

# **One-Family House Projects: A Comparative Analysis between Finland and Switzerland**



Bachelor's thesis

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ABSTRACT

The purpose of this Bachelor's thesis was to compare the most common project delivery methods used in one family-house projects in Switzerland and Finland and to examine their respective advantages and disadvantages.

The research method of the thesis was a comparable case study i.e. an actual one-family house project in Switzerland was monitored from a close range. In addition, professionals in the field and university professors were interviewed. Swiss and Finnish legislative documents were examined thoroughly, and different project delivery methods in Finland were studied to obtain a clear view of the differences between the project delivery methods in these countries.

The results of the thesis show that in recent years in Switzerland the usage of construction management companies in one-family house projects has been growing more and more. However, in Finland the construction management companies are used only in bigger projects. The presence of construction management companies in Switzerland has reduced the use of one main contractor and through the invitation to tender method professional small subcontractors have been chosen to deal with respective tasks. In Finland, this method is not so common. The selection of one main contractor being responsible for the whole project is preferred in Finnish one-family house projects. In both countries, different project delivery methods can be combined in different ways with the main goal being the qualitative and the cost-wise suitable end-product.

**Keywords** comparison, Finland, Switzerland, project delivery methods, construction management

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## 1 INTRODUCTION

The goal of this thesis was to compare the project delivery methods that are used in Switzerland and Finland when it comes to one-family house projects.

In order to understand how one-family house projects are done in Switzerland, a one-family house project was closely observed from February to August 2019, whereas similar projects in Finland were also studied, so that the differences and similarities between these countries could be found out.

From the early relationships between the involved parties in a construction project to the invitation to tenders, the contractors' selection and the contracts signed, the purpose was to see the noticeable and worth-mentioning points from each comparing countries' projects. Afterwards, recommendations were possible to be made about the most suitable project delivery method according to what have been researched, studied and compared during this comparable case study.

This study is divided into three main parts. First, the general idea of managing construction projects is explained. Then, detailed explanations for one-family house projects in Switzerland and Finland are discussed. Furthermore, some interviews that were conducted with professionals from both countries are included.

## 2 MANAGING A CONSTRUCTION PROJECT

### 2.1 Cooperation of various parties

From start to finish, every construction project consists of many parties involved. It includes problems, responsibilities, tasks and plenty of needs until the final goal is reached, i.e. the project is finished. The most important thing is that the project has to be finished well enough to meet the investor's requirements.

Therefore, all the parties involved have to be prepared to collaborate, to focus, to know their competencies, responsibilities and tasks exactly, and to be able to finish their jobs according to the required standards and quality.

A key part of an engineering project from its early stages to its finish is communication.

Investors, architects, engineers, contractors, subcontractors - everyone involved - must prioritize communication between each other, so that nothing is left to chance and everything goes as smoothly and as correctly as possible. Anybody can say that a building looks great, but before that point is reached, there are people who have planned, calculated, designed and then realized something that once was just a simple idea. (CMAA, n.d.)

As it can be seen in Figure 1 below, according to Schrapers (2018), some of the critical success variables to complete a project successfully include project management actions, project procedures, human-related factors, project related factors and external project environmental factors.

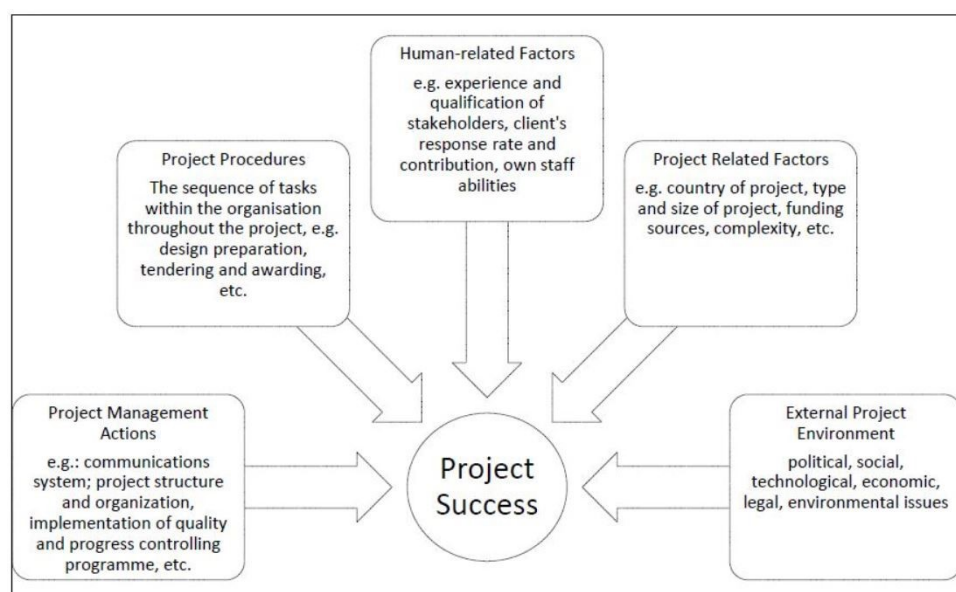


Figure 1. Critical Success Variables (Schrapers, 2018, p.177)

Compared to the past, where projects involved simple traditional parties such as architects, engineers, and contractors, in recent decades new project delivery methods have been introduced. For example, the introduction of construction managers, consultants, and sophisticated software has had a quite astonishing impact on the improvement of construction projects' quality.

