The role of communication and dissemination during the transition from geotechnical design to construction

Einar Helgason
Veidekke Entreprenør AS, Norway, einar.helgason@veidekke.no

Grete Tvedt
Norwegian Public Roads Administration, Norway, grete.tvedt@vegvesen.no

ABSTRACT
This paper investigates the communication flow between geotechnical design engineers and construction workers. A qualitative interview study was carried out in 2014. The aim of the study was to identify salient features of communication and dissemination of information among participants in construction projects, with a particular focus on ground works.
Dissemination of both general and specific information concerning the execution of special foundation work is an essential factor in successful implementation of construction projects. A problem within the industry is that detailed information is not always communicated from the consulting engineers via the construction client's resident engineers to the construction site. The same applies in reverse, with design engineers tending to receive inadequate feedback on the feasibility of their solutions.
The main findings from the study can be summarized as follows:
The contract between the parties must be financially viable. The success rate is highest in projects where all parties make a profit and the construction client receives an adequate return on investment. Inadequate return on investment leads to conflict, and conflict leads to inadequate return on investment. It is important to realise that the sooner you acquire an overview of risk elements and assess their costs, the greater safety is obtained in the production phase of the project.
Those who perform the job must be actively involved in the project. This applies to both the construction team, construction client team and the designing team. Dedicated project participants are willing to do that little extra. Direct communication between geotechnical design engineers, quality control engineers and the ground contractor is important. An initial meeting with all parties allows everyone to get involved in the terms of the contract, and procedures may be adjusted if necessary. The human factor plays an important role. Are we considered approachable? Do we want to work with people? Can we handle conflicts? In the answer to all of these questions, the level of trust between the parties involved plays a fundamental role.

Keywords: Communication, ground works, dissemination, risk management

1 BACKGROUND

In dense populated and urbanized areas it is vital to utilize areas for property development. As the above ground space is limited, there has been an urge to extend the structure downwards. This often results in deep supported excavation in soft clay deposits. Such excavation has a potential for causing ground settlements and related damage to neighboring buildings and structures.

Based on an initiative by the NGI (Norwegian Geotechnical Institute), the Norwegian Research Council has founded a research project BegrensSkade, i.e. "Damage Limitation". The project has broad support from the Norwegian construction industry with partners representing all major stakeholders (construction clients, contractors, subcontractors, design consultants, real estate and insurance

companies as well as research institutes and universities).
The main goal is to develop new methods for execution and improvement for the whole process, from idea to execution. The improved methods are to limit the risk of damage related to ground and foundation works in the construction industry. BegrensSkade looks at the whole chain of causes and potential remedies within designing, building and monitoring.
"Coming together is the beginning; keeping together is progress; working together is success." Henry Ford's quote summarizes the goal of this subproject within BegrensSkade. This part of BegrensSkade deals with "soft" issues, not the hard-core engineering, excavation or drilling, but the communication between the parties. What are the methods or procedures for communication in Norwegian construction projects? How do we communicate, how do we pass on information from one phase to the next? How do we learn from previous projects? What factors influence our communication pattern and methods?

2 INTERVIEW SURVEY

2.1 Background for study

A qualitative interview survey on the communication and dissemination of information among participants in construction projects was conducted in 2014. Prior to the interview survey, literature study revealed the following topics relevant to address during interviews:

- Laws and construction standards
- Form of contract
- Professional Competence
- Technical aids
- Colocation
- Common understanding of project goals
- Language and challenges with foreign-language employees
- Contract terms must be financially acceptable to all project participants
- Project participants have realistic timeframes for delivery
- Personal relationships and trust

Based on the above, the aim of the study was:

- To identify communication paths
- To identifying the dissemination of information, i.e. drawings, descriptions, 3D models mm.
- To identify the use of information systems, WEB hotels, 3D, etc.

The interview guide was structured to encourage and bring forward a mutual understanding of the problem and the interaction between the actors. The idea of developing new / improved communication and dissemination by strengthening communication in the transition stage from design to construction was a central topic. The focus has also been on communication from the contractor and back to the design engineer. Here the aim was on measures that can reduce or minimize damage risks through the development of a new or improved dialogue process. Further focus has been on trust building through balanced contracts and clarified risk management.

