



UCL

PROJECT PROFILE

Sweden

Södra Länken

The Southern Link

omega centre

Centre for Mega Projects in Transport and Development

A global Centre of Excellence in Future Urban Transport
sponsored by Volvo Research and Educational Foundations (VREF)

This report was compiled by the Swedish OMEGA Team, Lund University, Lund, Sweden.

Please Note: This Project Profile has been prepared as part of the ongoing OMEGA Centre of Excellence work on Mega Urban Transport Projects. The information presented in the Profile is essentially a 'work in progress' and will be updated/amended as necessary as work proceeds. Readers are therefore advised to periodically check for any updates or revisions.

The Centre and its collaborators/partners have obtained data from sources believed to be reliable and have made every reasonable effort to ensure its accuracy. However, the Centre and its collaborators/partners cannot assume responsibility for errors and omissions in the data nor in the documentation accompanying them.

CONTENTS

A INTRODUCTION

Type of project

- Project name
- Description of mode type
- Technical specification
- Principal transport modes
- Major associated developments
- Parent projects

Country/location

Current status

B BACKGROUND TO PROJECT

Principal project objectives

Key enabling mechanisms

- Description of key enabling mechanisms
- Key enabling mechanisms timeline

Main organisations involved

Planning regime

- Outline of planning legislation/policy related to the project and its associated developments
- Environmental statements and outcomes related to the project
- Overview of public consultation
- Archaeology
- Regeneration
- Quantify project appraisals before, during and after construction
- A description of complaints procedures

Land acquisition

C PRINCIPAL PROJECT CHARACTERISTICS

Detailed description of route

- Energy use
- Embodied energy
- Monitoring and safety

Detailed description of main and intermediate travel nodes

- Introduction
- Planning context
- Proposed development
- Key features
- Map of location

Project costs

- Predicted costs in year project gained parliamentary consent against actual costs
- Timeline of project cost estimates

Timeline/overview of project delivery

Main engineering features

- Details of engineering and construction

D PROJECT TIMELINE

Type of decision

Key timeline issues

E PROJECT FUNDING/FINANCING

Introduction

Background to funding/financing

- Revenue forecasts and actual revenue
- Funding costs
- Overview of key stages in funding approach

Traffic forecasts and financing/funding response

Funding sources

Comments on financing/funding

F OPERATIONS

Traffic volume

- Traffic predictions by mode
- How traffic forecasts were formulated

G BIBLIOGRAPHY

List of figures

Figure 1: The Southern Link	- 6 -
Figure 2: Stockholm with the Southern Link construction area indicated by the yellow box	- 7 -
Figure 3: The components of the Southern Link	- 8 -
Figure 4: The proposed Ring Road around central Stockholm. Broken lines indicate section in tunnels; the figures estimated cost in SEK.	- 13 -
Figure 5: Additional road projects in the Dennis agreement. Broken lines indicate sections in tunnels, figures estimated costs.	- 15 -
Figure 6: Unemployed as a percentage of the work force.....	- 16 -
Figure 7: A schematic overview of organisations involved in the Southern Link project ...	- 24 -
Figure 8: The Southern Link (yellow indicates sections in tunnels, dark grey indicates sections above ground)	- 27 -
Figure 9: A cross section of the tunnel interior	- 28 -
Figure 10: The ventilation system.....	- 28 -
Figure 11: The western section	- 30 -
Figure 12: The central section	- 30 -
Figure 13: The section at Nynäsvägen	- 31 -
Figure 14: The eastern section.....	- 31 -
Figure 15: Hammarby Sjöstad,	- 34 -
Figure 16: Årstafältet	- 34 -
Figure 17: Gullmarsplan-slakthusområdet,	- 35 -
Figure 18: Hammarby Sjöstad.....	- 35 -
Figure 19: Årstafältet	- 36 -
Figure 20: Gullmarsplan-slakthusområdet	- 36 -
Figure 21: Map of contracts for the Southern Link	- 39 -
Figure 22: Schematic overview of funding sources.	- 49 -

A INTRODUCTION

Type of project

Project name

Södra länken (the Southern Link).

Description of mode type

Urban motorway tunnel.

Technical specification

6km of motorway tunnel, altogether encompassing 17km of new road including above ground roads and access ramps.

- Maximum speed 70km/h.
- Lane width: 3.5m.
- Shoulder width: 1m to 2m.
- Maximum vehicle height: 4.5m

Source: SRA (2003a)

Figure 1: The Southern Link



(Source: SRA 2003a)

Principal transport nodes

The project provides a new east – west axis to the road system in the southern part of the greater Stockholm area. It links together some of the major roads in southern Stockholm; Essingeleden, Nynäsvägen, Huddingevägen and Värmdöleden.

Major associated developments

Hammarby Sjöstad: A waterfront regeneration area in southern Stockholm, one of the biggest development areas in Stockholm (and Sweden). The plans for the area include the completion of around 9,000 housing units for 20,000 to 30,000 people and roughly 10,000 workspaces. At the moment some 7,000 housing units have been completed.

Årsta fältet: As a consequence of the construction of the Southern Link a previously heavily trafficked road in the northern section of this area was made redundant. Initially the area was planned as a recreational park, but now it is classified as a major development area in southern Stockholm. At present the plans include some 4,000 housing units as well as substantial plans for workspace development.

Source: Bylund (2006: 74) & CoS (2009a).

Parent Projects

The Dennis agreement (*Dennispaketet*), a political agreement regarding the development of the transport system in the Stockholm region.

Country/location

Figure 2: Stockholm with the Southern Link construction area indicated by the yellow box

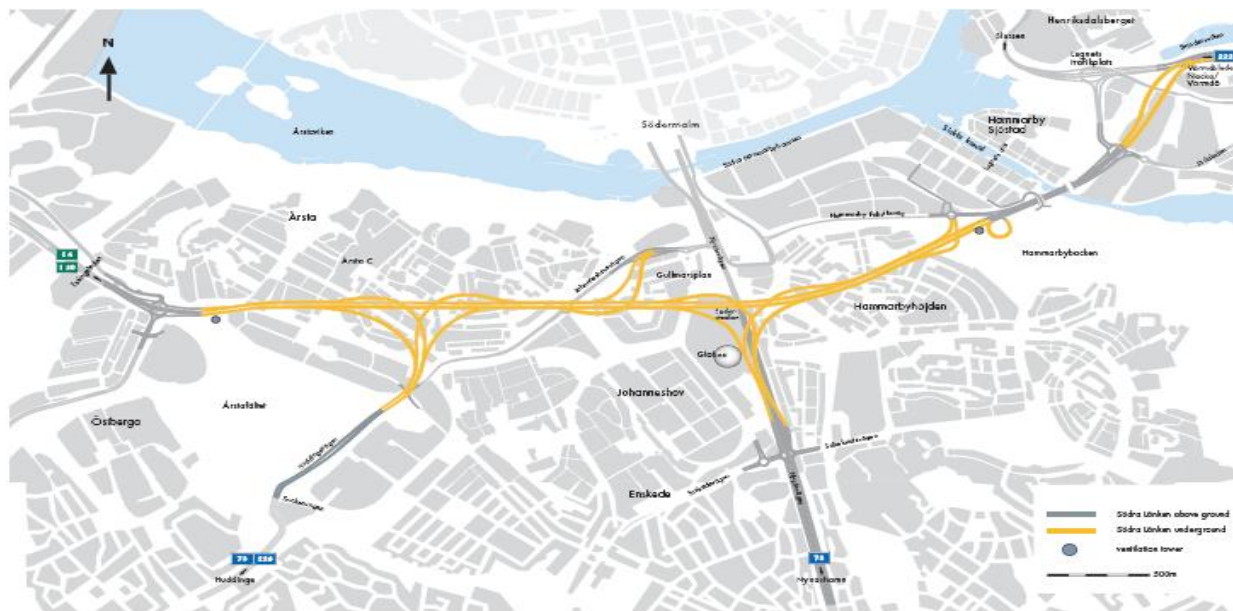


(Source: Lantmäteriet)

Current status

Completed.

Figure 3: The components of the Southern Link



(Source: SRA 2003b)

B BACKGROUND TO PROJECT

Principal project objectives

The background to the Southern Link is intimately connected with the Dennis agreement and as such it is hard to separate the objectives of the overall agreement from the specific objectives for the project.

The objectives of the Dennis agreement were to improve the regional environment, increase (regional) accessibility and create better conditions for regional development (conceptualised as economic development).

Source: Isaksson (2001: 1)

The specific objective for the Southern Link as stated by the National Road Administration was to add 'a missing link' to the urban motorway ring around Stockholm. The idea behind the ring was in turn to ease pressure on the road network in central Stockholm and thereby to improve environmental conditions and traffic safety.

Source: SRA (2003a)

Key enabling mechanisms

- Traffic planning in the 1960s;
- Increasing road traffic;
- The introduction of the idea to build as a tunnel;
- Bengt Dennis is appointed negotiator;
- The Dennis agreement;
- The recession;
- The scientific hearing about the Dennis agreement;
- The Dennis agreement is abolished;
- A new agreement for financing of the Southern Link is approved.

Description of key enabling mechanisms

Traffic planning in the 1960s

The idea of building a ring road around the central parts of Stockholm dates as far back as the 1930s. During the 1950s when the rates of car ownership rose drastically the plans became more developed and the ring road was included in the Stockholm general plan of 1952. The ideas were further developed in *Trafikledsplan för Stockholm*, presented in 1960. This was a plan concerning the road network of the Stockholm area specifically. In this plan the Southern Link was imagined as a motorway above ground. The south western sections of the ring road were built during the 1960s but after the completion of Essingleden in 1971 no more major road projects were initiated in Stockholm until the 1990s.

The long halt of major road projects in Stockholm can be explained by a number of factors. Rising awareness of the environmental problems associated with road traffic in combination with the energy crises of 1970s and significantly lower economic growth rates compared to the boom times of the 1950s and 60s are some important explanations. This led to a situation where major road projects became increasingly politically charged and for a long

time no consensus regarding the development of the transport system in the Stockholm region could be reached.

Source: Engwall & Söderström (2005), CoS (1960)

Increasing road traffic

Despite the opposition to new road projects a key characteristic of the development of the transport sector since the 1970s has been a tendency towards more road transport. During the 1980s this meant that the situation in the Stockholm region had become quite difficult with increasing problems such as congestion, environmental problems and accidents. The congested road network was also conceptualised as a problem regarding regional development, and politicians and representatives from the business community argued that the insufficient road network limited the expansion possibilities for businesses located in the region.

A poll by the Stockholm Chamber of Commerce, the County Council and the Swedish Road Administration (SRA) in the late 1980s showed that the construction of the Southern Link was a high priority for the business community in the Stockholm region.

Source: Engwall & Söderström (2005); Malmsten (1993)

In order to come to terms with the problematic traffic situation a number of investigations on state, regional and local level were carried out during the 1980s. A common denominator in many of the reports was a vision of an improved transport system for the entire Stockholm region. This vision would be achieved by way of substantial investments in public transport as well as the road network. A key aspect for the road network, recurring in several of the reports, was a motorway ring road, in basically the same alignment as the 1960s proposal in *Trafikledsplan för Stockholm*, aimed at easing the pressure on the central parts of the region. However, the situation on the political scene was characterised by conflicts and locked positions. Not only did the different political parties have opposing opinions but there were also internal party disagreements and divergence between the views of politicians on local, regional and state levels.

Source: Malmsten (1993); CoS (1960); Traffic Board of the County Council (1987); Swedish Government (1989a); Swedish Government (1989b); Swedish Government (1989c); Swedish Government (1989d); Stockholm Chamber of Commerce (1989); CoS (1990)

In the mid-1980s a number of politicians at local and regional levels with ties to the eastern side of the Stockholm region began to discuss the possibility of building the eastern section of the ring road as a tunnel financed with road tolls. The idea attracted interest from a number of companies located in the Nacka municipality which eventually led to them forming a joint venture called The Eastern Link Consortium (*Österledskonsortiet*). Their intention was to build a part of the ring road (later conceptualized as parts of the Northern Link and the Eastern Link) as a BOT project financed by road tolls. The consortium consisted of the following companies: Atlas Copco, Skanska, Fläkt and Arcona.

Source: Interview C 9; Tonell (2000); Glemdal (2008)

The introduction of the idea to build as a tunnel

The idea to build the Southern Link as a tunnel was put forward by an official from the municipality of Nacka in a meeting in December 1989. The bedrock in the areas concerned is generally quite solid which in combination with technical progress in the field of tunnelling

allowing for a more automated process and thus made tunnels a viable option. Road tunnel projects in the US (Boston) and Norway were important sources of inspiration for this idea.

The decision to tunnel was viewed as very important since it presented a way to avoid the complex and difficult task of acquiring the needed permissions to build a motorway through a densely populated area above ground. It was also motivated on environmental grounds since it was argued that tunnelling would limit the local impacts from increasing traffic volumes.

Source: Engwall & Söderström (2005); Interview C2; Interview C10

Bengt Dennis is appointed negotiator

The inability to reach an agreement regarding investments in the transport system in the Stockholm region led the central Government to appoint Bengt Dennis, head of the Swedish Central Bank as negotiator on behalf of the state in April 1990. Georg Andersson, the minister of communications at the time, stated that the purpose of the negotiations was to "... enable measures in the overall transport system leading to a better regional environment, increase accessibility and create favourable conditions for regional development." Malmsten (1993: 14) (our translation).