Essentially, the more parties involved in a project, the stronger the communication chain must be and that is the reason why the project delivery method selection from the investor before the project has even started has a huge importance. A mastermind architect will remain simply a mastermind if there is a lack of communication between him, the investor and the other parties involved.

As an architect, you must ask yourself: "Have I really understood exactly what the investor wants? Can I really put on paper that exact wish that is revolving around clients' brain?". Then, similar questions are asked by every other involved party in the project. The engineers have to clearly understand the architects. The client, the contractors, and the subcontractors involved have to be aware of their responsibilities, tasks, and goals as well, and between everything, the key is communication.

Regardless of how good a drawing can be, there will always be questions, there will always be needs for clarification, and the unclarities can only be resolved through good and persistent communication.

Moreover, it is of high importance to mention that accurate daily protocols, reports, and notices play an exceptional role, too. By keeping track of daily occurrences and developments, it is easier to identify the problems sooner and it is also easier to check the quality of the work.

## 2.2 Common project delivery methods

In the last decades, the construction industry has been witnessing the introduction of new and more sophisticated project delivery methods.

One of the most common forms of organization in the past was "Individual Appointed Parties". In this form of project delivery, the client has a bigger number of contracts, which he or she has to deal with. All the involved parties are individually appointed and that means there is more work for the client to be done since a separate agreement for everyone has to be reached. If the client is non-professional, this type of project delivery method can be riskier. This is due to the fact that he personally has to deal with the contractors and other parties involved, because there is no consultant or construction manager involved. On the positive side, this project delivery method gives the client a direct involvement in the

process. He directly knows all the appointed parties, but any possible mistake is his responsibility.

Another possible organisative model is the so-called “Package Deal” model. In this model, the client chooses a whole package, a team that has to deal with everything. Generally, this is easier for the client, who has a single contract with the whole team, which has a collective responsibility and liability for the whole project. Usually, this kind of delivery method is chosen when the client has full confidence in the team that he is choosing since they have to deal with everything and everything depends on a single unit. In different kinds of literature, this organisation method can be found in different names, too.

“Design Contractor and General Contractor” is another project delivery method very much used in recent years. In this case, the client has a single contract with the design contractor who claims full responsibility for the project. Then, it is the contractor’s responsibility to find the general contractor and other possible involved parties.

The invitation to tenders, the contracts with the general contractor, the quality assurance - all these responsibilities belong to the design contractor, which makes it easier for the client since he or she does not have to spend time dealing with the project. Of course, the client has to be careful when choosing his design contractor, since the whole burden of the project is loaded to him.

It is important to mention that these models in different publications or different countries can be found under different names, but if they are closely looked at, their operating system is the same as described above.

In between the above-mentioned models, there is a various combination of methods that is possible to be used and chosen as a project delivery method. The possible involved parties can be combined in different ways since there are no fixed laws that have to be followed when it comes to choosing a delivery method for a construction project. Of course, depending on the country, there are parties involved that must be selected before so that the permit is granted, but the combination of the parties that he wants to involve once the permit requirements are met is entirely up to the client. (Spellergberg, 2018)

Quality, time, scope, cost-efficiency and risks are the driving factors that have to be considered when a project delivery method is chosen. Which form of organisation is best suited to our project? It is necessary to understand and consider what you will build and then the selection of the project delivery method is easier. The point is that forms of organizations should not be viewed as immobile. They can always be adapted, modified and customized according to the needs and demands of the project.

### 2.3 Introduction of the construction manager

As a result of efforts to adapt and to create better and even more functional delivery methods, the construction engineering projects have witnessed the invention of new additions, parties that could improve the quality of the project even more, one of them being the construction management.

According to studies, construction management first began in Japan around the 1990s and then started to spread around the other part of the globe.

At that time, The Japan Institute of Architects (JIA) conducted basic research to determine how happy the clients are with the way the construction projects are going. JIA found out that the clients are not satisfied with the cost related services, project management services and the architects' cost management. Hence, they decided to think about creating a system that would make clients' needs fulfilled and they would be satisfied. (Furusaka, Kaneta, & Asahara, (n.d.).)