2.2 Execution of the survey

The interview study is based on four reference projects. These include major infrastructure and construction projects. Three of the projects are in the Oslo area, while one is in Trondheim. For each project we interviewed representatives of each party, for example the construction client's resident engineer, consulting geotechnical engineer, main contractor and subcontractor. A total of 12 interviews were conducted.
The informants covered a wide range of knowledge and experience, both high formal education and decades of industry practice. The interviews were based on an interview guide that stipulates 22 items covering general information regarding the project, communication methods and specific conditions. For the most part the informants were allowed to speak freely regarding the project and the conditions.
Minutes from each interview formed the basis for the analysis. The interviewees' responses were categorized and systematized in order to facilitate comparison. The purpose of the analysis was to discover similarities, as well as to bring forward individual comments.

The analysis was, in reality, both subjective and generalized. The analysis focused on factors related to soil conditions and foundation work, but not on the total production in the individual projects. We did not set a benchmark for success of the projects, we focused on the informants' experience of process and project.

3 COMMUNICATION

3.1 Procedures

A major focus of the interview study was to find out how communication takes place between the different participants in construction projects.
This was to see if it is possible to distinguish what makes a successful project and why some projects are not so successful.
As a basis, it is assumed that the main players in a construction project, are the construction client, often represented by the resident engineer (hired or employed by the construction client), the main consultant, sub-consultants, the main contractor and subcontractors.
Communication within the project organizations may be formal or informal. However, to fulfil legal and economic conditions, normally the contract stipulates formal requirements, especially related to modifications, amendments and other binding conditions. Regardless of the form of the contract, most common requirements include formal and clear documentation of contractual conditions.

In the perfect world (the perfect project), we assume that all participants have the information they require at the right time. We assume that communication flows freely and all parties are informed. But this is not always the case, particularly in communication downwards to the lower level of production.

3.2 Contract form

Regarding the contract form our focus has been on typical contracts. There are other contract forms and variations of contract types, but our focus has been on:

- Design-bid-build contract: Client-controlled main contractor (also called unit price contract)
- Design-build contract: Contractor-controlled turnkey
- Divided contracts controlled by a (hired) resident engineer
- Public-private partnership (PPP)

Different forms of contract leads to various communication paths between the parties.
For design-bid-build contracts the construction client is the contracting party for the consultant, while for turnkey contracts the main contractor is the contracting party for the consultant.
Figure 1 shows the principle for the communication path in design-bid-build contracts. For a design-build contract the construction client stands more on the sideline while the other players follow the scheme.