The directives for the negotiations further stated that the point of departure should be the resources made available by existing grants (to the national road and rail administrations) as well as resources that could be provided by the county council, municipalities and the private sector. No further increase in state grants should be expected; instead making use of private financing and user fee models was encouraged.

The reports and investigations made during the 1980s provided the platform for the negotiations and thus no new plans had to be made, the purpose of the negotiations were instead to incite political action. The intention of the negotiator was to arrive at a 'package solution', meaning a deal including public transport projects as well as road projects. No cherry picking would be allowed; instead the political parties involved in the decisions would have to accept the entire 'package'. Further the deal should be long term, have a broad political basis and be fully financed.

Source: Isaksson (2001); Malmsten (1993)

The Dennis agreement

The secretariat administering the negotiations began the process by organising a number of hearings with different stakeholders in May 1990. Stakeholder groups included representatives of the political parties on municipal and county level, the chamber of industry and commerce, the central labour organisation and the Eastern Link consortium. The stakeholder groups were asked to present their views of the problems related to traffic and the environment in the Stockholm region, as well as how to remedy these problems.

By June 1990 Bengt Dennis presented a draft of what he saw as the fundamental aspects of an agreement meeting the criteria established by the government. According to his view the traffic and environmental problems facing the Stockholm region could best be met with a mix of measures including measures aimed at strengthening the public transport, the construction of a ring road around the central parts of the city and the introduction of road tolls. The political parties were allowed some time to think through whether or not they could accept the proposal as a basis for continued negotiations.

In mid-August, when the political parties reconvened with the secretariat in order to continue negotiations the Environmental party, the Left party, the Center party and the Stockholm

party refused to continue negotiations under the conditions implied in the draft. The reason for this was above all the inclusion of the ring road and other major road projects. Bengt Dennis then decided to exclude these parties from the continued negotiations which meant that the Social democrats, the Conservative party and the Liberal party were left in the negotiation group.

The three political parties involved in the process each had positions regarding some of the contents of the draft which were hard to harmonize. The Social democrats were adamant opponents to the Eastern Link (see figure 4), the Conservatives (especially the representatives from county level) were negative about the introduction of road tolls and the Liberals were opposing the Western Link (a project adding a north – south axis to the road network west of the ring road, see figure 5).

The first agreement was signed in January 1991; it contained investments amounting to some SEK 28bn (not adjusted for inflation) for the period 1991–1995. Half of the investments were allocated to road investments and half to measures strengthening the public transport system. The three main issues of controversy did however remain unsolved and in the period leading up to the parliamentary elections of 1991 the negotiations were postponed. Bengt Dennis resigned from his post as leader for the negotiations and was replaced by Claes Ånstrand.

Source: Malmsten (1993); Isaksson (2001)

In the agreement it was stipulated that a company responsible for the financing, implementation and operation of the road projects was to be formed. It was named Stockholmsleder AB (SLAB), and was set up in May 1991. Formally, the process was preceded by Väginvest AB (a subsidiary company of the SRA) buying Stockholms Ringled AB from the Eastern Link consortium. Later in 1991 the City of Stockholm acquired 20% of the shares of SLAB. Between May 1991 and spring 1993 SLAB was responsible for the planning of all road projects in the Dennis agreement. The position of SLAB within the SRA's administration was however contested and the head of the SRA's regional division of Stockholm was very critical of the set up with a separate company (albeit a subsidiary of SRA) administering the road projects of the Dennis agreement. The power struggle ended in victory for the regional division of the SRA in March 1993 when the national leadership of the SRA decided that the staff of SLAB should be transferred to the SRA's regional division in Stockholm. From now on the project was run by a project organisation task force within the SRA, regional division of Stockholm.

In May 1993 the Eastern Link consortium's project company Österleden AB was acquired by the SRA and their executive at the time, Per Olof Sahlström was appointed as the head of the new task force. The merger meant that the SRA bought all the material previously produced by the private company (for instance technical investigations, but above all detailed monitoring of different opponents to the East link project). It also meant that the role of SLAB was drastically altered - from 'project owner' entitled to independently seek financing, plan, project, implement and operate the road projects of the Dennis agreement – to merely a subsidiary company of the SRA's regional division of Stockholm, in charge of overseeing the financing. It also ended the Eastern Link consortium's plans for constructing and operating the Eastern Link as a BOT project.

Source: Engwall & Söderström (2005); Glemdal (2008)

After the general elections in September 1991 the political negotiations regarding the Dennis agreement resumed. The three parties involved faced tough internal struggles in order to persuade their members to accept the parts of the agreement they did not like. Finally, in September 1992 a second version of the agreement was signed. The key enabling

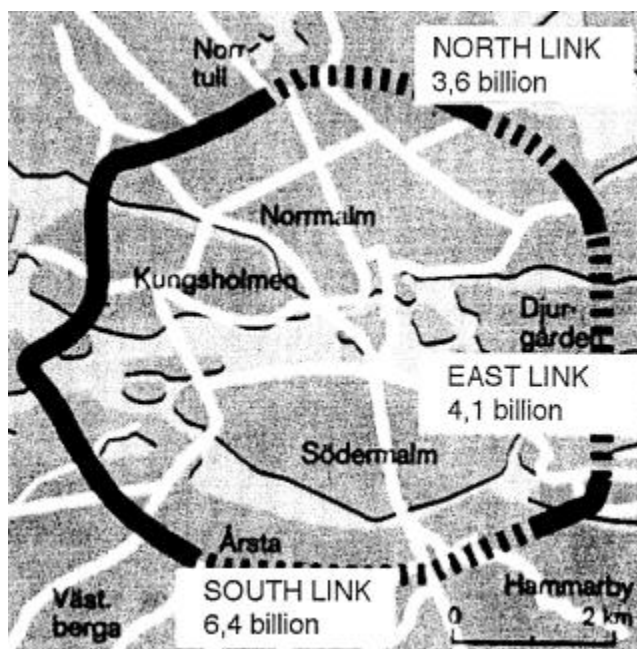
mechanism behind the signing was the settling of the three main issues outlined above and all three parties had to make compromises: the Liberals by accepting the West link; the Social democrats by accepting the Eastern link; and the Conservatives by accepting the road tolls. The question of acceptance of road tolls by the Conservative party was above all important since this was the main source of financing for the proposed road projects included in the agreement.

Source: Malmsten (1993), Isaksson (2001)

In April 1992 *Utredningsplan för Södra Länken* was presented by SLAB and the City of Stockholm. This study was based on work carried out over a number of years before the signing of the Dennis agreement and concerns different topics such as tunnel specifications, construction techniques, ventilation and technical installations, safety, traffic control, estimates of traffic volumes, environmental consequences, costs, time plans and land acquisitions. In this report an additional tunnel, called the Östberga tunnel, was also included in the project. The Southern Link project was also geographically delimited by the Sickla channel to the east. In this version the project cost, excluding VAT, financial costs during construction and costs associated with the permission granting process was estimated to be SEK 4.77bn. The Östberga tunnel which was dropped in later versions of the project was estimated to cost SEK 620m.

Source: SLAB & CoS (1992)

Figure 4: The proposed Ring Road around central Stockholm. Broken lines indicate section in tunnels; the figures estimated cost in SEK.



(Source: Ahlstrand 1998)

The criticism of the Dennis agreement was however not stifled after the signing. A number of articles questioning the basis of the agreement soon appeared in the major newspapers. One of the main issues being acknowledged was for instance that no proper Environmental Impact Analysis (EIA) of the individual projects had been carried out. This implied the possibility that the agreement was in conflict with the legal framework concerning the construction of roads (*väglagen*) which states that EIAs ought to be performed at every step of the planning process. At the time of decision the only available information regarding the

environmental effects was from two minor investigations discussing the effects of the agreement in a general, non-project specific way. The media also uncovered that the environmental administration of the City of Stockholm, who were administering the case, only had four days to investigate the environmental aspects of the road projects before the decision was made. Additionally no thorough analyses of the effects on regional development and accessibility were made.

The proponents of the agreement argued that there was no need for further investigations of the effects of the agreement since most of the projects included had been occurring in several of the reports and investigations carried out during the 1980s. Additionally, some of the key actors in the negotiations meant that the established directives for the negotiations (better regional environment, increasing accessibility and creating favourable conditions for regional development) were very unspecific and open for interpretation.

None the less, the politicians behind the agreement argued that the realisation of the projects would entail a considerable improvement of the environment while simultaneously increasing accessibility and regional development. But the growing critique of what were perceived as decisions made without a proper basis of knowledge led the Government to demand an investigation of the effects of the agreement. All concerned municipalities were called upon to present how individual projects would influence existing urban areas, planned development as well as the environment. The County Administrative Board (CAB) and the County Council were allocated the task of putting together a report illuminating the consequences of individual projects as well as the effects of all the projects in the deal. The deadline for the report was set at March 1993.

Source: Isaksson (2001)

In March 1993 the Southern Link project commenced when a contract was made with Södra länken konsulterna, a consultancy consortium with a staff of nearly 600 people. The design and alignment of the main parts of the Link were now being specified and the interior design and the design of the ventilation towers were decided.

At the time activity levels were very high as construction was expected to start soon. The original sum of the contract with Södra länken konsulterna was SEK 108m: when construction started in 1998 the cost had increased to SEK 300m.

Source: SRA (2005); Engwall & Söderström (2005)

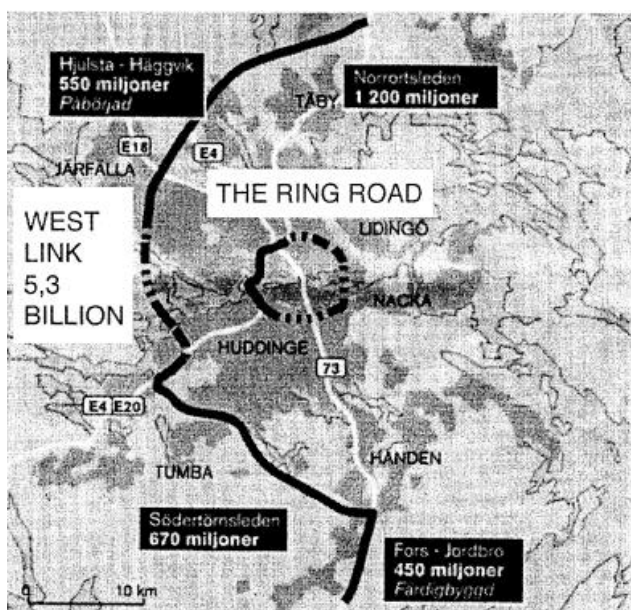
The controversy surrounding the Dennis agreement did not settle with the publication of the CAB's report *Dennis och Miljön* ('The Dennis agreement and the environment') in May 1993. On the contrary, the report, which concluded that the overall effects of the realisation of the Dennis agreement would be positive in terms of environmental effects, regional development and accessibility, met with massive criticism. Apart from the political parties not included in the negotiations and the NGOs opposed to the project several important public authorities and actors forwarded serious critique. Public authorities critical of the findings of the report included: the Swedish National Road and Transport Research Institute (VTI), the National Board of Housing, Building and Planning (*Boverket*), the National Board of Health and Welfare (*Socialstyrelsen*), the Swedish National Institute of Public Health (*Folkhälsoinstitutet*), the Swedish National Heritage Board (*Riksantikvarieämbetet*) and the National Property Board (*Statens fastighetsverk*). Thus to sum up, the criticism towards the report was massive, concerning a wide number of issues related to many of the projects included in the agreement (not only the road projects), and it highlighted the weak basis of knowledge upon which the agreement rested.

Source: Isaksson (2001)

During autumn 1993 the critique continued. This led the SRA and the National Rail Administration, the County Council and the City of Stockholm together with a consultant to start a new, more thorough EIA of the agreement. The investigation was however stopped when it was almost finished, according to some sources due to an all too straightforward description of the negative environmental outcomes of the road projects in the agreement. The report has since been destroyed so there is no clear evidence that this was the case. However, the scrapping of the report coincided with a very critical stage of the decision process when the SRA was awaiting the approval from the central Government to start lending money for the road projects through SLAB.

Source: Isaksson (2001)

Figure 5: Additional road projects in the Dennis agreement. Broken lines indicate sections in tunnels, figures estimated costs.



(Source: Ahlstrand 1998)

In January 1994 the Government presented *Proposition 1993/94: 86 Finansiering av vissa väginvesteringar i Stockholms län m.m.* ('Financing of certain road projects in Stockholm county etc.') to the Parliament. The proposition suggested the Parliament accept that SLAB started lending money through the National Debt Office in order to commence projecting for the road projects in the Dennis agreement. The Parliament was asked to approve a sum of SEK 11.5bn in state guaranteed loans. At the time the Southern Link was estimated to cost SEK 4.555bn (1992 price level), which implied an increase of SEK 135m compared to earlier estimates.

Source: Swedish Government (1994)

In May 1994 *Dennisöverenskommelsens effekter. Miljö*, the final EIA for the Dennis agreement was published. The report contained the same analyses as the EIA that had been stopped and destroyed half a year earlier, but the conclusions were much more favourable regarding the effects of the agreement.