Consequently, the introduction of construction managers took place. Transparency of costs, transparency of subcontractors' selection, quality assurance and the involvement of themselves were some of the reasons that made clients believe in construction managers' usage.

Since then, the involvement of construction management has started to spread across the globe. Construction managers have started to become one of the key links of the whole construction projects' chain.

The presence of the construction manager gives the investor a stronger link between the architects and the building contractors since the construction manager sometimes tends to act as a consultant to the clients. A construction manager is someone who plans, coordinates, consults and supervises construction projects from early development to completion. Cost estimating, scheduling and invitation to tenders are three processes that in the past usually belonged to the architects, who are usually specialized in designing and drawing. Therefore, if the three above mentioned tasks were to be taken by someone else, their job would be much easier and much better. This is exactly why the introduction of a construction manager has been welcomed.

Figure 2 that is attached below shows that a project manager's responsibilities include the following tasks: developing a project plan, leading and managing a project team, managing deliverables, determining the methodology, establishing a project schedule, and providing regular updates to upper management. (Invensis Learning, 2018). Naturally, the list of the tasks can be wider, depending on the type and the scale of the project.





Figure 2. Project manager's responsibilities (Invensis Learning, 2018)

The construction manager follows every step of the process, understands the architects' plans, is usually involved in the costing estimation and scheduling, writes the invitation to the tenders to the possible contractors, plays a role in choosing the right contractors, forms the contracts, and then supervises the construction process day-to-day. This speaks volumes about the importance of the construction manager. Generally speaking, the construction manager has taken some responsibilities that used to belong to the architects, making their job easier, and has been giving a hand to the building contractors too, by supervising their work and giving them day-to-day instructions based on the architects' plans and client's wishes. As a result, even the contractors' job has become easier and as a result, the final outcome of the projects has undoubtedly improved.

### 3 A ONE-FAMILY HOUSE PROJECTS IN SWITZERLAND

#### 3.1 Family house projects in Switzerland

As it was stated in the beginning, the aim of this thesis is to compare the difference between common ways of building one-family houses in Switzerland and Finland. This chapter will try to explain one of the most common ways of dealing with one-family house projects in Switzerland by thoroughly going through an actual project.

One of the most common ways of building one-family houses in Switzerland nowadays includes the presence of a construction management company. The gap between the investor, the designing company and the contractors in Switzerland's projects has started to close by the introduction of construction management companies, whose usage has been growing more and more lately. Certainly, there are occasions when Swiss projects are handled without the presence of a construction manager, methods where the parties involved are the traditional ones, but the focus of this thesis is to describe the most common method, which in Switzerland inevitably includes the presence of a construction manager.

The parties involved in the typical one-family house project in Switzerland are the investor, the designing company, the site managing company, the construction management company and the contractors. These parties' roles and their connections between one another will be explained in the coming paragraphs so that it will be clear how one-family house projects in Switzerland are mostly done nowadays.

It is worth remarking that in one-family house projects in Switzerland, that are usually not of a huge volume, the selection of one main contractor who is responsible for everything nowadays is not preferred. The fact that the investor tends to choose a construction management company adds more professionalism in the construction chain and that professionalism is used to get cost-effective and more qualitative results by picking small contractors. (Paulus, Menz & Batra, 2015)

Figure 3 below illustrates a common project delivery method in Switzerland.

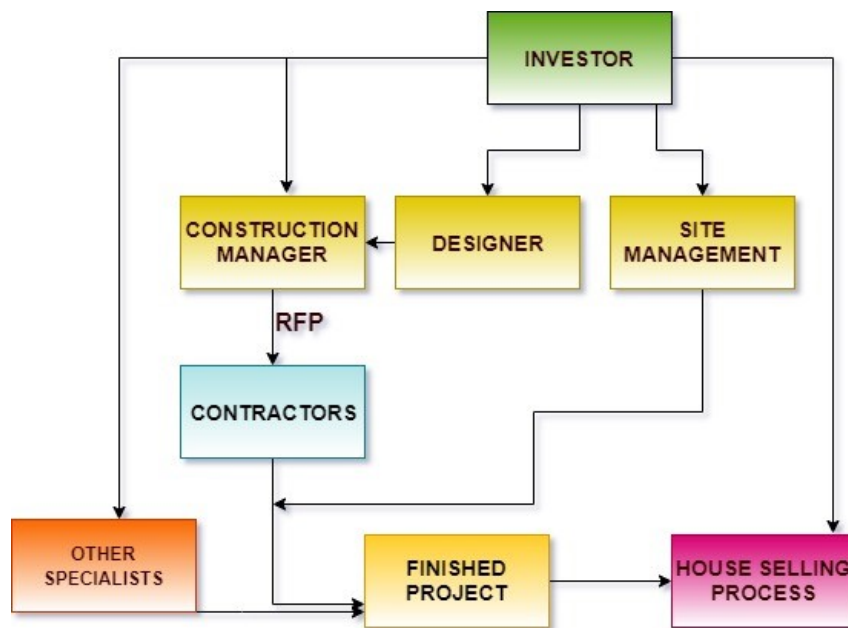


Figure 3. A common project delivery method in one-family house projects in Switzerland (Chart formed by using draw.io website)