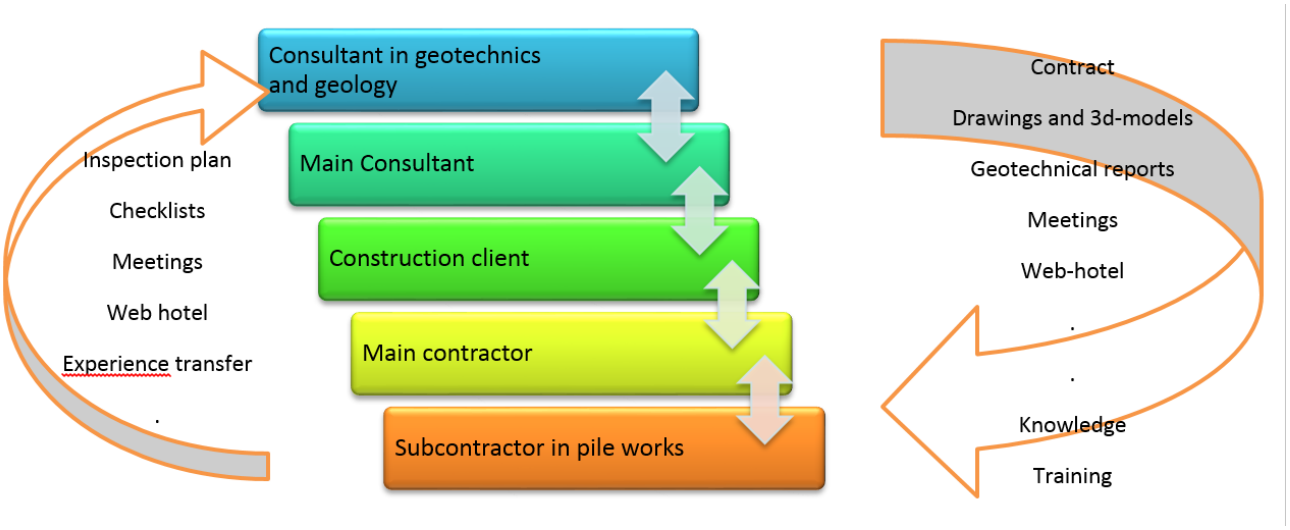

Figure 1 Communication in a design-bid-build contract

Figure 2 illustrates how the construction client transfers the responsibility for management and coordination with different contract forms, where design-build contracts gives the turnkey contractor the most responsibility, and shared construction leaves the construction client with the most responsibility. Independent contract forms will result in shared responsibility between both parties.

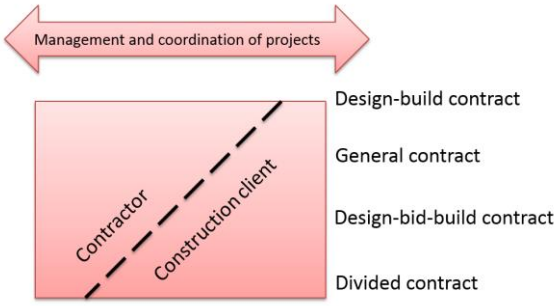

Figure 2 Division of responsibility depending on contract form

The turnkey contract has a clear advantage as there will be a short distance between contractor and consulting engineer. The short communication path will give good practical solutions adapted to the contractor's equipment. The contractor will be involved at an early stage. The drawback is that there can be a long path between the contractor and the future operating organization of maintenance. The operational needs may suffer. There is a risk for sloppy solutions that do not have sufficient quality for prolonged operation time.
In addition, the consultant is often pressed on time, and there is little time and space for innovation when the contractor's wishes are well-known solutions with a low-risk potential.
The design-bid-built contract has its greatest merit in the short distance between the construction client and the consultant, and the construction client and the operational organization. Future management of the facility will be better safeguarded. Furthermore the consultant will, in most cases, be granted sufficient time for the designing process. The downside is that the project will be divided into two phases, where the contractor comes in at a later date in the second phase. The designed solutions can suffer from low practical relevance and will not be designed to fit the contractor's work system. The contract will mainly be awarded after competition on the lowest price. This may make the contract financally unviable for the contractor. Divided contracts have the advantage of the short distance between the construction client's resident engineer and all contractors, suppliers and consultants. The construction client can thus save the contractor's profit on subcontracting. The drawback is the long way between the contractor and the future operating organization of maintenance. When the construction manager as well is recruited outside the main organization, he may not be familiar with the construction client's requirements and culture. There will also be a long way between consultant and contractor. The designed solutions may be poorly adapted to contractors' work systems, and may lead to inefficient progress.
In the interview study the plant manager expressed: "In a unit price contract you can't affect whether something can be done smarter. There is less communication with the construction client. The contractor has really no benefit from having communication with consultant, the soil strata are the construction client's responsibility". Now he is working on a turnkey project where the contractor owns the entire project and will sell the building afterwards: "Here you can customize solutions to fit the subcontractor's equipment. The subcontractor was included in the design process as well as the geotechnical engineer".
The differences between turnkey contracts, unit-price contracts and divided contracts are not that clear in terms of interaction between the geotechnical engineer and geotechnical subcontractor. How they are involved in the interaction and engage indirect dialogue with each other depends on individuals in key positions in between.
Although the contract is financially viable for the contractor, this does not necessarily apply for the subcontractor. It is well known that the subcontractor is often exposed to strong pressure with regard to prices and expected

progress during the negotiations of the contract with the main contractor. According to one informant, the kind of contract is not a determinant for how the communication or communication system works in projects.

3.3 Economic viability

One factor that has a major influence on communication is the economic viability of the contract. It is important that all parties in the project receives a gain for the job being performed. In projects with economically viable contracts, the commitment of the individual players is much higher. Viability means that the focus will be on implementation, optimization and smart solutions rather than economic aspects. In projects where all levels (consultant, main contractor and subcontractors) earn money, and the construction client gains value for the investment, the success rate is highest. Poor return on investment leads to conflicts and conflicts lead to poor return on investment, and this becomes an eternal vicious circle. The parties will focus on personal gain to reduce their loss instead of solving tasks optimally.