Source: Banverket et al (1994), Falkemark (1999)

The recession

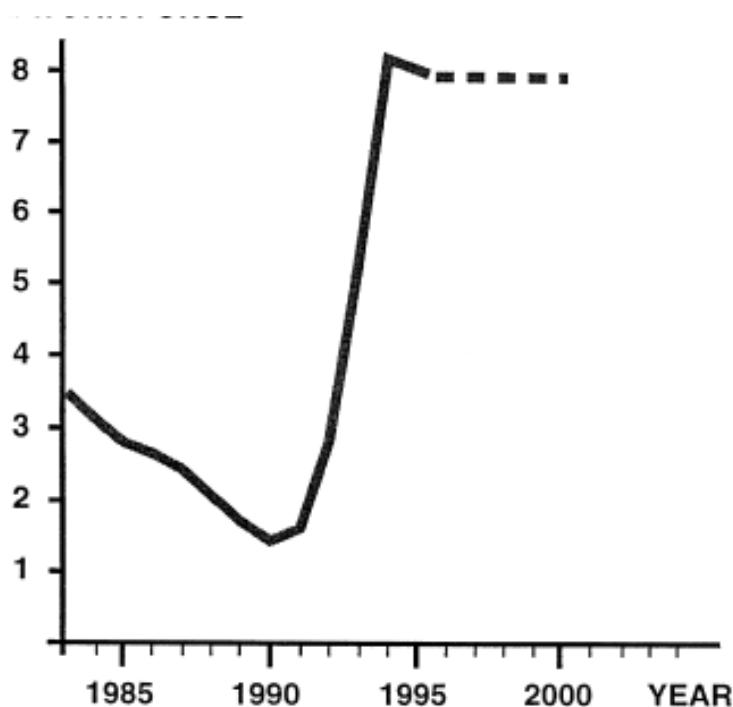
In 1994 the economic situation was very different from when negotiations commenced four years earlier. The late 1980s were characterised by an economic boom which turned into a recession by the early 1990s. By 1993 the recession had escalated to one of the worst crises ever to hit the Swedish economy. Hundreds of thousands of jobs were lost (see Figure 6) and the financial sector and the housing market were close to a total collapse. The creation of job opportunities thus became a new, strong argument for the proponents of the Dennis agreement. Some proponents argued that as many as 100,000 jobs could be created (or saved) by the implementation of the projects in the agreement.

At one point in September 1992 the Swedish central bank increased the interest rate to 500% in order to stop speculation against the Swedish currency. By October 1992 the interest rate was back to 11.5%. However, the situation with fluctuating interest rate levels continued for some time, adding uncertainty to the estimations for the projects financed by loans. The economic recession with high and unstable interest rates meant that it became difficult to estimate the costs for many of the road projects in the Dennis agreement since they were meant to be financed by loans.

Additionally, the recession also meant that increases in traffic volumes were lower than expected. According to Malmsten & Persson (2001) this implied a difficulty in explaining the need for the road investment since the problems with congestion were momentarily eased. Simultaneously the lower traffic volumes also implied a much weaker financial basis for the road projects which were meant to be financed by road tolls. It was now estimated that the total cost for all the road projects would amount to around SEK 24bn (price level of 1993), compared to SEK 18bn in 1991, implying an estimated increase of costs by around 30% in a few years.

Source: Isaksson (2001); Ahlstrand (1998); DN (2002); Interview C8

Figure 6: Unemployed as a percentage of the work force



(Source: Ahlstrand 1998)

In May 1994, work commenced on the first road projects in the Dennis agreement. Around the same time the first thorough cost-benefit analysis (CBA) of aggregate effects of the projects included in the agreement was published by the consultancy company Inregia. This CBA estimated benefits to exceed costs by 20–50%. (Inregia et al 1994), Jansson (2001)

The scientific hearing about the Dennis agreement.

In May 1994 a scientific hearing about the Dennis agreement was organised by the Government. Here proponents and opponents of the deal engaged in discussions regarding cost effectiveness, environmental impacts and the democratic legitimacy of the decision process. In retrospect it has been argued that this signalled a turning point regarding the line of argumentation pursued by the opponents. Earlier the language and rhetoric of the opponents were often based on emotional and abstract arguments implying a wider system critical view questioning the technocratic view of the future development of the transport system and the development of the Stockholm region. But during spring and summer 1994 the criticism was carried forth in the same language as used by the proponents. The CBA and the technical environmental aspects of the agreement were increasingly being challenged. In summer 1994 an alternative CBA (Jansson 1994) of the Dennis agreement was presented which criticised the official CBA (Inregia et al 1994) for using flawed methodology resulting in misleading results. Jansson (1994) argued that the predicted net result of a positive cost benefit ratio of 20–50% in the official CBA actually corresponded to a negative ratio of 60% if the proper methodological alterations were made. Isaksson (2001: chapter 3) argues that this discursive shift in the argumentation against the Dennis agreement was very important in terms of the fate of the agreement.

Source: Miljövärdsberedningen (1994), Isaksson (2001)

During the summer of 1994 *Vi som älskar Stockholm*, a new non-political network of opponents against the Dennis agreement, was formed. This network included many prominent citizens and members of the cultural elite. The Dennis agreement also became an important issue in the coming elections in September 1994, which resulted in a shift of power in favour of the Social Democrats, the Left party and the Environmental party on regional and local levels in Stockholm (as well as on the national level). This meant that the Social democrats who backed the Dennis agreement now had to rule in coalition with two parties very critical towards the deal, specifically the road projects. A compromise agreement was struck between the three parties stipulating that no planning errands for the Eastern and Western Links should be treated during the four year mandate.

Source: Isaksson (2001); ST (1996).

The Dennis agreement is abandoned

In the autumn of 1994 and the spring of 1995 several municipalities started a form of tacit opposition to the Dennis agreement by not treating planning errands awaiting approval in order to start construction. This was especially serious regarding the refusal of some municipalities to deal with errands concerning the pay stations for the road toll system. This meant that the supposed financial backing of the road projects in the agreement were delayed further which added increasing economic problems regarding implementation. At the time the Northern Link was to be the first step of completing the ring road and the planning and projecting process for this section was at the most advanced stages.

Source: Isaksson (2001: chapter 4)

In December 1994 the City of Stockholm approved three separate plans for the main tunnels of the Southern Link. Several important plans were still not approved, including above ground

sections at Nynäsvägen, and other access points and most importantly the section crossing the Sickla Canal.

Source: Sickla Sluss (2009)

In the budget proposition presented to the parliament in 1995 the lack of progress was stressed as a matter of grave concern. Extensive loans for projecting of the roads were already taken by SLAB through the National Debt Office and further delays of the implementation of the road tolls implied a risk of mortgages and interest to accumulate to such amounts that infrastructure investment in other parts of the county could be compromised. The Government demanded clarity regarding financing and the time schedule for the implementation of the road projects and the toll system. In June 1995 the lack of approved plans for the Northern Link and the toll stations led to a freezing of grants from the Government which implied a halt of projecting and construction for all the projects in agreement lasting until May 1996.

Source: Swedish government (1995); Malmsten & Persson (2001); Interview C 2

In May 1995 the City of Stockholm announced that decisions on the plans for the Northern Link should be made in September and decisions on the toll stations in November. But first a more comprehensive environmental investigation would be undertaken in which several environmental NGOs were asked to participate.

Source: Isaksson (2001)

During spring 1996 the planning errands for the Southern Link became a hot topic for the politicians in the Municipal Board of the City of Stockholm and Nacka municipality that had to approve the planning documents. Most of the plans were now approved but conflict ensued over the issue of where the Southern Link ended to the east. In earlier versions (e.g. SLAB & CoS 1992) the project was delimited to the east at the Sickla Canal. Now the plans also included the section from the Sickla Canal to Värmdöleden. The Environmental party meant that this implied that a part of the Eastern Link now was included in the project which violated the agreement made earlier with the Social democrats concerning the Eastern Link. The controversy led to a slow progress on the errands concerned with the elements of the Southern Link located within the borders of the City of Stockholm east of the Sickla Canal. On the other side of the municipal border, in the municipality of Nacka the planning errands were already solved but on the other hand the issue of financing this section of the Link was unresolved (thus lending some credibility to the arguments of the Environmental party).

Source: SvD (1996)

Around this time an alternative Southern Link project, referred to as 'the mini-link', also existed. In this version of the project the tunnels were shorter and existing roads on the surface were used to a greater extent. This meant that the predicted cost also was much lower. Exactly how and when the decision to go for the big version was settled is not entirely clear to us; but it is clear that the issue was decided in the process leading up to the approval of the planning documents, since this essentially implied a freezing of the design. By September 1996 the Municipal Board of the City of Stockholm had approved all the planning documents for the Southern Link west of the Sickla Canal. The section at Sickla Canal was still controversial and the approval errand for this section was postponed due to conflicts within the parties in power in the City of Stockholm. Eventually the planning errand was settled by way of the Social democrats asking the opposition parties (above all the Conservative party) to vote for an approval of the plans.

Source: Interview C6

In September 1996 the Government presented a new budget proposition in which the state guarantees for the Southern Link were increased from SEK 5.1bn to SEK 6.3bn in order to secure the financing of the section east of the Sickla Canal.

Source: DN (1996)

In October 1996 a report acting as a “control station” for the Dennis agreement was published. The report describes the new situation resulting from the delays and changes regarding the financing of the projects. For the Southern Link the most important change is the discarding of the idea to include the Östberga tunnel in the project. The report also mentions that some alterations have been made regarding the design of the intersections at the Årsta field and at Hammarbyhamnen. Additionally the above ground section of the project concerning Nynäsvägen has been altered to improve environmental aspects.

Source: National Rail Administration et al (1996)

In November 1996 tender invitations for some contracts of the Southern Link (SL 08,09 & 10, see ‘Map of main contracts’) were sent out by the SRA. The tendering process was completed and the winners were announced in April (SL 08 and 09) and September (SL 10) of 1997.

Source: VTI (2002)

In the summer and autumn of 1996 the plans for the Northern Link were also approved by the CAB and the Government. The approved plans were however appealed against and the last juridical authority to try the case was the Supreme Administrative Court of Sweden (*Regeringsrätten*). Court proceedings began in December of 1996. In January 1997 the proceedings were finished and the verdict was that the planned alignment of the link in tunnels under the Bellevue National park (the only urban national park in Sweden) was incompatible with the existing legal framework for environmental issues (the law of natural resources). This meant that the Northern Link project was halted.

Only a week later the Government presented a proposal in effect meaning that the Dennis Agreement was abolished. A new proposal, which became known as the Ines deal (after minister of communication Ines Uusman) was presented. This deal was presented as a slimmed and more environmentally adapted deal. In effect it meant that the most controversial road projects (the Eastern Link and the Western Link) and the road toll system were dropped.

Source: Isaksson (2001)

The unexpected halting of the Northern Link and the abolition of the Dennis agreement had important consequences. Firstly, the collapse of the Dennis agreement meant that a clear financial foundation for the remaining road projects no longer existed. Since these projects were not included in the investment plans for the SRA some kind of alternative financing model had to be agreed upon.

Secondly, it meant that the project organisation built up within the SRA in order to implement the road projects included in the deal underwent a big reorganisation. The staff previously assigned to planning and projecting tasks for the different road projects in the deal were now assigned to the project organisation for the Southern Link instead.

Source: Malmsten & Persson (2001); Interview C2

In November 1997 construction work on the Southern Link commenced. Holes for working tunnels were blown in several places and preparatory tasks such as reinforcing the bedrock began.

Source: SRA (2005)

A new agreement for financing is approved

In December 1997 the Government, the County Council and the City of Stockholm signed an agreement regarding the financing of the Southern Link. Once again the agreement concerned a number of projects in the Stockholm region, this time the key projects in the deal were the Southern Link, the Årsta bridge (a new double track railway bridge) and the upgrading from two to four tracks on a section south of this bridge. The Government wanted the City of Stockholm and the County Council to co-finance the projects, but a major problem for this was the legal framework for county councils governing where and on what grounds they are allowed to make investments. The key question was whether or not the Southern Link could be considered as a project of regional importance, since this was a prerequisite for allowing financing from the County Council. If the County Council agreed to co-finance the Southern Link on grounds not totally in line with the legal framework there was an imminent risk of an appeal process against the agreement. So instead the solution was to let the state finance a larger share of the Southern Link (87.5% instead of 75% as originally proposed) in return for the County Council agreeing to finance the Årsta Bridge and the upgrading of the connecting rail tracks.

Source: Swedish Government (1998); Interview C3; Interview C8

The financing arrangement for the Southern Link was thus: the state agreed to invest SEK 5.68bn excluding costs for land acquisitions, and the City of Stockholm agreed to invest SEK 827m (1997 prices). It was also agreed that in the event of cost overruns the state agreed to pay 75% and the city of Stockholm 25%. The cost of land acquisition was estimated to be SEK 972m, but it was not specified who should pay for this. The proposal further suggested that roughly SEK 825m was to be allocated to the project by re-distributing some of the funds allocated to the SRA in the current state budget. The financial obligation of the state was then estimated to amount to around SEK 5bn, which should be acquired by lending money on the 'free market'. Further the agreement stated that operation of the finished project should be paid for by the state by an annual grant of SEK 15m until the loans for the project was repaid.

