes as a part of the initial measures. Due to the relatively short time of construction, the usage of Mobility Management is limited. Although, the West Swedish Solution includes several major projects and it would be of highest interest to measure the benefits and effects of a Mobility management implementation in those larger projects.

During the study there have been several comments regarding the pedestrian traffic. The authors believe that there is a lack of prioritization regarding the pedestrian traffic especially on measures performed at the national road network but the problem needs to be illuminated on the municipal road network as well.

## 6 Conclusion and Recommendations

This chapter will summarize and point out the conclusions made in this study. The structure of this chapter differs from the structure in chapter 4 and 5 since some areas presented in the results and in the discussion, can be summarized together.

### *Presentation of the goals for the West Swedish Solution*

The goals for the West Swedish Solution should be presented more intense in the whole organization of the Swedish Transport Administration region west. This will lead to a higher efficiency in the operative work if every co-worker is aiming for the same goals.

It is also of great importance that the goals for the WSS are perceived correct and handled in a proper way. This should be stressed to the communicators of the goals. It is recommended that the secretariat of the West Swedish Solution educate employees in involved organisations more in detail of how to interpret the goals of the WSS.

### *Increase the competence regarding Mobility Management*

Education of project leaders and communication of the concept of Mobility Management is relevant for the Swedish Transport Administration. It is also suggested to educate planners to ensure that the concept of Mobility Management is included in the internal ordering of projects that are supposed to create disturbances. It is also highly important that project leaders gain support from MM coordinators, the risk of unexpected disturbances in project increases if such competence is missing. By this, the concept can be introduced earlier in the planning process which will lead to increased efficiency, and the project objectives can be fulfilled.

### *Improved communication*

The project leaders at the Swedish Transport Administration follow the written project descriptions and it is therefore important that every measure contributing to the project objectives and to fulfilment of the goals for the WSS, is included in the descriptions. This recommendation involves increased interactions between planners and project leaders and the descriptions should be followed-up more in detail.

### *Model to simplify decision making*

In the compiled goals for the WSS there is no demand on economic efficiency. This creates a situation where the decision regarding prioritization of public transport can be confusing. This is due to the objective with an economically efficient provision of transport services in the Swedish transport policy. To ease the project leaders' work, it is suggested to create a model with certain threshold values based on socio-economic effects. In such model, the monetary values can be correlated to the number of affected users of the public transport. This is believed to ease the decisions regarding prioritization of public transports.

### *Evaluation of the Swedish transport policy*

Since the conditions of transport possibilities are varying in different regions, especially for the larger cities, this study indicates a need for an evaluation of the Swedish transport policy and its objectives. It is suggested to have a mutual base regarding the impact objective. For the functional objective, additional information

regarding priority of different types of traffic is suggested. This version would be suitable for the city regions where the street room is limited.

## 7 Bibliography

Appeltofft, K., Palmlund, C., Svensson, B. & Åström, G., 2012. *Handbok för planering inför Mobility Management-åtgärder i byggskedet (Handbook for planning of Mobility Management Measures during the construction phase. In Swedish)*, Sweden: Trafikverket.

Carlsson, A., Hammarström, U., Yahya, M.-R. & Jonsson, P., 2006. *Utvärdering av Stockholmsförsökets effekter på vägtrafikens emissioner (Evaluation of The Stockholm try's effects on emissions. In Swedish)*, Stockholm, Sweden: VTI.

Eneroth, B., 1984. *Hur mäter man "vackert"? Grundbok i kvalitativ metod. (How do you measure "beatiful"? A guide in qualitative methodology, in Swedish)*. Stockholm, Sweden: Akademilitteratur.

EPOMM, 2012(b). *EPOMM*. [Online]

Available at: [http://www.epomm.eu/index.phtml?Main\\_ID=820](http://www.epomm.eu/index.phtml?Main_ID=820)  
[Accessed 23 01 2012].

Franzén, U. & Sott, P., 2012. *www.vastsvenskapaketet.se*. [Online]

Available at:

<http://www.google.se/url?sa=t&rct=j&q=pernilla%20sott%20konsult%20%E2%80%9393%20trafikplanering%2C%20cowi%20ulrika%20franz%20C3%A9n%20konsult%20-%20mobility%20management%2C%20sweco&source=web&cd=1&sqi=2&ved=0CDIQFjAA&url=http%3A%2F%2Fmmoresund.nu%2Fwp-content>  
[Accessed 26 03 2012].

Google Maps, 2009. *Google Maps*. [Online]

Available at: <http://maps.google.se/>  
[Accessed 28 05 2012].