Lack of information or lack of understanding of the primary tasks may result in large deviations and major conflicts between the parties. Here, culture and customs play a major role. Subcontractors have often evolved a tradition for specific methods. These may conflict with what is described in tender documents, and deviation ultimately leads to conflict and economic losses. Lack of information and communication between the parties often leads to disputes. One informant from the consultants emphasizes that the contracting of subcontractors must be based on detailed tender documents, drawings and technical descriptions. Information and special restrictions must be communicated down through all levels.

3.4 Involvement in the planning process

In projects where the contractor is involved in the planning and the concept phase or has a direct influence on the engineering, the likelihood of a good execution increases, both in terms of progress and outcome.

An informant from a subcontractor states: "NN (employed by consulting engineering firm of geotechnics and resident quality control engineer) is the main man which one would go to and ask when there are things that pop up. There are issues he cannot take there and then, but then he takes the issue with his boss in the geotechnical firm. NN has tried to look at the most critical problems way before they happen. The consulting engineer has made very good drawings with a good technical specification for the planned work".

Several informants pointed out the importance of communication between the contractor and the consulting design engineer. The importance can be reflected in the fact that the engineer needs to design what the contractor is "willing to" or "able to" to construct, without compromising on quality and/or safety. The contractor’s experience is too often that the designed solutions are not adapted to the equipment or competence available. "We were involved in the process, and took part in the discussion and selection of the technical solution" says an informant from a large contractor. The main conclusion is that it is important to include the contractor in the selection of technical solutions.

In another project there was no form of direct communication between consultant and subcontractor. The representative from the subcontractor did not participate in technical meetings. An informant from the main contractor said: "The construction client decided that the subcontractor should not participate. The subcontractor participated only in some of the economy meetings, so that they would understand that the resident engineer accepted/rejected their claims. "

In that project there were some challenges with subcontractors on piles. The subcontractor did not participate in the meetings. The informant from the consultant stated that "There are both advantages and disadvantages to having the subcontractor participating in the meetings. It is ok to have the subcontractor participating in technical meetings, but in this project the subcontractor got the information they needed through the main contractor."

However, there was direct communication between the construction client and subcontractor on the construction site. An informant from the main contractor stated: "The construction client's quality control engineer was available on the construction site and chatted with the workers. He had a practical eye, understood what was important and what was not so important. "
At a construction site there was an incident with leakage through the sheet pile wall. The construction manager responded, when asked whether the subcontractor contributed to the solution: "They were not at the meetings. It is therefore difficult to say who came up with the solution. I was missing the main contractor's monitoring of the subcontractor. The subcontractor had his own management team, and the main contractor would not take responsibility for the management. The main contractor should take more responsibility for management of the subcontractors. Follow-up between the two could have been better." Later in the interview, he states: "There was a lack of communication between the main contractor and the subcontractor. The subcontractor attended some meetings, not all. The resident engineer's instructions did not always reach down to the subcontractor."
An informant from production informed us about the process by which they were involved in the preparation of solutions. They participated in meetings, where the production resources were utilized positively. The consulting geotechnical engineer could subsequently document the selected solution. The resident engineer approved the financial aspect. An informant from the construction client added that this methodology normally gave a better result with a view to progress and financial outcome.
We also observed a certain difference in how the people involved apprehended the process. For a specific incident an informant, from the ground constructor experienced that they were consulted, while the consulting engineers felt that the solution was developed by themselves. Despite the different involvement, both parties experienced the incident as both constructive and positive. The common view was that this was a good way to solve challenges.

An informant stated that there rarely was direct contact between the geotechnical designing team and the construction team for ground works. Typically, there is a man in between that conveys information in both directions. The man in the middle is normally "construction manager for civil works" or the construction client's resident engineer. Successful implementation can be highly dependent on the personality of this person and on his activity level. "Full overview and control over the site" says an active and diligent construction manager. This attitude can make the difference between success and failure.
An informant from the production side states that in addition they are often held outside the loop, for instance they are not active participants in the planning of the works. The informants are in general agreement that involvement and information flow results in a form of pride or sense of coping. This is especially true for the production people who often lack the theoretical/academic basis. Information and communication about what is to be done, why it should be done and how to do it, gives a sense of appreciation.
An informant from the subcontractors stated that they often did not have access to the total contractual documents. Communication between the main contractor and subcontractor is often in the form of drawings and accompanying Excel lists or technical descriptions. This often leads to unbalanced contracts and unresolved risk management between the parties.