Hence, since the client does not have to deal by himself with the contractor or subcontractors' selection, this task is assigned to the construction management company, who through the invitation to tender process has to pick small contractors for the small respective tasks. Naturally, the final decision is made by the investor when the time to choose the subcontractors comes, but in most of the occasions, the client chooses the contractor that is proposed to be chosen by the construction management company, on account of the fact that it is the construction management company that has been receiving different companies' offers and has been in touch with them for months during the invitation to tenders process.

This approach, especially when the investor does not come from the construction sector, makes everything easier for the investor. Besides the site management company, who is only needed later in the process, all the client has to do is choose a designing company and a construction management company. The two latter ones, by cooperating together go through the next steps of the projects and the investor, although being notified about everything that is happening during the project, does not have so much to do. In other different project delivery methods the client has to choose the contractors by himself, which will lead to more work to be done by him and could lead to a larger risk of not choosing correctly due to the possible lack of client's professionalism and knowledge. The presence of the construction management company in a project delivery method gives the investor more assurance that the project will be done more efficiently.

The benefit of having small contractors for small tasks is that you get companies doing works that they are specialized in. The actuality that the

construction management company through the invitation to tender process for a specific task, for instance, roof, invites to compete roof building companies, will lead to better results than having a big contractor doing everything. This is due to the fact that it is hard for one company to be specialized in everything.

Surely, even if you have one big contractor for the whole project, there are cases when the big contractor then hires small contractors to do small tasks, but they are not tied directly to the client anymore; they are only tied to the big main contractor and the client does not have control in what the main contractor is choosing. It can occur that the main contractor does not make the right decisions when choosing the small contractors and these possible errors are reduced when involved are small contractors chosen by a construction management company while the client is fully aware of the invitation to tenders process with all the competitors.

What can be challenging when you have to deal with a lot of different small contractors is the working schedule. The fact that those companies are not related to each other and if one of them is late with its works, it can make the job harder for the other, makes scheduling one of the most challenging tasks of the construction management company. Besides going through the invitation to the tender process and choosing the contractors, the construction management company has to do the working schedule for the whole project. In order to do it, meetings with the chosen contractors are conducted, so that they can confirm if a specific task can be done in the amount of time that was predicted by the construction management company.

Typically, the client will discuss with the designing company and the construction management company at a very early stage his ideas and his budget so that the two professional parties involved will be able to tell if what he wants is possible and how long the whole project might take when everything is taken into account. When an agreement is reached, the project can move forward.

It is important to highlight that in this type of project delivery, the designing company and the construction management company have to be in touch all the time, especially when the invitation to tenders are written, because the works that are listed to be done in the invitation to tender document are described according to the designer's plans. Therefore, the construction manager has to be sure that he understands the drawings very well, since the contractors will be doing their tasks according to the descriptions in the invitation to tender documents. If the plans are not clearly dismantled by the construction manager, errors on site can happen and the job might not be done properly. The better the communication between all the parties involved is, the better the final results will be. Misinterpretation of plans, hurry, too cheap price, a poor atmosphere on site, disagreement between contractors, etc., can all be

factors that can affect the final quality of a project. These are matters that the client should always be aware of. (Paulus, A., Menz, S., & Batra, R., 2015)

### 3.2 A four-family house project in Switzerland

After distinguishing the main project delivery method in one-family houses projects in Switzerland, the coming chapters will elaborate distinctively on all the steps that “g2y baumanagement” company had to be through as the chosen construction management company for a one-family house project named PORT.

#### 3.2.1 PORT project

The “4 Einfamilienhäuser Lohnmatte” project that will be built in Port, a municipality in the canton of Bern in Switzerland, includes four family houses that will all be built according to the same architectural plan designed by "Von Graffenried AG Liegenschaftem", the architectural company that was chosen by the investor of the project. This company, alongside the client, was responsible for getting the building permit for the project as well, a process that in Switzerland usually lasts from three to six months. Sometimes this has to be covered by the construction management company but in this project, it was the designing company that took care of that.

Figure 4 below shows the parties involved in PORT project.