GR, 2012(a). *grkom.se*. [Online]

Available at:

<http://www.grkom.se/download/18.2fe1b41a11c70e6248a80009340/Strukturbild+gbg-regionen.pdf>  
[Accessed 23 02 2012].

GR, 2012(b). *grkom.se*. [Online]

Available at:

[http://www.grkom.se/download/18.1e54ec5411db5915e3880002391/K2020\\_public\\_transport\\_development\\_program.pdf](http://www.grkom.se/download/18.1e54ec5411db5915e3880002391/K2020_public_transport_development_program.pdf)  
[Accessed 15 05 2012].

Ipsos, 2011. *Årsrapport 2010, KOLLEKTIVTRAFIKBAROMETERN, Svensk Kollektivtrafik. (Yearly report 2010, Public Transport Barometer, Swedish public transport. In Swedish)*, Stockholm, Sweden: Ipsos.

Jansson, J. O., 2008. Public transport policy for cenral-city travel in the light of recent experties of congestion charging. *Research in Transport Economics vol22*, pp. 179-187.

Lucas, D., 2009. Var femte Londonbil försvann med avgiften. (Every fifth car disappeared due to the fee. In Swedish). *Dagens Nyheter*, 19 10.

Lundin, P., 2008. *Bilsamhället: Ideologi expertis och regelskapande i efterkrigstidens Sverige (The car society : ideology, expertise and rule-making in post-war Sweden. In Swedish)*, Stockholm, Sweden: KTH.

mobilitymanagement, 2012. *Mobility Management.se*. [Online]  
Available at: [www.mobilitymanagement.se/teori/?tabIndex=1](http://www.mobilitymanagement.se/teori/?tabIndex=1)  
[Accessed 23 01 2012].

Regeringskansliet, 2009. *Overall objective of the Swedish Transport Policy*. [Online]  
Available at: <http://www.regeringen.se/sb/d/11346/a/126432>  
[Accessed 30 01 2012].

Region Halland, 2012. *regionhalland*. [Online]  
Available at: [www.regionhalland.se/utveckling-och-tillvaxt/projekt/infrastrukturprojekt/vastpaketet/](http://www.regionhalland.se/utveckling-och-tillvaxt/projekt/infrastrukturprojekt/vastpaketet/)  
[Accessed 26 01 2012].

Statistiska Centralbyrån, 2011. *SCB*. [Online]  
Available at: <http://www.ssd.scb.se/databaser/makro/SaveShow.asp>  
[Accessed 25 05 2012].

Trafikanalys, 2011(a). *Arbetspendling i storstadsregioner-en nulägesanalys. (Commuting in metropolitan areas-a situatin analysis. In Swedish) Rapport 2011:3*, Stockholm, Sweden: Trafikanalys.

Trafikanalys, 2011(b). *Lokal och regional kollektivtrafik 2010 (Local and regional public transportation plan 2010. In Swedish), statistik 2011:19*, Stockholm, Sweden: Statisticon AB.

Trafikkontoret; Göteborgs Stad, 2011. *Konsekvensbeskrivning av trafikförslag Linnéstråket. (Consequence description of traffic proposal Linné Route. In Swedish)*, Göteborg, Sweden: Göteborgs Stad, Trafikkontoret.

Trafikverket.region.väst, et al., 2011. *VÄSTSVENSKA PAKETET, AVTAL OM GENOMFÖRANDE AV BLOCK 1 MED TILLÄGG TILL AVTAL OM MEDFINANSIERING AV TRANSPORTSLAGSÖVERGRIPANDE INFRASTRUKTURÅTGÄRDER I VÄSTSVERIGE (The West Swedish Solution, Agreement on implementation of block 1. In Swedish)*, Göteborg: Trafikverket region väst; Västra Götalandsregionen; Region Halland; Göteborgs Stad; Göteborgsregionens Kommunalförbund; Trafikverket Region Väst.

Trafikverket, 2010(a). *Förstudie, E6, Bäckebolesmotet - Jordfallsbron, Tredje körfält och Vattenskydd. (Prestudy, E6, Bäckebolesmotet - Jordfallsbron, Third lane and Water Protection. in Swedish)*, Göteborg, Sweden: Trafikverket Region Väst.

Trafikverket, 2010(b). *Så finansieras Västsvenska Paketet (How the West Swedish Solution is financed. In Swedish)*. [Online]  
Available at: <http://www.trafikverket.se/Privat/I-ditt-land/Vastra-gotaland/Vastsvenska-paketet/Sa-finansieras-Vastsvenska-paketet/>  
[Accessed 24 01 2012].