3.5 Risk / risk management

Nowegian construction contracts are based on the principle that each participant basically is affected by the risk of their own work. The participant who has the ability to anticipate and prevent risks should therefore be responsible.
Contract forms will generate different risk distribution between the parties. It is valid for both increased costs (e.g. due to variation in depth to bedrock resulting in longer piles) and for delays in progress.

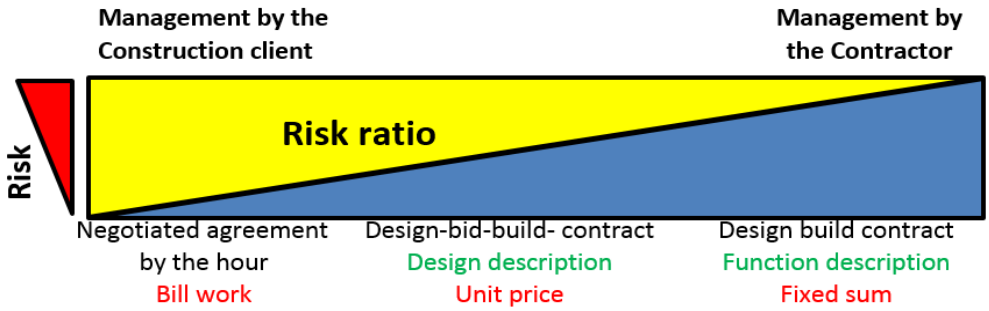

Figure 3 Risk distribution in construction projects. (Øfstedal E.,n.d)

Figure 3 shows how the allocation of risk between contractor and construction client changes with contract form. The construction client holds the largest share of risk if work is performed based on time used and hourly rates. The construction client's risk diminished gradually and is transferred to the contractor as the contract form develops to a turnkey contract. With unit-price contracts the construction client and contractor share the risk. With turnkey contracts the contractor will have the primary responsibility for risk. In a PPP contract the contractor gains even greater risk, including the responsibility for operation and financing as well.

Regardless of the contract form, the construction client will end up paying for risk. The contractor will always add risk expenses to the final bid. For a turnkey project the risk expenses will be higher.

In projects with ground works there is always a certain degree of uncertainty related to the soil conditions. Usually it is "the construction client's ground" and the construction client will be responsible for all extra costs associated with aberrant soil conditions beyond what one might expect from geotechnical or geological reports.

For a unit-price contract the construction client pays for quantity, e.g. meters of pile and is thus responsible for the depth to bedrock. Often the contractor will be responsible for the number of junctions and the cutting of the piles regardless of depth to bedrock.

Risk distribution between parties in different contract forms follows Norwegian standards. Risk displacement can occur if one contractual party includes a clause in the tender documents that distorts the allocation of risk.

In the interview study, risk and risk management was discussed repeatedly as an important factor in a successful project.

A subcontractor said about the planning of the work: "From the start, risk assessment was essential. The construction client was represented by a geotechnical engineer. The subcontractor in this project was well prepared and planned ahead before tasks were to be executed. They had listed up what could happen, and if there was anything unexpected that might emerge. Thus, they had managed to capture the problems before they emerged and developed solutions".

A construction supervisor in another project reported that the project had a risk plan with regard to what should be planned ahead. This was done on paper and showed phases and excavation plans with hand calculations. The contractor felt confident about the method, which also was reflected in the progress.

Another measure to reduce the risk of unforeseen ground conditions was suggested by a consultant: "Execute systematic ground exploration when all traffic is removed, and the area is cleared. The risk will be mitigated with better information. It is often not possible to execute ground exploration on heavily trafficked roads. "

One of the projects included in the interview study had a tender period with competitive dialogue. The dialogue was carried out by generating a risk model. After identification of the main risk elements the contractor worked out solutions and methods to minimize the risk. This process was executed individually with each contractor. When the risk profile for the project was acceptable the contractors calculated their bid individually

without knowledge of the parallel process. This was a successful solution for this particular project and other similar projects where it is difficult to estimate and manage the risk.