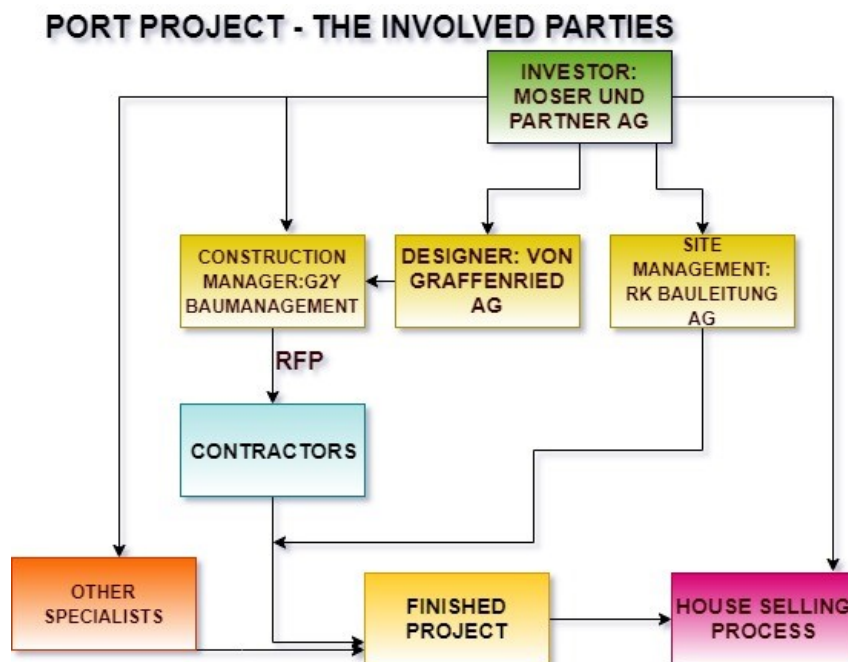


Figure 4. PORT Project - the involved parties (Chart formed by using draw.io website)

The investor of this project, who will be selling the houses after they are finished, is “Moser und Partner AG”. The total sum of the project was 2.5 million Swiss francs. The area of each house was 170 square meters, meanwhile, the area of each house’s property differs from one another as seen in Table 1 below, where the selling price of each house is included, too. Naturally, besides the fact that Swiss houses are expensive in general, the fact that the houses have a wine cellar and a gym in the basement has also played a role in the selling price.

Table 1. The area of each house and the selling prices for all of them and their garages (received from the investor of the project)

Objekt Objet	Bruttofläche Surface brute	Landanteil Terrain	Verkaufspreis Prix de vente
Haus / Maison 11	ca. 170m <sup>2</sup>	ca. 445m <sup>2</sup>	CHF 1'195'000.00
Haus / Maison 13	ca. 170m <sup>2</sup>	ca. 378m <sup>2</sup>	CHF 1'155'000.00
Haus / Maison 15	ca. 170m <sup>2</sup>	ca. 383m <sup>2</sup>	CHF 1'155'000.00
Haus / Maison 17	ca. 170m <sup>2</sup>	ca. 455m <sup>2</sup>	CHF 1'195'000.00
Garage			CHF 45'000.00

Each house had a basement, a ground floor, and a second floor, so they were 3-story houses. They had pitched roofs, stairwells and there was a carport outside the houses. As for the interior part of the house, on the first floor, as noticed in the plan, the kitchen was joined to the dining and living room. The dining room could be entered from the entrance hallway, which was connected to the entrance door and to the bathroom, too. On the second floor, there was a bathroom, bigger than the one on the first floor, four rooms and a corridor between the rooms, the bathroom and the stairwell. When it comes to the basement, it contained a laundry room, a gym, a wine cellar, and a utility room.

The only difference between the four houses was in the garage of one of the houses, as seen in the architectural plans, but the rest of the plans for all the houses was identical.

Figure 5 below shows the architectural plans of the houses.

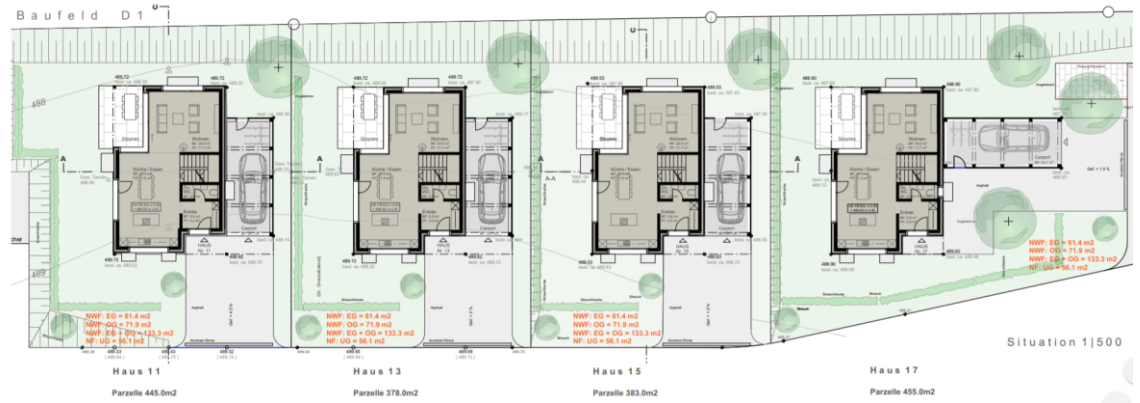


Figure 5. The architectural plans of the houses (received from Von Graffenried AG)