Source: Swedish Government (1998)

In January 1998 the first blasting charge on the main tunnel was fired by Ines Uusman, minister of communications, Mats Hulth, the mayor of Stockholm and Hans Rode, head of the regional division of the SRA.

Source: SRA (2005)

In spring and summer of 1998 the tendering process for the majority of the contracts for the Southern Link was completed. Some contracts were not closed until later in 1999 – 2001.

Source: VTI (2002)

Key enabling mechanisms timeline

Month	Year	Event
	1952	The general plan of 1952 is published.
...	1960	<i>Trafikledsplan för Stockholm</i> is published.
	1971	The Essinge link, constituting the south western section of the ring road, is completed.
	1980s	A number of investigations regarding traffic in the metropolitan area of Stockholm are carried out on state, regional and local levels. The completion of the ring road is a recurring theme in many of the published reports.
	1985	The Eastern Link consortium is formed.
December	1989	The idea of constructing the Southern Link as a tunnel is introduced.
April	1990	Bengt Dennis is appointed as negotiator by the state. A row of hearings is arranged with selected stakeholders.
June	1990	The first proposal from the Dennis group is presented.
August	1990	The negotiations commence after establishing which political actors to include and exclude.
January	1991	The first Dennis agreement is signed by the Social democrats, the Liberals and the Conservatives.
May	1991	Stockholmsleder AB (SLAB) is registered as a subsidiary company of the SRA. Work commences on the design of the road projects.
April	1992	<i>Utredningsplan för Södra Länken</i> , a preliminary plan for the Southern Link is presented by SLAB and the City of Stockholm.
September	1992	The second Dennis agreement is signed.
	1992	The central Government demands an investigation of the environmental consequences of the Dennis agreement.
	1992	The NGO <i>Ur tid är leden</i> is formed as a reaction to the ring road plans.
March	1993	Projecting for the Southern Link commences.
March	1993	SLAB is transferred to the SRA's regional division of Stockholm.
May	1993	The CAB publishes <i>Dennis och miljön</i> , the first EIA of the entire Dennis agreement.
Autumn	1993	The critique against the agreement intensifies. In November a demonstration gathering more than 3,500 people is held.
Autumn	1993	A new EIA of the Dennis agreement is undertaken. The report is stopped and destroyed when almost finished.
January	1994	The Government presents the proposition 1993/94: 86 <i>Finansiering av vissa väginvesteringar i Stockholms län</i> .
May	1994	<i>Dennisöverenskommelsens effekter. Miljö</i> , the final EIA of the agreement is published.
May	1994	The first CBA (Inregia et al. 1994) for the Dennis agreement is published.
May	1994	A scientific hearing about the Dennis agreement is held on the initiative of the Government.
September	1994	Elections are held resulting in a shift of power in favour of the Social democrats, the Left party and the Environmental party. An agreement is struck not to commence work on the Eastern and Western Link

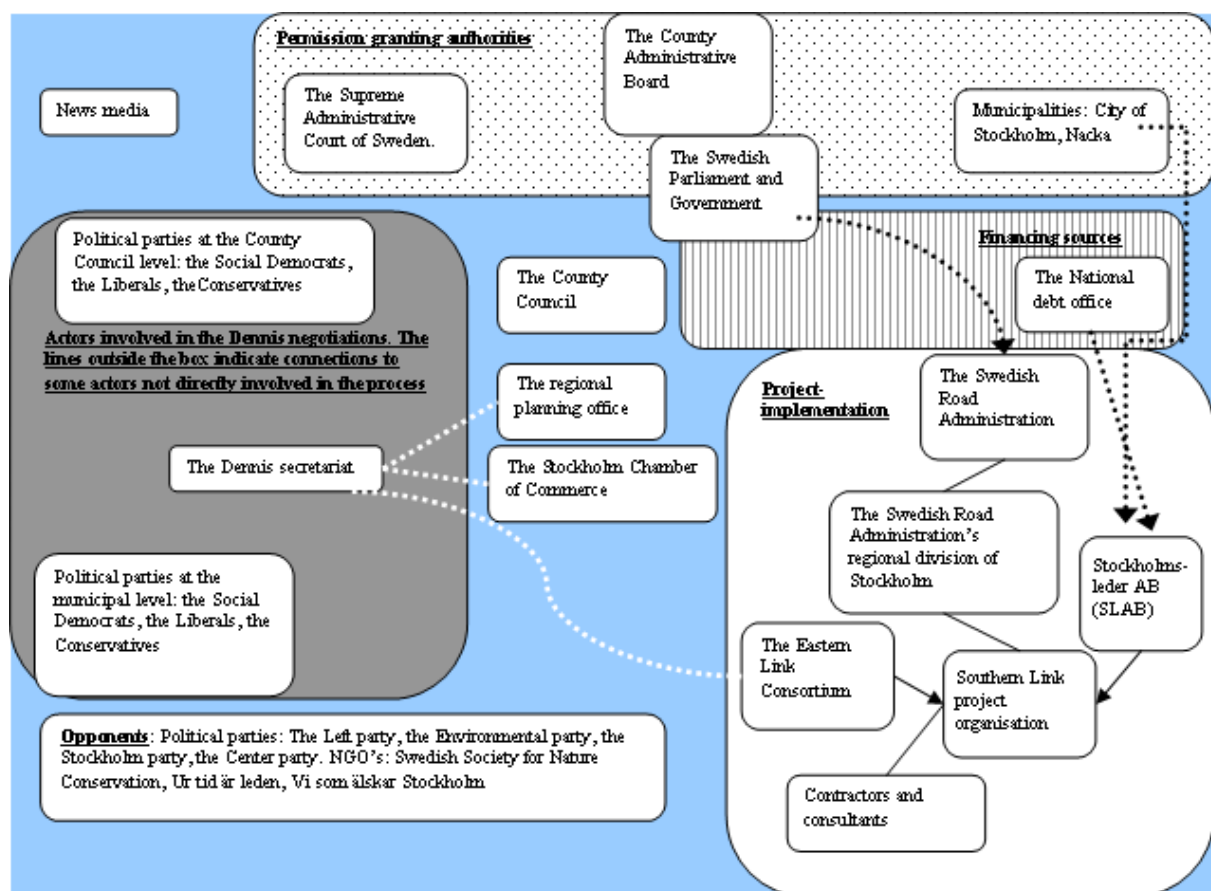
Month	Year	Event
		projects during the mandate.
Autumn – spring	1994 – 1995	Increasing worries about the financial viability of the Dennis agreement.
December	1994	The City of Stockholm approves three plans for the main tunnels of the Southern Link.
June	1995	The lack of approved plans for road toll stations leads to a halt of projecting and construction for all the projects in the Dennis agreement until May 1996.
Summer – autumn	1995	The extended environmental investigation of the Dennis agreement is carried out.
Spring	1996	The coalition of parties in power in the City of Stockholm argues over the delimitation of the Southern Link project.
	1996	Inregia (1996) presents the first CBA of the Southern Link, implying a cost-benefit ratio of - 0.9.
May	1996	The construction halt is revoked.
September	1996	The Government proposes additional financing for the Southern Link for section east of the Sickla Canal.
November	1996	Tender invitations for some contracts of the Southern Link (SL 08, 09 & 10, see 'Map of main contracts') are sent out by the SRA.
Summer – autumn	1996	The CAB and the Government approve the plans for the construction of the Northern Link. The plans are however appealed against and the errand is referred to the Supreme Administrative Court for a final verdict.
January	1997	The Supreme Administrative Court of Sweden declares the plans for the Northern Link project to be in violation of the existing legal framework for environmental issues.
February	1997	The Dennis agreement is abolished.
Spring	1997	The project implementation organisation within the SRA is reconstructed. All personnel and funds previously concerned with different road projects are transferred to different sub-projects of the Southern Link.
April	1997	Winners of the Southern Link contracts SL 08 and SL 09 (working tunnels) are announced by the SRA.
September	1997	The winner of the Southern Link contract SL 10 (concrete tunnel at the Årsta field) is announced by the SRA.
October	1997	Negotiations between the Government, the County Council and the City of Stockholm commence regarding financing for the remaining projects of the abolished Dennis agreement.
November	1997	Preparatory construction work for the Southern Link commences on working tunnels, strengthening of bedrock etc.
December	1997	A new financial deal for the Southern link is struck between the Government, the City of Stockholm and the County Council.
January	1998	Blasting of the main tunnels commences.
May	1998	The Parliament approves the financing deal struck in December 1997.
Spring – summer	1998	The tendering process for the majority of contracts of the Southern Link is completed. Some contracts are closed in 1999 – 2001.
August	1998	A CBA (Transek 1998) of the Southern Link is published, indicating a cost-benefit ratio of -0.6.

Main organisations involved

- The Swedish Government (dep. of communications, dep. of finance)
- The Parliament
- The National Road Administration (the regional division of Stockholm)
- The Eastern Link consortium
- The secretariat under Bengt Dennis
- The Conservative party
- The Social democratic party
- The Liberal party
- The Stockholm County Council (the regional planning office)
- The Stockholm chamber of commerce
- The County Administrative Board
- The Supreme Administrative Court of Sweden
- Stockholmsleder AB
- The National debt office
- City of Stockholm
- Nacka municipality

Supporting diagrams showing structure of organisations

Figure 7: A schematic overview of organisations involved in the Southern Link project



Planning regime

In Sweden municipalities play an important role since they have responsibility for approving planning documents required for implementing projects. There are two types of plans carried out by municipalities; comprehensive plans which were made compulsory in the early 1990s (but are not legally binding) and detailed plans which are legally binding documents. Regarding infrastructure projects the environmental impact assessment, which has to be approved by the County Administrative Board, also plays an important role. The environmental impact assessment document is prepared by the project implementation organisation (in the case of the Southern Link, the SRA) as a part of establishing a working plan for the project.

Outline of planning legislation/policy related to the project and its associated developments

See above.

Environmental statements and outcomes related to the project

The County Administrative Board approved the EIA of the project, but the City of Stockholm and the municipality of Nacka also had to approve the planning documents.

Overview of public consultation

The planning system requires all municipal detailed plans, as well as working plans produced by the SRA considered to have a substantial environmental impact, to be subject to a public consultation process. This has been the case for several of the planning documents of the Southern Link, however due to lack of time we have not been able to produce an overview of this process.

Archaeology

No information available.

Regeneration

There are indirect connections between the Southern Link and regeneration. Although we do not perceive this as being a direct result of the construction of the Link, the connections to some development areas are however discussed in the 'Detailed description of route' section.

Quantify project appraisals before, during and after construction

- **Baseline Studies**

The proponents and architects of the Dennis agreement argued that the 'package' of investments constituting the deal could not be analysed as separate entities. As a consequence CBAs for individual projects as well as for the entire agreement were not carried out until after its political approval. The first more thorough CBA, carried out by consultancies Inregia, Transek and Temaplan, was presented in May 1994. The CBA (Inregia et al 1994) was ordered by the SRA and the National Rail Administration, the County Council, the City of Stockholm and SL (the regional public transport authority). The result of this CBA showed that the net benefits of the investments exceeded net costs by 20%-50%.

This report soon became heavily criticised by independent researchers. Kjell Jansson (1994) argues that the Inregia report suffered from methodological flaws implying that the results were lopsided. According to Jansson (1994) net costs exceeded net benefits by 60%.

A number of studies focusing specifically on the road projects of the Dennis agreement followed, several of which showed a substantial negative cost-benefit ratio. Two separate CBAs for the Southern Link were also carried out which were meant to be used as a basis for the EIA of the project. The results showed a clear negative cost-benefit ratio. Inregia (1996) indicated a negative ratio of almost 0.9 and Transek (1998) a negative ratio of 0.6. In Inregia (1996) the outcome is somewhat better: -0.7 assuming the road toll system later abandoned. The second CBA (Transek 1998) was ordered by the SRA Regional division of Stockholm to compare with the one performed by Inregia in 1996.

The negative results in both analyses are very interesting, not least because the reports use drastically varying assumptions in their calculations. What this above all indicates is a different view of the effects of the Link. In Inregia (1996) it is found that costs for accidents and emissions will increase, which diminishes the benefits from time savings. In Transek (1998) it is instead assumed that costs for accidents and emissions will actually decrease as a result from building the Link, thus adding to the benefits. According to Jansson (2000) the main result from these analyses is that a minor decrease of traffic volumes in the inner city (from -0.25% to -2.22%) can be expected, while regionally the volumes will increase rather drastically (+20% to +60%). The main effect of the Southern Link is thus expected to be time savings brought about by a quicker, but longer route. Nonetheless, both analyses arrive at a

negative cost-benefit ratio, a fact above all explained by the enormous cost of building underground.

- During construction

The result of the second CBA (Transek 1998) was actually not published until August 1998, when construction of the Southern Link was well under way.

- After construction

To the best of our knowledge no further appraisals have been made after construction.

A description of complaint procedures

Information not available.

Land acquisition

Information not available.

