Cooperation Makes Everyone a Winner
- Closer Cooperation between Employer and Contractor in Norra Länken Tunnels

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1. Background.

Stockholm, the capital of Sweden, is growing. The number of inhabitants is now more than two million. In the growing city there is a demand for both better public transport and new motorways. A ring road around central Stockholm was planned in the sixties. The first underground motorway link of this ring road, the southern link, was constructed between 1997 and 2004. At the moment the northern link (Norra Länken) is under construction.

The Norra Länken of Stockholm is one of the largest road tunnel projects in Sweden. There will be a total of 11 km of tunnel, of which 9 km are rock tunnels and 2 km concrete tunnels. The total budget is 1.1 billion EUR at 2007 price levels. In all there are about forty contracts for the construction works. The construction started in 2006 and the project will be opened to traffic in 2015. Ten civil works contracts, having contract values of about 50-120 million EUR, are in progress and are referred to in this paper. The rock tunnels are procured as execution contracts and the concrete/cut and cover tunnels are procured as design and construct contracts.
The experience in Sweden during the last ten years is that many civil works contracts have ended in disputes. Also, the contractors have lost money. There is an understanding between the parties that change and renewal in the civil engineering industry is both necessary and possible. The fundamental objective is to guarantee the employer more construction for their money and the contractor a stable and sustainable level of profitability.

2. Components to reach efficiency in the agreement between contractor and employer.

The employer has the following tools to ensure a good conclusion to a project:
- Mode of procurement. A tool to create competition in the tender process.
- Mode of contract. A tool to establish a balance in liability between the employer and the contractor.
- Mode of payment. A tool for an effective incentive.

However, our experience in Sweden shows that these tools are not enough to avoid conflicts during execution of the contract and to create a climate of cooperation beneficial for both parties. Our way to handle this in the Norra Länken project is to implement a fourth tool:
- A tool for efficient cooperation.

The motto for this cooperation is: "We are all (the employer and the contractor) in the same boat. If the boat leaks we both get our feet wet."

Figure 3. The ten main civil works contracts.

Figure 4. The variation during time of the contingency reserve for the Southern link project.

Figure 5. Components to reach efficiency.
3. The model.

Our way to handle this in the Norra Länken project is to, when the contract document is signed; arrange a
initial meeting to develop a close cooperation between the parties.  
An invitation to this cooperation is already written in the inquiry for tenders. 
The intention of the initial meeting is not to change the contract documents, but to find common ways of
how the contract shall be executed.

Participators in the initial meeting are the project teams of the employer and the contractor and if
applicable, the designer. 
The goals for the meeting are:
- Establishing common objectives/targets
- Establishing an organization form
- Knowing each other and understanding one another’s roles
- Working on building relationships
- Working on transparency in the project
- Establishing conflict solution methods
- Establishing transparent risk management

An agreement is signed by the participants. This is not a contractual document but a moral agreement; a
partnering declaration.

The initial meeting should be led by an independent moderator. 
During this first stage of cooperation action plans, to attain the objectives set up at the meeting, should be
established.

The action plan and the “temperature” of the cooperation shall be monitored over the course of the
project. Twice a year monitoring meetings shall be held. Also between the meetings the project managers
from the employer and the contractor shall handle issues of cooperation in the daily work.

![Figure 6. Partnering declaration.](image1)

![Figure 7. Cooperation.](image2)

To illustrate how cooperation can be implemented the following example of a cooperation document from a rock tunneling contract based on bill of quantities is discussed. In practice a number of goals are set up. Each goal has an action plan, and a staff member either from the contractor and/or the employer is responsible for implementation of the action plan. The result is monitored and graded throughout the project. If the grade unsatisfactory then the action plan must continue to be followed-up.

The goals have been subdivided into nine areas. These nine areas are discussed briefly in the following sections with some selected examples of action plans.

4.1 Environmental goals

The environmental goals include interactions with environmental authorities, owners of adjacent facilities and private individuals. Fulfilling the environmental regulations is essential for continuation of the project. Several specific goals have been to maintain zero complaints with respect to handling of chemicals, compliance with noise and vibration limits, and zero recurring grievances from third parties which could lead to negative public relations and media attention.

Action plans that must be carried out by a specific staff member have included submission of reports to local environmental authorities, coordination of blasting times with working schedules of neighboring businesses, and continuous information being provided to affected individuals. Information to private individuals has included measures such as text-messages being sent just prior to blasting, and offers for alternative short-term housing in the event that the construction works are too disruptive.

An example of the cooperation document for these environmental goals is shown in Table 1.