### 3.2.2 Analysis of the plans

In the first stages of the project, the architectural plans were sent to “g2y baumanagement” by the architectural company. It was very important to see the plans at a very early stage of the project so that they would be analysed. Afterwards an idea was created about the scale of the project, the number of floors, the difference between the design of walls, floors, roof, windows, doors, insulation and every other house component that was chosen by the architectural company. All these aspects are of high importance due to the fact that the construction management company was going to do the invitation to tender process, which includes precisely describing all the jobs for the competing companies.

After analyzing the first plans that were sent by the architectural company, in agreement with the architects and after having a permission from the investor, it was decided that some changes should happen in the design.

Below in Figure 6 a predictive view of the houses can be seen.



Figure 6. A view of the houses according to the architectural plan (received from Von Graffenried AG)



In the initial plans, all the doors of the house were 2.04 m high, meanwhile after the intervention, in the final plans it was decided that the doors in the second floor of the house should stay as they are, but in the basement and on the first floor, they should be changed to 2.24 m. Some changes were also made in walls. According to the final plans, all exterior walls of the second floor will be brick walls, not concrete walls as they were first planned. These are the main changes that happened at a very early stage of the project after discussions between the architects and the construction management company took place. However, in the later stages of the project changes were also possible to happen, as long as the involved parties agreed.

In summary, the first architectural drawings were received on February 8, 2019; then after some changes, improved plans were received on March 12, 2019 and June 28, 2019, and then the final plans were received on September 26, 2019.

As it can be seen below, Figure 7 shows a photograph taken from the place where the houses will be built.



Figure 7. A picture of the house plot (personal copyrights)



### 3.2.3 Measurements and calculations

After discussing the architectural plans with the architects, both parties came to a conclusion about the final version of the technical drawings. Consequently, an agreement was reached and the investor had approved what had been shown to him by the construction management company and the architects. After this, it was time for the construction management company to deal with the measurements of the buildings.

Before writing the invitation of tenders, which will be explained later, there are measurements from the drawings that have to be made.

By using "Bluebeam", an engineering software similar to "AutoCad" that can be used for measuring and drawing, the area and the perimeter of the foundation, floors, walls, windows, doors, insulation and sewerage had to be measured, in order to know exactly the volume of each task of the project.

For instance, when finding out how much area there is for walls, it was possible to list it in the invitation of tenders document that would be sent to the painter, because it was known how much work had to be done by the painter. The same applied for the floors, foundation and every other part of the house.

Figure 8 below lists the folders that were created in order to organize the measurement files.

📁 Aussenwände_Ausmass_190516	20/07/2019 12:49	File folder
📁 Boden_Ausmass_190516	20/07/2019 12:49	File folder
📁 Fassaden_Ausmass_190516	20/07/2019 12:49	File folder
📁 Fenster_Ausmass_190516	20/07/2019 12:49	File folder
📁 Fensterbank_Ausmass_190522	20/07/2019 12:49	File folder
📁 Innenwände_Ausmass_190516	20/07/2019 12:49	File folder
📁 Isolation_Ausmass_190516	20/07/2019 12:49	File folder
📁 Lamellastoren RAF_Ausmass_190516	20/07/2019 12:49	File folder
📁 Mauerwerk_Ausmass_190516	20/07/2019 12:49	File folder
📁 Türen_Ausmass_190516	20/07/2019 12:49	File folder

Figure 8. The folders with the measurement files

If the measurements are done correctly, the invitation of tenders documents are more accurate. Any mistakes when measuring and calculating can result in money loss since the chosen contractor will always rely on the list of works that are issued according to the measurements

written in the invitation to tenders document. If fewer walls' area has been calculated, then the painter, for instance, will give a lower price for his work, and when the actual work begins, it will turn out that there is more work to be done, because there is more area than it was calculated. Hence, since this will be additional work for the painter and not work that has been predicted in the contract, the price of the work will be higher, because it will be seen as additional work.