C PRINCIPAL PROJECT CHARACTERISTICS

Detailed description of route

Figure 8: The Southern Link (yellow indicates sections in tunnels, dark grey indicates sections above ground)



(Source SRA 2003b)

The Southern Link consists of tunnels, roads and access ramps. From east to west the link is 6km long, of which 4.5km is in tunnels. The link consists of two separate main tunnels, one for traffic in each direction. The length of the sections underground total 17km including access ramps. The geological conditions in the area allowed for large sections of the tunnels to be blasted through the bedrock. However in some sections without sufficient bedrock cover, as well as for the caves housing the underground intersections and the access ramp tunnels, extensive amounts of concrete have been used. Altogether there are 14km of bedrock tunnels and 3km of concrete tunnels (built with cut and cover technique). The tunnel ceilings are also lined with white concrete. This inner ceiling performs a double function of protecting the tunnels from ground water seepage as well as helping motorists' orientation.

Apart from the actual roads and tunnels the Southern Link also consists of several important control, monitoring and safety systems. Altogether these system consist of 200,000 different components.

Source: SRA (2003: 43); Jonsson (2005)

Figure 9: A cross section of the tunnel interior



(Source: SRA 2003b)

The Southern Link has its own water treatment plant. According to an agreement with the City of Stockholm all potentially harmful substances and pollutants in the road surface water (for instance heavy metals, hydrocarbon and carcinogenic substances) must be collected and purified. According to this agreement a continued monitoring of ground water levels is also demanded and any seepage of ground water has to be compensated by reintroduction into the aquifers. Thus a sophisticated system for capturing and cleaning of waste water is installed. Apart from the water treatment plant situated in a rock cavern at Hammarby this includes five pump stations, five sedimentation tanks, 1,200 water chambers and a cleaning facility for drainage water. Additionally the water system also includes 132 fire hydrants.

Figure 10: The ventilation system



(Source SRA 2003b)

In order to meet the demands regarding air quality in the tunnels there is an air quality monitoring system installed in the tunnels which measure the levels of carbon monoxide and nitrogen dioxide. The principal for the ventilation system is a longitudinal system reliant on the draught caused by the moving vehicles. If the air quality in the tunnels drops below the threshold defined by the control monitor system the jet fans installed in the ceiling are activated. The measurement system includes 30 air speed sensors, five CO sensors, 38 NO_x sensors (of which eight are situated in the surface road network). Altogether there are 159 jet fans, five air supply stations and two ventilation towers.

Energy use

The technical and maintenance systems of the tunnels require a lot of energy in the form of electricity. The energy use fluctuates quite considerably depending on the hour of the day and season of the year. On average it is estimated that between 1,000kW and 3,000kW of electricity is used at any given hour of the day. Maximal energy use occurs during peak hour traffic when the fans are used the most. Energy use during winter is also higher since the road surface is warmed up in order to avoid ice and snow creating dangerous traffic conditions. Weighting for different conditions during different seasons and hours of the day, an average energy use of 1,700kW is estimated. This translates to an energy use of roughly 54TJ/year. If this figure is adjusted for transmission losses the energy use amounts to 166TJ/year.

Source: Jonsson (2005)

Embodied energy

Another aspect regarding energy is the amount of embodied energy in the infrastructure. Tunneling requires a lot of energy during construction and estimates by Jonsson (2005) indicate that the embodied energy for the Southern Link is twice as high as for the average Swedish road.

Monitoring and safety

The road safety standard in the tunnels is quite high since the parallel tunnels imply no oncoming traffic. The traffic situation in the tunnels is carefully monitored by a CCTV system with 450 cameras. The sides of the tunnels have been provided with lateral safety barriers (altogether 50,000m²) to ensure that injuries from collisions are minimised. The monitoring central can react to accidents quickly and close access ramps if deemed necessary. Additionally there are 277 emergency telephones and 80 help buttons located in the tunnels. The fire fighting equipment consists of 931 fire detectors and 132 fire hydrants. There are 140 emergency exits located within 100–150m of each other. The exits lead into a fire protected room, from where one can either access the parallel tunnel or await the arrival of rescue personnel. In case of a fire in one of the tunnels the entire tunnel system will be shut down. Emergency vehicles will then travel through the parallel tunnel and evacuate people from this tube.

The system monitoring system is connected to traffic controllers at Trafik Stockholm, an authority under the SRA which monitors and informs about the traffic situation on the state road network in the Stockholm area. The Southern Link has several separate systems allowing the operators at Trafik Stockholm to control the traffic in the tunnel systems. The Motorway Control System (MCS) has two main functions, firstly to warn motorists about queues and thereby minimise the risk of rear collisions and secondly to close one or several lanes for traffic. The MCS can monitor the speed of vehicles passing by and if a queue situation arises the system reacts by lowering the speed on the electronic signs in the tunnels. If an unmoving vehicle is detected the system sends an alarm to the operators who

in turn can verify the incident by the monitoring cameras and then close a lane, and/or lower the speed limit as a response.

PCMS system is a shutdown system consisting of Variable Direction Signs (VDS), boom barriers and Tunnel Entrance Signs (TES). The TES located near the access ramps informs motorists when sections of the Southern Link are closed. The VDS allow traffic control to re-route traffic and shut off entrances if necessary.

The systems are coordinated by the Central Technical System (CTS) which allows traffic control to perform certain programmed plans involving all the systems mentioned above.

Source: SRA (2006)

Figure 11: The western section



(Source: SRA 2003b)

To the west the Southern link connects to the Essinge link, the first section of the ring road which was built during the 1960s. Here a new intersection with a roundabout and new access roads to the local road network has been built. The Southern Link replaced a road called the Årsta link which previously ran across the northern section of the Årsta field (lower right corner of figure 8). To the east of the intersection the road descends into the entrance of the tunnel system. The first section of the tunnel consists of a 450m concrete tunnel. Above the tunnel entrance there is a 20m high ventilation tower made of glass and steel, and a building housing important parts of the fan system for the tunnels.

Figure 12: The central section



(Source : SRA 2003b)

In the middle section of the link there are two access and exit points, one connecting to Huddingevägen to the south, and one connecting to Johanneshovsvägen to the north. The main tunnels of this section are blasted through the bedrock. The southern exit and access points consist of concrete tunnels approximately 350m long. Huddingevägen south of the access points (indicated by dark grey in Figure 9) has been moved to the east and widened and now has two lanes in each direction. The access and exit point to the north connects to Johanneshovsvägen, and at the interchange a stretch of road approximately 350m long has been upgraded from two to four lanes.

Figure 13: The section at Nynäsvägen



(Source: SRA 2003b)

Nynäsvägen is one of the busiest access roads for traffic to and from the central parts of Stockholm. Apart from the access and exit points for the tunnels a 1.5km section of Nynäsvägen south of the Stockholm Globe Arena and the Southern Stadium (two major sporting facilities) has been rebuilt. New features include a lowered section of Nynäsvägen (up to 8m lower compared to its former level) and a new interchange at Sofielundsplan (where Nynäsvägen, Enskedevägen and Sofielundsvägen intersect). The alterations include grade separation of traffic on the streets with mainly local traffic from the through fare traffic of Nynäsvägen.

Figure 14: The eastern section



(Source: SRA 2003b)

At the eastern end the tunnels of the Southern Link connect to Värmdöleden. Going west the link continues in tunnels (600m) under the Nobelberget and surfaces again at the Nacka roundabout. From the roundabout the link continues above ground in a lowered alignment across the Sickla Canal and past Hammarby Sjöstad (a major regeneration area in Stockholm). East of the Sickla Canal the link descends below ground again. Above the entrance of the tunnels west of the canal another 20m high ventilation tower in steel and glass is situated. In the section above ground two 'ecoducts' have been built on each side of the canal, allowing for people and wildlife to cross the road. At the crossing of the Sickla Canal new bridges have been constructed. Additionally a new lock with a fish ladder, allowing for recreational boat traffic and migrating salmon to move between the Hammarby lake and the Sickla lake, has been built.

Detailed description of main and intermediate travel nodes

Introduction

The arguments for building the Southern Link have to a large extent been based on perceptions of problems of the transport system and the project was above all presented as a solution to traffic related problems in the inner city areas. The development areas described below should thus not be viewed as integral parts of the project even though they to some extent clearly are related (one example is the plans for the regeneration project Hammarby Sjöstad: when this project went forward it was argued that the Southern Link was essential for the development of this area).

The development at Årstafältet described below has been made possible by the construction of the Southern Link since this replaced the previously heavily trafficked road, the Årsta link. The section of the Årsta link between Nynäsvägen to the east and the Årsta intersection to the west is now closed for traffic.

Planning context

For the historical background of the project see 'Description of key enabling mechanisms'. On a more local level the planning context in this area of Stockholm is governed by the comprehensive plans established by the City of Stockholm. The comprehensive plan of 1990 (*Översiktsplan 90*) was approved by the City of Stockholm on 18 February 1991. This comprehensive plan was later complemented by a detailed plan for the southern area of the city in 1994 (*Översiktsplan för Södra Trafikbandet*), approved on 18 April 1994).

In the Swedish planning system the comprehensive plans are meant to give guidance for decisions regarding land use and development. Comprehensive plans are not legally binding, but in the detailed planning process and the allowing of building permits it must be established if the accepted plans are compatible with the intentions of the current comprehensive plan. The comprehensive planning process is carried out in a continuous manner and once every mandate the municipal board has to decide on whether or not the current comprehensive plan is valid.

For the Southern Link a number of detailed plans were processed by the City of Stockholm and the municipality of Nacka respectively.

Proposed development

Hammarbysjöstad (figure 15): A waterfront development project in an area formerly housing industrial and harbour activities. The project, which was initiated in the early 1990s, is one of the major development areas in Stockholm (and Sweden). The City of Stockholm's

unsuccessful application for the 2004 Olympic Games was an important trigger for the development of the area since the Hammarbysjöstad was planned as the Olympic village.

At the moment some 7,000 apartments have been built, and another 4,000 are planned. Fully developed it is estimated that some 25,000 people will live in the area. Additionally some 10,000 workspaces are planned. The western tunnel section of the Southern Link surfaces at the south of the area (see figure 13).

Source: CoS (2009a)

Årstafältet (figure 16): The area comprising roughly 50ha has been classified as a green area in earlier planning documents (for instance ÖP 1999, the 1999 Comprehensive plan for the City of Stockholm). As a result of the construction of the Southern Link the Årstalänk was made redundant and some space was made available at the northern edge of the field. Additionally the Huddingevägen at the eastern edge of the field was moved some 70 m further east and noise barriers were made. This meant that the area of the field increased by around 10ha and the noise levels were lowered substantially. In 2001 a plan (DP 90345) for the area was accepted. The intention of this plan was to turn the area into a 'landscape park', a recreational area housing different activities.

In 2006 when a new political leadership of Stockholm was established after the general elections the development of this area was however halted. In the new comprehensive plan (CoS 2009b) Årstafältet is classified as a strategic development area. In the latest proposal for the development the northern section of the area will instead be the site of housing development. The idea of a 'landscape park' has been replaced by an 'urban park'. An architect competition was determined in 2009 and the winning proposal comprises plans for 4,000 housing units and 210,000m² of office space, which will use up about two thirds of the space of the area.

Source: CoS (2009a); CoS (2009b)

Gullmarsplan – Slakthusområdet (figure 17): In the vicinity of some of the Stockholm area's biggest event and sporting facilities, the Globe Arena, Hovet and Söderstadion are located. The plans for the area are only in an early phase. At the moment the most significant plan is to construct a new event and sporting arena to replace the Söderstadion, which will be demolished to provide land for housing development.

Source: CoS (2009a); CoS (2009b)

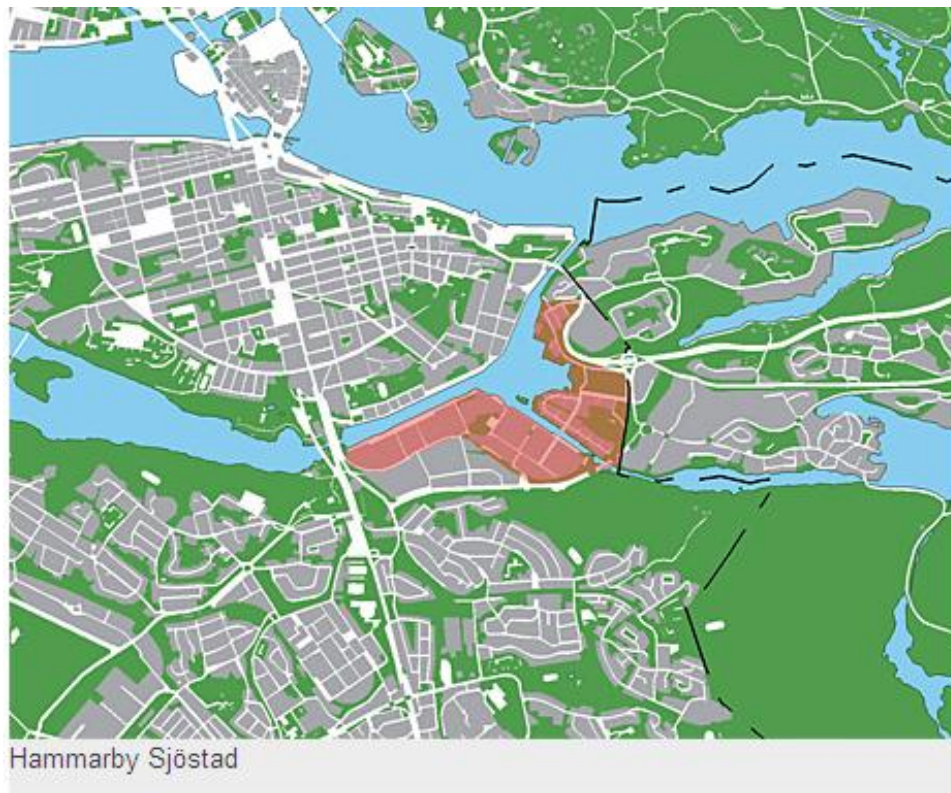
Additionally, the western area of the municipality of Nacka also harbours some major development areas such as Henriksdal and Kvarnholmen.