<table>
<thead>
<tr>
<th>Nr</th>
<th>Environmental goal</th>
<th>Action plan</th>
<th>Individual responsible for action</th>
<th>Grade from meeting nr</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1</td>
<td>Zero recurring grievances from ‘third parties’</td>
<td>Take actions and provide feedback, including text-messages to neighbors and offers of alternative housing</td>
<td>one from Contactor, one from Employer</td>
<td>3 3 4</td>
</tr>
<tr>
<td>6.2</td>
<td>Zero complaints/deficiencies from the environmental inspections with respect to handling of chemicals</td>
<td>Prepare statement of working methods, ensure that they are followed.</td>
<td>one from Contactor, one from Employer</td>
<td>3 4 4</td>
</tr>
<tr>
<td>6.3</td>
<td>Comply with blasting times.</td>
<td>Coordination with owners of adjacent underground facilities.</td>
<td>one from Contactor, one from Employer</td>
<td>4 4 4</td>
</tr>
<tr>
<td>6.4</td>
<td>Zero exceedance of vibration limits</td>
<td>Provide feedback from site personnel to the designer.</td>
<td>one from Contactor, one from Employer</td>
<td>3 3 3</td>
</tr>
</tbody>
</table>

Table 1: Example of a cooperation document for environmental goals
4.2 Functional goals

The functional goals are aimed at achieving the functional requirements of the tunnel construction. These goals include seepage criteria, confirmation of the final section geometry, and stability of the tunnel both in the temporary phase and in the permanent conditions.

Action plans to achieve these goals have included installation of measurement weirs, continuous laser scanning, and continuously updated programs for geologic mapping. It is also essential that information from on-site observations is provided to the designer as feedback.

4.3 Quality goals

The quality goals are intended to provide planning for the final as-built documentation and final inspections. The goals are to continuously update the as-built documents and to have zero non-compliances. Specific action plans have included early identification of the required content and structure of the final documentation, and preliminary inspections are carried out in a timely manner and to an appropriate level of detail. The inspection plan is followed by continuously taking corrective measures to avoid that there are non-compliances at the final inspection.

4.4 Time goals

The time goals have included maintaining contractual construction time, compliance with production schedules and minimization of downtime. Action plans have included confirming that there is a production schedule and that it is followed tracked and complied with, analyzing scheduling discrepancies in dialogues between the employer and contractor. In addition it is important that the project geologist is available at all times.

4.5 Collaboration goals

The collaboration goals are intended to resolve issues quickly and to ensure that the issues are not revisited again. Disputes shall be addressed by those parties most directly affected. Bringing disputes to executive levels and/or to arbitrators should be avoided whenever possible. This can be achieved through open dialogue prior to formal written notification. These dialogues facilitate an early agreement when a change notice or change order arises.

4.6 Safety goals

The safety goals are to have zero serious injuries or deaths. In addition there is a quantifiable goal of less than 15 injuries per one million working hours. The action plans include monitoring and follow up of accidents and near-misses. Furthermore the contractor holds weekly meetings specifically focused on safety issues. Finally official safety inspections are conducted on a regular basis.

4.7 Economic goals

The economic goals are geared towards encouraging a creative atmosphere in which staff members can find new ideas and suggestions than can lead to cost savings. Furthermore there is a goal that sharing of the cost savings be determined based on which party had come up with the idea, and not strictly according to the contact. In order to achieve this goal recognition and reward are given for good ideas, and there is a standing agenda item at project meetings so that participants are encouraged to bring up new cost saving ideas. When a new suggestion is raised the employer forms a working group from his organization together with the contractor and designers to review these suggestions. In order to review suggestion in consistent manner a decision tree for the review process is implemented.
4.8 ‘Feel good’ goals

The ‘feel good’ goals encourage a positive attitude at the work place through joint social activities with staff members of the employer and contractor several times each year. A questionnaire is completed each year by all staff members in order to gain feedback on the workplace atmosphere and to receive new ideas as to how the atmosphere can be improved.

4.9 Communication goals

The primary goal of internal communication is that all staff members should be informed of overall project goals as well as the project’s ‘guidelines’ as to how these goals will be achieved. Progress reports are distributed to all staff members to encourage their sense of active participation with the project. In addition there are goals for external communications that focus on public relations. When questions or suggestions are received from the public they should be dealt with within 24 hours.

5. Results

So far this model of close cooperation has been implemented in all ten major civil works contracts in Norra Länken. Our experience so far includes:
- Few conflicts and no legal proceedings.
- Keeping the budget and time schedule.
- An efficient risk management.
- Job satisfaction.” A project with a good reputation to be proud of”

This climate of cooperation also creates a good environment for implementing improvements and finding better technical solutions.
In addition it is possible to discuss the sharing of cost savings between parties. If economic incentives can be created within the contract framework, the cooperation becomes even more interesting for all parties.

Here are some examples of cost savings in Norra Länken:
- Use of secant pile walls as a part of the permanent structure. In cooperation with the contractor, a design complying with Swedish conditions was found.
- Solutions for surface water and inlets. A new design, a product of technical cooperation, replaces three inlets with one.
- Change in fan length for rock grouting. Increased length from 22 to 25 meters improved the production efficiency.
- Cut and cover pipes instead of proposed jacked pipes. Temporary land use was negotiated by the employer.
- Smarter solutions for existing traffic during construction phase. Proposals by the contractor were accepted by land owners with help from the employer.

According to our experience a cost saving of about 2% could be achieved through better solutions. The major cost savings however is in avoidance of conflicts and maintenance of budget and time schedule.

The model for close cooperation was recommended by FIA-Förnyelse i anläggningsbranschen [1] (Renewal in the Civil Engineering Industry) in 2006. The motivation to adapt to new ways to work within the framework of a contract is generally high among contractors and their employers in Sweden. Most of the people involved in the Norra Länken project are also positive to this approach, especially the young members of the project. People enjoy being part of a successful project.

6. References