Table 2. The measurements of the basement's exterior walls

Wände UG (Aus)								
Geschoss	Wand	Höhe	Fläche	Umfang	Abzug	Addition	Fläche	Umfang
UG	Fitness OBEN	2.4	12.792	15.46	1.2	5.2	11.592	20.66
UG	Wand RECHTS	2.4	23.928	24.74	0.48	2.8	23.448	27.54
UG	Waschen Wand (unten)	2.4	7.464	11.02			7.464	11.02
UG	Technik Wand RECHTS	2.4	3.6	7.8			3.6	7.8
UG	Wand unter Technik	2.4	10.968	13.94			10.968	13.94
UG	Wand LINKS	2.4	16.608	18.64	0.48	2.8	16.128	21.44
UG	Wand oben Weinkeller	2.4	5.64	9.5			5.64	9.5
UG	Wand links von Fitness	2.4	10.872	13.86			10.872	13.86
						TOTAL	89.712	125.76
						TOTAL MIT 5%	94.1976	132.048

In Table 2 above, the measurements of the basement's exterior walls are shown. The area and the perimeter of each wall were calculated, and in the last rows, the total area and the total perimeter of the whole basement's exterior walls can be seen. As the last row in the picture shows, 5% has been added to the total value so that possible measuring mistakes could be covered. The same percentage has been used for all the measurements done in this project.

### 3.2.4 Invitation to tenders

A bid or a tender is a submission made by a company, a contractor, in response to an invitation from a bid writer, a company that has written a document with a list of tasks, which will be completed by a chosen company, the company that is selected to do the job based on some criteria after all tenders are reviewed.


In this project, the bid writer for most of the works was the construction management company.

The invitation to tender documents in literature can be found under different names: a call for bids, a call for tenders, an invitation to tender (ITT), an invitation for bid (IFB) or a request for proposal (RFP), but according to our research, the most suitable term in this case is "Request for Proposal" term, or shortly RFP, a term which is going to be used in the rest of this thesis.

According to the schedule of the invitation of tenders, each RFP for each respective job had to be written separately, at its specific time. Most of the works had to be written and completed as RFP documents by the construction management company, but there were some works that had to be described by specific engineers, chosen by the investor and the architectural company.

It is important to mention that this construction project followed selective tendering, not open tendering; therefore, only some companies that were chosen by the investor competed for the specific tasks of the project. A huge list of companies was received from the investor at the beginning of the project and the RFP documents with the described tasks were sent to these companies so that they could compete for the particular jobs.

In Figure 9 that is attached below, the competing companies for the painting work can be seen.



**4 EFH Jersingerstrasse, 2562 Port**

BKP 285.1	Malerarbeiten	Versand	Eingabe	Vergabevergleich	Vergabeverhandlung	Werkvertrag
	Arifi GmbH Statthalterstrasse 107 3018 Bern					
	Egli AG Gips- und Fassadensysteme Längfeldweg 115A 2504 Biel					
	Frepa Malerei AG Gutenberg-Strasse 3 2504 Biel					
	Bernasconi Looslistrasse 16 Postfach 439 3000 Bern 5					
	Schori Malerei AG Bielstrasse 75 2555 Brügg					

Figure 9. The competing companies for the painting work (file received from the investor)

Every work that has to be done in the project is described in detail in the invitation to tenders document. The materials were chosen, the measurements were written and all necessary information was included so that when this document was sent to the companies that wanted to apply for a specific work, they would know what is needed to be done.

Then, this invitation of tenders document was analyzed by the companies which received it and was filled out with their assumed prices for every small task that was included in the work. In the RFP documents it was important to list every single task, regardless of how small it might look,

and not forget anything because once the contract with the contractor is signed, the chosen contractor will only do the works that are listed in the contract. Every other task, as small as it might be, if not written in the RFP document, will be counted as an extra job and will be invoiced to the client at the end. Naturally, the extra works cost more and the more work is forgotten in the RFP, the more extra bills will be received at the end.

In order to have more efficiency during the tendering process and during the whole construction project, too, it is really important to know exactly what the investor wants and to understand exactly what the architectural company has planned. Every little misunderstanding can lead to errors; therefore, meetings and communication have a huge importance in the efficiency of a construction project. As a construction management company, being the bridge between the investor and the contractors, it is our responsibility to first understand for ourselves and then to be able to explain their tasks to the contractors really well, so that everything goes smoothly and according to the investor's wishes.

At "g2y baumanagement" company, the RFP documents are written using a special highly efficient software named "Messerli", which can be partly seen in Figure 10 below and the next coming figures.