Key features

- Hammarby Sjöstad: Built: 7,000 housing units; Planned: 4,000 housing units, 10,000 workspaces;
- Årstafältet: Planned: 4,000 housing units, 210,000m² office space;
- Gullmarsplan – Slakthusområdet: Planned: New event and sporting arena for 30,000–40,000 people, housing development.

Map of location, plan of development

Figure 15: Hammarby Sjöstad,



Source: CoS (2009a)

Figure 16: Årstafältet



Source: CoS (2009a)

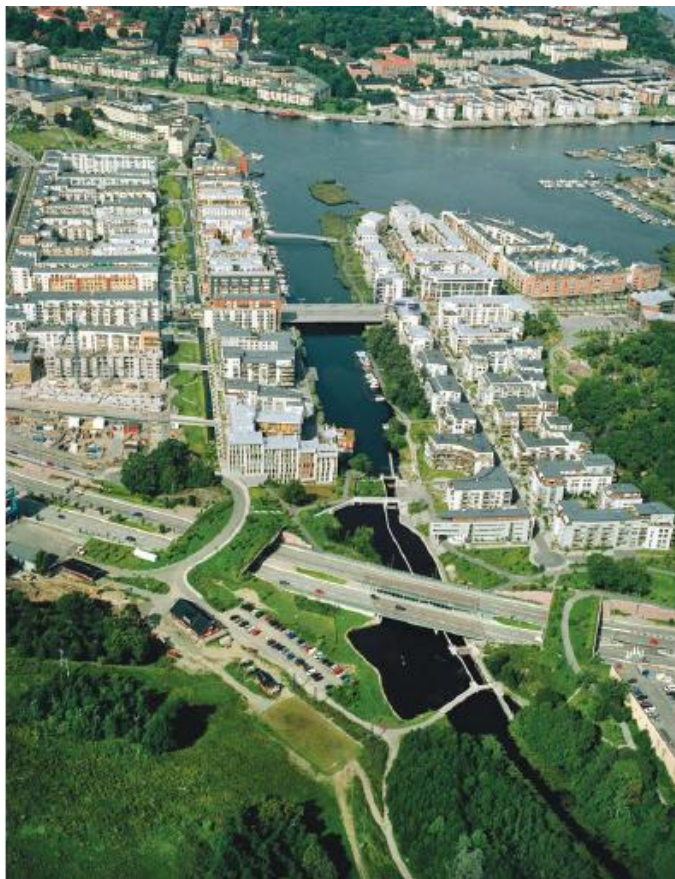
Figure 17: Gullmarsplan-slakthusområdet,



(Source: CoS 2009a)

Photo/aerial photo of development

Figure 18: Hammarby Sjöstad



(Source CoS 2007; photo: Lennart Johansson Infobild)

Figure 19: Årstafältet



(Source: CoS 2009a)

Figure 20: Gullmarsplan-slakthusområdet



(Source: CoS 2009a)

Project costs

The SRA (2005) estimates the cost of the finished project at SEK 8.2bn. Compared to the estimates when the project was politically approved as a part of the Dennis agreement (SLAB & CoS 1992) it is clear that there have been substantial increases over time. The figures should however be treated with caution since they are not entirely comparable. The project components included in the project that was later realised shifted quite considerably from the first proposals in the Dennis agreement. The earliest version of the project (SLAB & CoS 1992) included another tunnel section called the Östberga tunnel and alterations to the connecting road south of this tunnel. These sections were later left out resulting in a lowering of cost estimates in Malmsten (1993). It is also interesting to notice that the early cost estimates are considerably lower despite assuming a sprinkler system later left out and a dimensioning of access ramps for higher speeds. Additionally the section east of the Sickla Canal (see figure 13), was not included until 1996. In the budget proposition for 1997 (Swedish Government 1996) the cost of the section from Sickla Canal to the Värmdö link is discussed and it is estimated that it will amount to SEK 1.198bn (1996 prices).

However, the reason for the rather drastic increase between the estimates made in 1994 and 1998 is not totally clear. The inclusion of the section between Sickla Canal and the Värmdö link can partly explain the increase between 1994 and 1996, although the alterations in standard and the exclusion of the Östberga tunnel should arguably have balanced out the increase. Another factor behind the cost increase between 1994 and 1998 was also the projecting and design stop in June 1995 lasting until May 1996 which entailed unforeseen costs.

The increase between 1996 and 1998 (when the project was politically approved the second time) is probably the most interesting in terms of cost increase over time since this actually represents figures for a comparable project. The reason for the increase during this period is not clear and to our knowledge there is no explanation found in any official documents. One explanation is perhaps that the projecting and design phase of the project was in a more detailed stage by then which means that the cost estimates were more realistic. Another factor to be considered is the altered situation in the construction sector where the latter half of the 1990s was characterised by high activity which acted to drive up wages, especially in the Stockholm area. (VTI 2002).

The estimates made at the time of the second political approval (Swedish government 1998), when a new financing structure was agreed on are rather close to the actual cost (SRA 2005). Thus it can be concluded that the project was delivered within budget if a comparison is made with the estimates made in 1998. But there is clearly a big discrepancy between these and the estimates made seven years earlier when the project was approved for the first time. Additionally an interesting picture emerges from interviews with contractors who claim they actually lost money on the project since the project organisation (at least in some cases) was very adamant about not paying more than stipulated by the contract. There are thus indications that the project was subject to more cost overruns than can be discerned through the figures presented above, but in terms of allocating the risk for these overruns the project organisation was quite successful in transferring risk to the contractors.

Source: Interview C1; Engwall & Söderström (2005)

Predicted costs in year project gained parliamentary consent against actual cost (to date):

See 'Timeline of project cost estimates'.

Timeline of project cost estimates

Predicted (in year of decision to go ahead)	Value recalculated to the price level of 2005 (price level in € calculated at SEK 100 = €10,1)	
SLAB & CoS (1992) SEK 4.77bn	SEK 5.755bn	€570m
Malmsten (1993) SEK 4.02bn	SEK 4.64bn	€460m
Swedish Government (1994) SEK 4.555bn	SEK 5.25bn	€520m
Swedish Government (1996) SEK 6.330bn	SEK 6.935bn	€690m
Swedish Government (1998) SEK 7.47bn	SEK 8.15bn	€740m
Actual:		
SRA (2005)	SEK 8.2bn	€810m

Timeline/overview of project delivery

January 1991: The first Dennis agreement is signed.

May 1991: Stockholmsleder AB (SLAB) is registered as a company.

May 1992: A preliminary plan (SLAB & CoS 1992) for the Southern Link is presented.

September 1992: The second Dennis agreement is signed.

March 1993: Projecting for the Southern Link commences.

December 1994: The City of Stockholm approves the main detailed plans for the Southern Link.

September 1996: The Government proposes additional funding for the Southern Link project east of the Sickla Canal.

November 1996: Tender invitations for some of the Southern Link contracts are sent out.

February 1997: The Dennis agreement is abolished.

Spring 1997: The project implementation organisation for the Southern Link project is re-organised.

April 1997: The winners of the first Southern Link contracts (working tunnels) are announced.

November 1997: Work commences on the first contracts.

December 1997: A new agreement for financing of the Southern Link is signed.

January 1998: Work commences on the main tunnels.

2001: The tunnels are completed. Work on installations commences.

November 2002: The SRA is sued by a contractor.

October 2004: The Southern Link is inaugurated.

Main engineering features

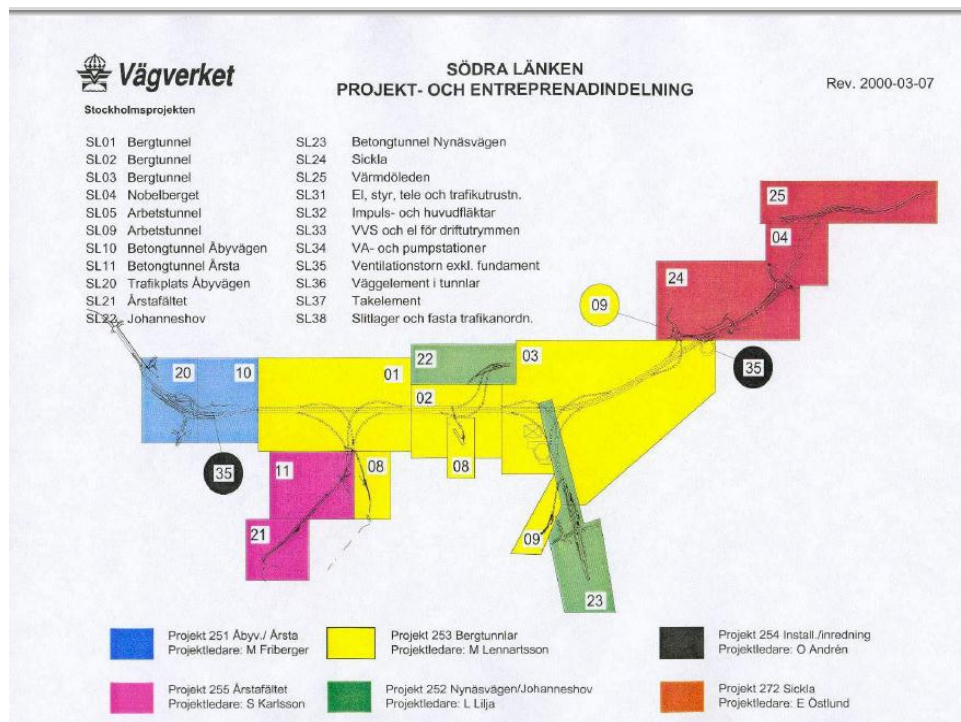
Details of engineering and construction

- Total rock excavation: 2,035,000m³
- Total soil excavation : 747,000m³
- Total volume of concrete: 225,000m³
- Reinforcement: 14,500 tonnes
- Paved surface: 282,000m²
- Lateral safety barriers: 50,000m²
- Suspended ceiling: 100,000m²
- Nr of jet fans: 159
- Emergency exits: 140 located within 100–150m from each other.
- Road barriers: 37
- Fire detectors: 931
- CCTV cameras: 450
- Emergency telephones: 277
- Emergency help buttons: 80

Source: SRA (2005)

Map of main contracts

Figure 21: Map of contracts for the Southern Link



(Source: VTI 2002)

Figures for some of the main contracts (2001 prices):

- Skanska, including contracts won by Selmer which was bought by Skanska during the project (SL 03, SL 10, SL 11, SL 23 & SL 24): SEK 1.8bn.

- NCC (SL 01, 02): SEK 630m.
- Tunnelentreprenad HB (SL 31): SEK 530m.
- Peab (SL 37): SEK 220m.
- Source: Engwall & Söderström (2005)

Contract	Contractor
Projecting contracts (design)	
Tunnels and connections to the existing road network in the Årsta field	Södra länken consultants: Ramböll (former SCC) and Golder
Intersection at Nynäsvägen	Carl Bro (then Stockholm consult)
Intersection at Johanneshov	SWECO (former VBB Viak)
Section at Sickla	WSP (former J & W)
Electrical installations	KM elteknik AB, White arkitekter AB
Ventilation towers	Tengboms Arkitekter AB
Construction management contracts	
The tunnels plus the Sickla area	Hifab-Tyréns HB, Bergab, Ansvarsbesiktning
The intersections at the Årsta field	SCC projektledning
The intersections at Nynäsvägen and Johanneshov	Swepro (former Scandpro)
Construction contracts	See Figure 17 for geographical overview of contracts
Tunnels under Årsta	SL 01,02 NCC
Tunnels under the Hammarby heights	SL 03 Selmer (Bought by Skanska during the project)
Tunnels at Sickla	SL 04 Vägverket production
Working tunnels	SL 08 PEAB, SL 09 YIT (former ABB contracting)
Concrete tunnels at the Årsta field (cut and cover)	SL 10 Skanska
Concrete tunnels at Huddinge intersection (cut and cover)	SL 11 Selmer (Bought by Skanska during the project)
Huddingevägen at the Årsta field	SL 21 Vägverket production
The intersection at Åbyvägen	SL 20 Vägverket production
The intersection at Johanneshov	SL 22 AFS/Frijo
The intersection at Nynäsvägen	SL 23 Skanska
Bridges, the lock and concrete tunnels at Sickla	SL 24 Skanska
The connection to Värmdöleden	SL 25 Vägverket produktion
Installation and fixtures contracts	See Figure 17 for geographical overview of contracts
SL 31 Electrical, steering and monitoring technology, telephone and traffic equipment	Tunnelentreprenad HB
SL 32 Tunnel ventilation	Fläkt Woods (former ABB Ventilation)
SL 33 Plumbing and electricity for substations	YIT (former ABB contracting)
SL 34 Plumbing and pumping stations	Purac AB
SL 35 Ventilation towers	Martin Larsson AB, Skanska Glasbyggarna AB
SL 36 Wall elements	AB Strängbetong
SL 37 Ceiling	PEAB

Contract	Contractor
SL 38 Surfacing	Sandahls Grus & Asfalt, Cleanosol AB, ATA
SL 39 Remaining work	Frijo, Vägverket produktion
SL 40 Art works	Bohusläns stenindustri, Frijo, Viedekke, Vätö stenhuggeri, Zaar Granit.