Trafikverket, 2011(a). *Västsvenska Paketet, ett stort steg mot smartare resor och transporter (The West Swedish Solution, a big leap towards smarter travels and transports. In Swedish)*. [Online]  
Available at:  
[http://www.trafikverket.se/PageFiles/31267/sammanfattande\\_text\\_om\\_vastsvenska\\_p](http://www.trafikverket.se/PageFiles/31267/sammanfattande_text_om_vastsvenska_p)



[aketet.pdf](#)

[Accessed 24 01 2012].

Trafikverket, 2011(b). *Arbetsplan, Väg 158, Pilegården - Hovåsmotet, Askim ( Land acquisition plan, Road 158, Pilegården - Hovåsmotet, Askim. In Swedish)*, Göteborg, Sweden: Trafikverket.

Trafikverket, 2011(c). *Förstudie, delen Pilegården - Hovåsmotet. Ökad framkomlighet för kollektivtrafik (Pre Study, Pilegården - Hovåsmotet. Increased availability for public transportation. In Swedish)*, Göteborg, Sweden: Trafikverket.

Trafikverket, 2012(a). *E6, Bäckeboismotet – Kärramotet*. [Online] Available at: <http://www.trafikverket.se/Privat/Projekt/Vastra-Gotaland/E6-Backebolismotet-Karramotet/>

[Accessed 23 02 2012].

Trafikverket, 2012(b). *Västsvenska paketet, Förstudie Väg 155 Öckeröleden, delen Lilla Varholmen-Gossbydal. Ökad framkomlighet för kollektivtrafiken (The West Swedish Solution, Pre Study Road 155, Öckerö lane. Increased availability for public transport. In Swedish)*, Göteborg, Sweden: Trafikverket.

Trafikverket, et al., 2011(a). *Västsvenska paketet Sammanställning av målen*, Göteborg, Sweden: Västsvenska Paketets Samordningsgrupp.

Trafikverket, et al., 2011(b). *Västsvenska Paketet, Uppföljningsplan (Follow-up plan for the West Swedish Package, in Swedish), rapport 2011:2*, Göteborg, Sweden: Göteborgs stad, Trafikkontoret.

Trafikverket, et al., 2012. *Gemensamma formuleringar att användas i underlag för initiering av projekt inom ramen för Västsvenska Paketet (Joint formulations for use in support of initiating projects for the West Swedish Solution)*, Göteborg, Sweden: Västsvenska Paketets kansli.

Transportstyrelsen, 2010. *Transportstyrelsen*. [Online]

Available at: <http://www.transportstyrelsen.se/sv/Vag/Trangselskatt/Trangselskatt-i-goteborg/>

[Accessed 24 01 2012].

VTI, 2012. *Kollektivtrafik som verktyg för regional utveckling (Public transport as a tool for regional development. In Swedish)*, VTI rapport 739, Linköping, Sweden: VTI.

Vägverket, 2008. *Mobility management i byggsleden – erfarenheter, exempel och metod (Mobility Management during construction-experiences, examples and method. In Swedish)*, Göteborg, Sweden: Vägverket Region Väst.

Västtrafik, et al., 2009. *Kollektivtrafikprogram för Göteborgsregionen (public transport program for the Gothenburg region. In Swedish)*, Göteborg, Sweden: Västra Götalandsregionen, Göteborgs stad, Västtrafik, Vägverket, Banverket, Göteborgsregionens kommunalförbund.



# Attachment II

## Interview questions

- What is your job at the Swedish Transport Administration?
- How were the goals for the WSS presented for you?
- What do you think of how the goals are formulated, are they easy to adapt?
- How well are the goals adapted in the organization?
- How are project descriptions formulated, how are Investment and Society interacting?
- Shall the WSS goals be broken down by planners or should the project leaders make their own interpretation of the goals?
- Are goals losing priority during chain of planning and construction? Are there any shortages?
- When a project description is formulated, are there any follow-up?
- How are you supposed to work with goals during construction, how can you promote public transport over car traffic during the construction phase?
- Is it different opinions within the organization regarding prioritizing of different transportation ways?
- Are the national goals of transportation sufficient for the whole country with different conditions in the larger city regions?
- Do you think that the K2020 goal will be fulfilled?
- Is Mobility Management implemented in projects you are involved in?
- Is the MM knowledge broad within the organization, does the right person have the knowledge?
- Where in the building process is MM initiated?