3.6 Personal abilities

Trust and personal relations are important cornerstones for good interaction. It takes time to build trust, but it may take less time to tear it down. Trust at the production level is strongly affected by the communication coming from the leaders. Trust at the managerial level in turn depends on confidence at the operational level. Bygg21 (www.bygg21.no) believes there is a lack of procurement expertise in the industry. Their experience is that imbalance in the contractual conditions destroys the interaction between the parties. Balanced and clear contracts create confidence. Contractors wish to compete on other factors than the price in public contracts, but they are often quite skeptical when it comes to using “the construction client’s experience with the contractor from previous projects” as an eligibility criterion. However, in the private market, the parties find each other often based on trust and prior experience. Trust that has been developed in previous project is transferred to the next. This is difficult for construction clients who are subject to public procurement regulations.

The construction client and the contractor share the risks associated with of logistics and progress. Normally the construction client is responsible for the soil conditions, and the contractor for construction. Who is responsible for the foundation engineering depends on contract terms. The sharing of risk has often led to many legal disputes. The aim must be to solve conflicts continuously during the construction period. When working on foundation projects, unforeseen incidents related to the soil conditions will occur. "No one has been there before, other than God" said a site supervisor. Conflicts related to unforeseen soil conditions, are not necessarily black or white. When the construction client and the consultants and/or the contractor normally are disputing both side have partly right and partly wrong. In such conflicts there is a risk of deadlock. To solve a deadlock the usage of a settlement board is a possibility. The settlement board helps the parties to resolve conflicts and economic issues at a new venue without interfering with the daily progress.

3.7 Construction meetings

It emerged during the interviews that construction meetings between geotechnical engineers and contractor are important to enforce a good communication. Furthermore, colocation can be important to enhance the interaction. Successful projects emphasize this as a major factor. It is important that the constructions meetings focus primarily on technique and solutions to challenges faced in the project. Economy and progress should be addressed in separate meetings to prioritize a good technical solution. Here it is also important that the right people are summoned to the meetings. The delegates must have sufficient knowledge to make quick decisions to ensure progress. If the challenge concerns issues involving the subcontractor, a representative from the subcontractor should be present. The construction client and the main contractor have important roles in summoning the right people with the right expertise to the meetings.

3.8 Professional Competence

A knowledge-driven industry creates a basis for trust and mutual respect. Sufficient expertise includes all professions and roles, leadership at all levels, multidisciplinary and comprehensive understanding and good cooperation. In addition to expertise in the technical professions, all parties must have expertise in contract law and progress planning. By creating better conditions for the approval, updating and supplementing of foreign expertise, the industry's major foreign workforce can be utilized in a positive way. It is also important to spread knowledge from the production level to the leader/consulting level, a kind of bottom-up flow of knowledge. The construction workers must also find information on how the task is performed and which restrictions apply.

Technical skills are an important element in the execution of the tasks and in the communication between the parties, "birds of a feather flock together". It can be a major challenge if the parties misunderstand each other due to differences in skills or language. It is important for smooth and seamless communication that the participant speaks the same language, both directly and indirectly. Hence, the transfer of competence and dialogue regarding the task in question is a vital factor.

"It may happen that there is much sloppy execution of geotechnical works. It is difficult to control". This can be interpreted as referring to subcontractors taking shortcuts when the main contractor lacks the expertise to reveal this.

The Norwegian model for management and collaboration characterizes the industry, where involvement and employee participation are central. This develops a sense of responsibility and initiative. Furthermore, it facilitates good utilization of skills, as well as efficient and safe production processes.

The required core competence must be supported through a good education and training system. Learning and knowledge transfer in an industry characterized by project organization can be demanding. There is a huge potential for learning and value creation based on closer cooperation between the players in the construction industry.

Geotechnical training for workers who are not trained in geotechnical engineering from University/College is only offered in a small degree. Geotechnical conferences and seminars are mostly adapted to the University / College group. This may hinder the spreading of expertise among workers in the construction industry. A lack of basic geotechnical competence will affect a worker's insight into the profession and workmanship and will in the long run affect the quality of the work. In a collaboration between the various actors in the industry, it is possible to develop courses on basic geotechnics, which are aimed toward contractors.