Source: SRA (2005); VTI (2002); Engwall & Söderström (2005)

D PROJECT TIMELINE

Project timeline

Month	Year	Type of decision /event	Key Decision/Event
	1952	Alignment	The general plan of 1952 is published.
	1960	Alignment	<i>Trafikledsplan för Stockholm</i> is published.
	1971	Associated development	The Essinge link, constituting the south western section of the ring road is completed.
	1980s	Alignment/ environmental effects/ financing/ associated development	A number of investigations regarding traffic in the metropolitan area of Stockholm are carried out on state, regional and local levels. The completion of the ring road is a recurring theme in many of the published reports.
	1985	Associated development	The Eastern link consortium is formed.
December	1989	Alignment/ environmental effects	The idea of constructing the Southern link as a tunnel is introduced.
April	1990	Political negotiations	Bengt Dennis is appointed as negotiator by the state to ensure that political action is taken.
June	1990	Alignment/financing	The first proposal from the Dennis group is presented
August	1990	Political negotiations	Negotiations commence.
	1990	Associated development	The area which later became Hammarby Sjöstad is classified as a regeneration area.
January	1991	Alignment//financing/ associated development	The first Dennis agreement is signed by the Social democrats, the Liberals and the Conservatives.
September	1991	Elections	The general elections are won by a coalition of conservative and liberal parties.
April	1992	Project alignment/ appraisal, technical specifications/ environmental impact etc.	<i>Utredningsplan för Södra Länken</i> , a preliminary plan for the Southern Link is presented by Stockholmsleder AB (SLAB) and the City of Stockholm (CoS).
September	1992	Political decision	The second Dennis agreement is signed.
September	1992	Financial crisis	In order to stop speculation against the Swedish currency the Swedish Central Bank increases the interest rate from 20% to 500%. In October the rate is back to 11.5%.
	1992	Environmental assessment	The Government demands an ex-post investigation of the environmental effects of the Dennis agreement.
	1992	Opposition	The NGO <i>Ur tid är leden</i> is formed as a reaction to the ring road plans.
March	1993	Project implementation	Projecting for the Southern Link commences.
March	1993	Project implementation	SLAB is transferred to the Swedish Road Administration's regional division of Stockholm.

Month	Year	Type of decision /event	Key Decision/Event
May	1993	Environmental assessment	The County Administrative Board publishes <i>Dennis och miljön</i> , the first EIA of the Dennis agreement.
Autumn	1993	Opposition	The critique against the Dennis agreement intensifies. In November a demonstration gathering more than 3000 people is held.
Autumn	1993	Environmental assessment	A new EIA of the Dennis agreement is undertaken. The report is stopped and destroyed when almost finished.
January	1994	Financing	The Government presents proposition 1993/94: 86 <i>Finansiering av vissa väginvesteringar i Stockholms län</i> .
May	1994	Environmental assessment	<i>Dennisöverenskommelsens effekter. Miljö</i> , the final EIA of the agreement is published.
May	1994	Appraisal	The first CBA of the Dennis agreement is published. Inregia (1994)
May	1994	Environmental assessment/ Project appraisal	A scientific hearing about the Dennis agreement is held on the initiative of the Government.
September	1994	Elections	The general elections result in a shift of power in favour of the Social democrats, the Left party and the Environmental party. An agreement is struck not to commence work on the Eastern and Western Link projects during the mandate.
Autumn-spring	1994-1995	Opposition	Increasing worries about the financial viability of the Dennis agreement.
December	1994	Planning approval	The CoS approves three plans for the main tunnels of the Southern Link.
Spring	1996	Political negotiations	The coalition in power in the City of Stockholm argues over the delimitation of the Southern Link project.
June	1995	Project stop	The lack of approved plans for road toll systems leads the Government to stop the payments, leading to a halt of all projecting and construction activities.
Summer – autumn	1995	Environmental assessment	The extended environmental investigation of the Dennis agreement is carried out.
May	1996	Project start	The freezing of Government grants introduced in June 1995 is revoked.
	1996	Project appraisal	Inregia (1996) presents a CBA of the Southern Link indicating a cost–benefit ratio of -0.9
August	1996	Associated development	The application for the 2004 Olympic Games is handed in to the IOC.
September	1996	Financing	The Government proposes additional financing for the Southern Link for the section east of the Sickla Canal.
November	1996	Implementation	Tender invitations for some contracts of the

Month	Year	Type of decision /event	Key Decision/Event
			Southern Link (SL 08, 09 & 10) are sent out by the Swedish Road Administration.
Summer – autumn	1996	Associated development	The Government and the County Administrative Board approve the plans for the construction of the Northern Link. The plans are appealed against and the errand is transferred to the Supreme Administrative Court for a final verdict.
January	1997	Associated development	The Swedish Supreme Administrative Court declares the plans for the Northern Link to be in violation of the existing legal framework for environmental issues.
February	1997	Financing	The Dennis agreement is abolished.
Spring	1997	Implementation	The project implementation organisation within the SRA is reconstructed. All personnel previously concerned with different road projects are transferred to different sub-projects of the Southern Link.
April	1997	Implementation	Winners of the Southern Link contracts SL 08 and SL 09 (working tunnels) are announced.
September	1997	Associated development	The IOC decides that Athens will host the 2004 Olympics.
September	1997	Implementation	The winner of Southern Link contract SL10 (concrete tunnels at the Årsta field) is announced.
October	1997	Financing	Negotiations between the Government, the County Council and the City of Stockholm commences regarding financing of the remaining projects of the abolished Dennis agreement.
November	1997	Implementation	Preparatory construction work for the Southern Link commences on working tunnels, strengthening of bedrock etc.
December	1997	financing	The Government, the County Council and the City of Stockholm agree on a new financial solution for the Southern Link.
January	1998	Implementation	Work commences on blasting the main tunnels.
May	1998	Financing	The parliament approves the Government's proposition for financing.
August	1998	Project appraisal	CBA of the Southern Link published by Transek indicating a cost-benefit ratio of -0.4.
	2001	Implementation	The tunnels are completed. Work on installations commences.
November	2002	Other	The SRA is sued by one of the contractors due to different opinions on contractual obligations.
October	2004	Implementation	The Southern Link opens for traffic.

Key timeline issues

One key timeline issue is the long history of the project: improved east-west axis road transport capacity in the Stockholm region has been discussed since the 1950s. The idea of a ring road around the inner city has thus been a key element asserting great influence on city- and traffic planning for decades. The almost 14 years from the first formal decision to build the project (the signing of the Dennis agreement in 1991) to the inauguration of the Southern Link in 2004 point to the controversial nature of the project and the volatile political and economic context within which the project developed. The political power configurations changed rather drastically several times during sensitive phases of the project initiation phase, which implies an uncertain political context for the project. Some of the most important events for the implementation of the Southern Link have also been closely connected to external events, above all the Northern Link planning approval process and the abandonment of the Dennis agreement.

To a perhaps somewhat lesser extent the economic recession and decisions regarding application for the 2004 Olympics and the regeneration plans for Hammarby Sjöstad were also important contextual elements in the critical project initiation phase. In this respect it is interesting to notice that the Government came up with a financing proposal for a contested section of the Southern Link in September 1996, only shortly after the City of Stockholm handed in their application to the IOC. The pending IOC application may also have contributed to the continuing political resolve to find a solution to the financing of the Southern Link after the collapse of the Dennis agreement.

The great influence of external factors is reflected in events related to financing. Here it is interesting to notice that the question of financing was not formally settled until after the project had started. The events during autumn 1996 seem to be of great importance from this perspective. After the Government proposed additional financing for the section east of the Sickla Canal in September 1996 the SRA commenced the tendering process by sending tender invitations for some of the contracts in November. The tendering process for the Southern Link was thus already initiated when the Northern Link project was stopped and the Dennis agreement subsequently abandoned in early 1997. During spring and summer 1997 the tendering process for the Southern Link continued despite the project lacking a politically approved financing model. Several contracts for the Southern Link were thus already closed and construction was well underway before the agreement between the Government, the County Council and the City of Stockholm was finally formally approved by the Parliament in May 1998.

Another key timeline issue is that the project specific appraisal procedures (the CBAs and the EIA) to a large extent took place after the decision to build the project. The project being one of the elements of the Dennis agreement is one major reason for this. The architects behind this agreement argued that there was no need for project specific appraisals since the effects of the agreement must be viewed on an aggregate level. However, due to strong resistance against the Dennis agreement some of the individual projects, such as the Southern Link, were eventually assessed.

E PROJECT FUNDING/FINANCING

Introduction

At the time when the Dennis agreement was signed and the Southern Link was politically approved the stepping stone of the funding agreement was a road toll system on the proposed ring road. This idea, which eventually became one of the main focal points of criticisms against the Dennis agreement, was finally dropped when the agreement gradually collapsed in autumn/winter 1996–1997. A new agreement for financing of the remaining projects of the Dennis agreement was reached between the Government and the City of Stockholm in late 1997. The agreement was then approved by the parliament in May 1998.

Background to funding/financing

When the Dennis agreement was abandoned the funding of the Southern Link project was in a state of limbo. Negotiations between the Government, the County Council and the City of Stockholm soon commenced in order to find a solution regarding how to finance the Southern Link and other remaining projects. In December 1997 the Government, the County Council and the City of Stockholm signed an agreement regarding the financing of the Southern Link. Once again the agreement concerned a number of projects in the Stockholm region, this time the key projects in the deal were the Southern Link, the Årsta bridge (a new double track railway bridge) and the upgrading from two to four tracks of a section south of the bridge. The Government wanted the City of Stockholm and the County Council to co-finance the projects, but a major problem for this was the legal framework for county councils governing where and on what grounds they are allowed to make investments. The key question was whether or not the Southern Link could be considered as a project of regional importance, since this was a prerequisite for allowing financing from the County Council. If the County Council agreed to co-finance the Southern Link on grounds not totally in line with the legal framework there was an imminent risk of an appeal process against the agreement. So instead the solution was to let the state finance a larger share of the Southern Link (87.5% instead of 75% as originally proposed) in return for the County Council agreeing to finance the Årsta bridge and the upgrading of the connecting rail tracks.

Source: Swedish Government (1998); interview C3

The financing arrangement for the Southern Link was thus: the state agreed to invest SEK 5.68bn excluding costs for land acquisitions, and the City of Stockholm agreed to invest SEK 827m (1997 prices). It was also agreed that in the event of cost overruns the state would pay 75% and the city of Stockholm 25%. The cost of land acquisitions was estimated to be SEK 972m, but it was not specified who should pay for this. The proposal further suggested that roughly SEK 825m were to be allocated to the project by re-distributing some of the funds allocated to the SRA in the current state budget. The financial obligation of the state was then estimated to amount to around SEK 5bn which should be acquired by borrowing money on the 'free market'. Further the agreement stated that the operation of the finished project should be paid for by the state by an annual grant of SEK 15m until the loans for the project are repaid.

Source: Swedish Government (1998)

In accordance with the Dennis agreement the loans were initially made through Stockholmsleder AB (SLAB), a subsidiary company of the SRA established in 1991 and originally intended to administer all aspects of the road projects included in the agreement. A conflict between SLAB and the SRA's regional division of Stockholm eventually led to a transfer of staff and responsibilities to the former organisation. The responsibility for lending

money did however remain within SLAB. When the Dennis agreement was abolished in February 1997 it meant that the rationale for lending money through SLAB was nullified and eventually this led to SLAB being merged into Väginvest AB, a state owned project financing company administered by the Ministry of Enterprise, Energy and Communications and consolidated through the budget of the SRA.

Source: Glemdal (2008)

The SRA started repaying the loans when the Southern Link opened in 2004. In 2008 and 2009 the annual cost for mortgage and interest amounted to SEK 340m and SEK 347m. The annual sums are established assuming an average interest rate of 4.5% and the loans are expected to be repaid by the year 2025. The money is taken from the funds allocated to the SRA through the state budget. The City of Stockholm used money obtained from selling assets for financing their share of the project. More specifically this meant using money obtained from selling the municipal energy company Stockholm Energi.

Source: SRA (2008); e-mail correspondence with the Audit Office of the City of Stockholm

It is interesting to notice that the City of Stockholm ended up paying roughly SEK 500m more than stated in the agreement of 1998 (Swedish government 1998). We have not been able to find out exactly why this is the case, only that the City of Stockholm paid SEK 1.3bn instead of SEK 827m as stated in the agreement. (SRA 2005). According to one of the key actors in the project implementation organisation (interview C2) the additional costs for the City of Stockholm were due to “additional orders” not included in the original project plans. We have however not been able to find out exactly what is meant by this.

Revenue

Not applicable.

Funding costs

The SRA started repaying the loans when the Southern Link opened in 2004. In 2008 and 2009 the annual cost for mortgage and interest amounted to SEK 340m and SEK 347m. The annual sums are established assuming an average interest rate of 4.5% and the loans are expected to be repaid by the year 2025.

Source: SRA (2008)

Overview of key stages in funding approach

The key stages of funding of the project were:

- The signing of the second Dennis agreement in September 1992: The agreement established that the Southern Link and the other road projects of the agreement should be financed by road tolls on the envisioned ring road. This eventually enabled Stockholmsleder AB (SLAB), a subsidiary of the SRA, to start lending money for the road projects through the National Debt Office.
- In September 1996 the Government proposed additional financing for the section of the Southern Link east of the Sickla Canal, previously a section of the now postponed Eastern Link project.

- The abolishment of the Dennis agreement in February 1997 meant that the funds allocated to the Northern Link project were transferred to the Southern Link. It also meant that the Southern Link project no longer had a clear financing model.
- In December 1997 a new agreement for the financing of the Southern Link was struck between the Government, the County Council and the City of Stockholm.

Month	Year	Event
September	1992	The signing of the second Dennis agreement.
September	1996	Additional funding for the section of the Southern Link east of the Sickla Canal is proposed by the government.
February	1997	The Dennis agreement is abolished.
December	1997	A new financial deal for the Southern link is struck between the Government, the City of Stockholm and the County Council

Traffic forecasts and financing/funding response

A forecast from 1992 estimates the traffic volumes in the year 2000 (at that time it was expected that the Link would open for traffic in 1998) to 55,000–65,000 vehicles per day (AADT). (SLAB & Cos 1992)

The CBA performed by Transek (1998) estimates the traffic volume in 2005 to be between 70,000 and 90,000 vehicles per day (AADT). Jonsson (2005)

Trucks: An assumption of trucks constituting around 10% of the total number of vehicles seems to have been used in the forecasts. Jonsson (2005)

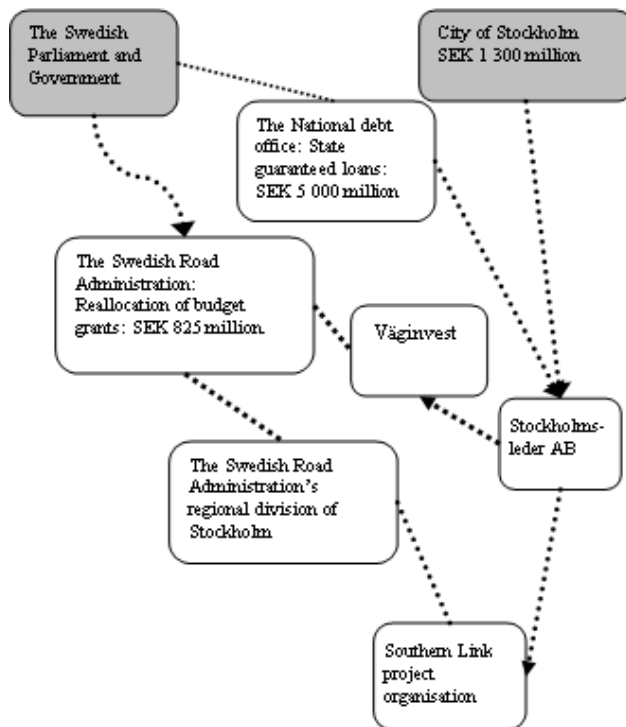
Coaches: Information not available

Rail Freight: Not applicable

Other: Not applicable

Funding sources

Figure 22: Schematic overview of funding sources.



(Source: authors)

Commentary on financing/funding

A key issue regarding financing/funding of the Southern Link project is the great difference between the original proposal for financing through road tolls on the envisioned ring road as proposed in the Dennis agreement, and the loan based model later agreed on. There is clearly a fundamental difference between the two approaches and the consequences of the shift in approach are worth pondering. The annual costs for mortgages and interest for the loans amount to almost SEK 1m per day and the annual burden of the state budget grants to the SRA is quite significant (see 'Background to funding/financing' section).

F OPERATIONS

Traffic volume

Reported traffic volume

	Year 1 (Nov 2004, AADT) (Jonsson 2005)	Year 2 (2005, AADT) (SRA 2006)	Year 4 (Oct 2007, AADT) CoS (2008)
Trucks (assumed to constitute 10% of total number of vehicles).	7,500	8,500	10,300
Cars	67,500	77,500	92,700
Coaches	Not available	...	
Rail Freight	Not applicable	...	
Other	Not applicable	...	

Traffic predictions by mode

A forecast from 1992 estimates the traffic volumes in the year 2000 (at that time it was expected that the Link would open for traffic in 1998) to 55,000–65,000 vehicles per day (AADT).

Source: SLAB & Cos (1992)

The CBA performed by Transek (1998) estimates the traffic volume in 2005 at between 70,000 and 90,000 vehicles per day (AADT). Jonsson (2005)

Trucks: An assumption of trucks constituting around 10% of the total number of vehicles seems to have been used in the forecasts. Jonsson (2005)

Coaches: Information not available

Rail Freight: Not applicable

Other: Not applicable

How traffic forecasts were formulated

In SLAB & CoS (1992) it is stated that the majority of traffic in the Southern Link in the year 2000 (then expected to be a couple of years after completion) will amount to 55,000–65,000 vehicles per day. It is established that the majority of traffic will consist of traffic transferred from the road surface network. The generation of new traffic in the short run is expected to be very minor.

In the CBAs carried out by Inregia (1996) and Transek (1998) the local and regional effects of the Link are treated in more detail. According to Jansson (2000) the main result from these analyses is that a minor decrease of traffic volumes in the inner city (from -0.25% to -2.22%) can be expected while regionally the volumes will increase rather drastically (+20% to +60%). The main effect of the Southern Link is thus expected to be time savings brought about by a quicker, but longer route.

In SRA (2003a) it is stated that when the Southern Link is opened for traffic in 2004 some 60,000 vehicles per day will travel through the tunnels. Apart from the traffic through the tunnels a central aspect of the traffic forecasts (e.g in CoS & SLAB 1992 and SRA 2003a) has been the effects on the existing surface road network, i.e. traffic on Huddingevägen, Hammarby fabriksväg, Nynäsvägen, Årstälänken and Värmdöleden. Some of the roads mentioned above were estimated to have drastically reduced traffic volumes once the Southern Link opened for traffic.

An important argument for the transferring of traffic underground is the improved local environmental situation and the increasing traffic safety this will imply. Transferring traffic underground is argued as having benign effects by increasing traffic safety for pedestrians and cyclists using the surface road network. It also implies increasing safety for motorists since the tunnels are designed for one-way traffic in parallel tubes. (SRA 2003a). The local environmental benefits include decreasing noise and emissions.

G BIBLIOGRAPHY

- Ahlstrand, I. (1998) The rise and fall of the heroic transport plan for Stockholm, in *Transport policy*, nr 5, 1998, pp. 205 – 211.
- Banverket et al. (1994) *Dennisöverenskommelsens effekter. Miljö.*
- Bylund, J. (2006) *Planning, projects, practice: A human geography of the Stockholm local investment programme in Hammarby Sjöstad.*
- CoS (1960) City of Stockholm, *Trafikledsplan för Stockholm : framlagd av generalplaneberedningen den 20 februari 1960.*
- CoS (1990) City of Stockholm, *Trafikplan 90, förslag*
- CoS (2007) City of Stockholm, *Hammarby Sjöstad 2007*
- CoS (2008) City of Stockholm, *Analys av flöden och framkomlighet i Stockholmstrafiken, utveckling och nuläge oktober 2008.*
- CoS (2009a) City of Stockholm, *Stora utvecklingsprojekt*, available at: <http://www.stockholm.se/TrafikStadsplanering/Stadsutvecklingsprojekt/>, accessed 091120
- CoS (2009b) City of Stockholm, *Översiktsplan för Stockholm: utställningsförslag maj 2009.*
- DN (1996) Dagens Nyheter 1996-09-22, *Mer pengar till Södra länken.*
- DN(2002) Dagens Nyheter 2002-09-13, *94 dagar som skakade Sverige.*
- Engwall, M. & Söderström, J.(2005) *Innovationsprojektet Södra Länken, utmaningar och kritiska framgångsfaktorer.*
- Falkemark, G.(1999) *Politik, lobbyism och manipulation. Svensk trafikpolitik i verkligheten.*
- Glemdal M.(2008) *Gubben på kullen: Om den smärtsamma skillnaden mellan politiska intentioner och praktiska resultat.*
- Jansson, K (1994) *Dennispaketet – är det lönsamt?*
- Jansson, J O (2000) *Granskning av de samhällsekonomiska kalkylerna för Södra Länken presenterade i Inregia (1996) och Transek (1998), Riksdagens Revisorer, Rapport 2000/01: 5, bilaga 4*
- Jansson, J O (2001) *Bortom Dennispaketet.*
- Jonsson, D (2005) *Indirekt energi för svenska väg- och järnvägstransporter – Ett nationellt perspektiv samt fallstudier av Bottniabanan och Södra Länken.*
- Inregia, Transek & Temaplan (1994) *Dennisöverenskommelsens effekter – Samhällsnytta.*
- Inregia (1996) *Objeksanalys för Södra Länken, uppdrag av finanskontoret, Stockholms stad.*
- Isaksson, K. (2001) *Framtidens trafiksystem? Maktutövningen i konflikten om rummet och miljön i Dennispaketets vägfrågor.*
- Malmsten (1993) *Dennisöverenskommelsen, förhandlingen, processen, aktörerna, innehållet.*
- Malmsten, B & Persson, M (2001) *Dennispaketet – låsningar och lösningar, regionplane- och trafikkontoret*
- Miljövårdsberedningen (1994) *Medling om Dennispaketet, miljövårdsberedningens rapport 1994: 5.*
- National Rail Administration et al (1996) *Kontrollstation 96, Dennisöverenskommelsen*
- Sickla Sluss (2009) Information available at Föreningen Sicklaslussen homepage, *röster i media med anledning av Dennispaketet, Södra Länken och Sickla Sluss.* Available at: <http://www.sicklasluss.se/Artiklar/Artiklar.htm> accessed 091221
- SLAB & CoS (1992) Stockholmssleder AB & the City of Stockholm, *Utredningsplan för Södra Länken, utgåva 4.*
- SRA (2003a) Swedish Road Administration, Vägverket, *Södra länken en ny trafikled i Stockholm.*
- SRA (2003b) Swedish Road Administration, Vägverket, *The Southern Link, a new traffic route in Stockholm.*
- SRA (2005) Swedish Road Administration, Vägverket, *Södra Länken, Sveriges största vägtunnelprojekt.*
- SRA (2006) Swedish Road Administration, Vägverket, *Operations and Maintenance of Södra Länken.*

SRA (2008) Swedish Road Administration, Vägverket, *budgetunderlag 2009 – 2011*.

ST (1996) Stockholmstidningen 1996-08-02, (Editorial), *En länk eller led?*

Stockholm Chamber of Commerce (1989) *Stockholm mot 2000-talet: näringslivet om Stockholms läns framtid*.

SvD (1996) Svenska Dagbladet 1996-06-23, *Södra Länken splittrar Dennislägret*.

Swedish Government (1989a) Statens Offentliga Utredningar, *SOU 1989:15 Storstadstrafik 2: bakgrundsmaterial : sammanställning*

Swedish Government (1989b) Statens Offentliga Utredningar *SOU 1989: 43 Storstadstrafik 3: bilavgifter: betänkande*

Swedish Government (1989c) Statens Offentliga Utredningar *SOU 1989: 79 Storstadstrafik 4: Ytterligare bakgrundsmaterial: sammanställning*

Swedish Government (1989d) Statens Offentliga Utredningar *SOU 1989: 16 Storstadstrafik 5: Ett samlat underlag, slutbetänkande*

Swedish Government (1994) *Proposition 1993/94: 86 Finansiering av vissa väginvesteringar i Stockholms län m.m.*

Swedish Government (1995)) *Proposition 1994/95: 100 Förslag till statsbudget för budgetåret 1995/96, bilaga 7.*

Swedish Government (1996) *Proposition 1996/97:1D14 Förslag till statsbudget för budgetåret 1997,m.m*

Swedish Government (1998) *Proposition 1997/98: 123 Finansiering av vissa trafikanläggningar i Stockholms län m.m.*

Tonell, L. (2000) Byggen för kommunikation, in *Arkitektur, no. 2, 2000*.

Traffic Board of the County Council (1987) *Effekter av kringfartsleder*.

Transek (1998) *Södra Länken - Samhällsekonomisk analys*, uppdrag av Vägverket Region Stockholm

VTI (2002) Väg och transportforskningsinstitutet, *Upphandling av komplexa projekt – En förstudie av Södra Länken. VTI notat 55-2002*.

Interviews

Interview C1, 091110 Head of regional division of a major construction company

Interview C2, 090529 Representative of the project implementation organisation

Interview C3, 090907 Municipal commissioner, the City of Stockholm

Interview C6, 091201 Municipal commissioner, the City of Stockholm

Interview C8 091202 Representative of the planning department, Region of Stockholm

Interview C9 091202 Municipal commissioner, Municipality of Nacka, representative of the Region of Stockholm

Interview C10, 090612 Representative of the project implementation organisation