The drilling operators expressed in the interviews that they miss the presence of the geotechnical engineer on the construction site. They also believe that project management generally lacks understanding of basic soil mechanics.

In addition, they believe that geotechnical engineers have little practical understanding of the work performed on the site. As a solution, they propose a mandatory practice year as a part of the education program. Senior geotechnical consultants express that the younger engineers should spend more time out on site.

Other measures to spread expertise and disseminate lessons learned can be courses or meetings covering geotechnical issues intended for working geotechnical engineers and skilled workers. This may be achieved by organizing annual events about efficiency in civil works where new projects are presented and experience is shared.

3.9 Communication

In the interview study the question was asked why damage occurs during foundation work. Some of the answers were as follows:

A consulting geotechnical engineer said on the cause of a discrepancy: "Time pressure leads to quick decisions, which are not always good. There may be a lack of understanding of the requirements in the specification. A major factor is the structure of the contract, how it is set up". He also believes that communication back to the design engineer is deficient and can cause deviations: "Lack of feedback to the design engineer: What works in the description? What does not work? It is important to give the designer feedback about incidents: What happened, and how was it solved? "

The same engineer also mentioned: "Excavation depends a lot on how you do it. If the drill procedure is to be gentle, but at the lowest price, these are two factors working against one another. If the contractor is to perform the tasks carefully, it is a must to follow up the work closely. One possible improvement may be to change the terms so that both time and amount of work are taken into account."

An interviewed construction manager believes that the resident engineer should signalize in one of the initial construction meetings if there are specific vulnerable areas. One must go through the procedures that are necessary to ensure a non-leaking construction pit.
The information must be spread to those who will be performing the job. It is not enough to just talk with the management. The workers must know why it should be built in that way, and this must be repeated when new workers are introduced to the site.
The question then becomes how can this be done better with interaction?

4 CONCLUSIONS

The interview study investigated the communication between the various parties involved in construction projects. The interview study showed that the contract terms are not decisive when it comes to communication and interaction between the parties. There is a disadvantage in single procurements as it takes time to build trust between the parties. In general it is possible to achieve confidence with every type of contract.
It emerged during the interviews that the main contractor sometimes lacks knowledge about the subcontractor's skills and ability to perform the works. Therefore, they often are unable to follow up the work. Due to this fact sometimes the subcontractor seems to have a greater opportunity to take shortcuts. The follow-up of subcontractors' work should be prioritized. It is also important to ensure that the special contract provisions are communicated to the subcontractors. In many cases the subcontractor only receives a part of the complete tender documents.
The resident engineer must follow up contract specifications. Deviations from the technical requirements and differences between construction projects lead to unpredictable conditions for the contractor. It is important that the contractors compete on equal terms. Resident engineers must follow up the technical requirements and terms of the contract as closely as they follow up economic terms.
To ensure good cooperation between several parties, it is important that the risk of the contract is reduced during the preparation of tender documents. If all parties profit from the project their desire and readiness for good cooperation increases. Successful development of economic viable contracts requires that the construction client and the consultant are aware that the risk costs regardless of the visibility. Putting it bluntly, if the risk is chased around the project like a short straw, and "all" parties want to push it over to "someone else", this will not benefit the process. It is important to realize that the sooner you acquire an overview of risk elements and their costs, the greater safety is obtained in the production phase of the project. In construction projects, the common goal is to construct a building or facility. Apart from the common goal of contributing to the final product, the participants have various interests in the process itself. For all participants, issues such as finance, production, progress, quality, safety, responsibility and cooperation are included to a lesser or greater extent.
Contract forms where players feel that there is not an equal distribution of risk, responsibility and opportunity for profit, may easily destroy any interest in cooperation. If the construction client has secured the contract so that changes or deviations cause the contractors or consultants to lose money easily, their readiness for cooperation deteriorates.

5 ACKOWLEDGMENTS

The authors would like to thank the Research Council of Norway and all partners in the R&D project "Damage Limitation" for their financial contribution.
Furthermore we would like to thank all participants in the interview study for their contribution.

6 REFRENCES

Øfstedal, E (n.d). http://nvfnorden.org ;taken from the internet on June 15 2014
www.bygg21.no (January 2016)