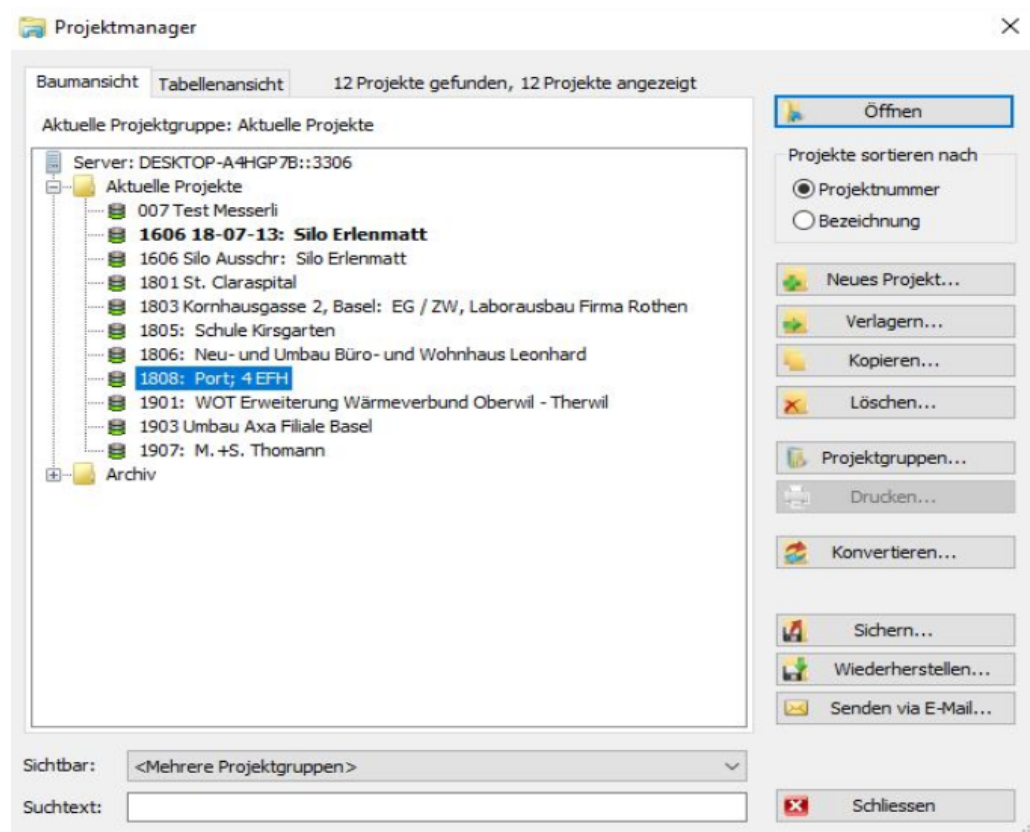


Figure 10. PORT Project Folder in the Messerli software

Messerli is filled with catalogs that contain the list of works for every construction task, from which you can choose exactly what you need and

form your RFP depending on your architectural plans. For instance, if you have to write the RFP for the painter's works, the so-called "Painter's works" section in Messerli has a huge list of works that are part of the painter's duties in construction projects. From that list, you select what you need according to your plans and write the necessary dimensions. In this way the RFP document for the painter works is formed.

Figure 11 below shows an example of a Messerli catalog that contains a list of works.

P	:POS	VN	Text	:BKP	:OGL	Vor
	000.000		Bedingungen . Individueller Bereich (Reservfenster): Nur hier kann der Anwender Positionen des NPK für seine individuellen Bedürfnisse abändern oder ergänzen. Die angepassten Positionen werden mit einem "R" vor der Positionsnummer bezeichnet. . Kurztext-Leistungsverzeichnis: Von Vorbemerkungen, Hauptpositionen und geschlossenen Unterpositionen werden nur je die ersten 2 Zeilen wiedergegeben. Es gilt in jedem Fall die Volltextversion des NPK.			
H	100.000		Baustelleneinrichtung und Vorarbeiten Betreffend Vergütungsregelungen, Ausmassbestimmungen und Begriffsdefinitionen gelten die Bedingungen in Pos. 000.200.			
H	200.000		Fassadengerüste Betreffend Vergütungsregelungen, Ausmassbestimmungen und Begriffsdefinitionen gelten die Bedingungen in Pos. 000.200.			
H	300.000		Gerüstergänzungen zu Fassadengerüsten . Betreffend Vergütungsregelungen, Ausmassbestimmungen und Begriffsdefinitionen gelten die Bedingungen in Pos. 000.200. . Gerüstergänzungen in den Uabschnitten 310 und 320 haben der Lastklasse 3 zu entsprechen. . Gerüstergänzungen der Lastklassen 4 und 5 sind als Mehrleistung mit Uabschnitt 370 zu beschreiben.			
H	400.000		Flächengerüste Betreffend Vergütungsregelungen, Ausmassbestimmungen und Begriffsdefinitionen gelten die Bedingungen in Pos. 000.200.			
H	500.000		Besondere Gerüste Betreffend Vergütungsregelungen, Ausmassbestimmungen und Begriffsdefinitionen gelten die Bedingungen in Pos. 000.200.			
H	600.000		Notdächer Betreffend Vergütungsregelungen, Ausmassbestimmungen und Begriffsdefinitionen gelten die Bedingungen in Pos. 000.200.			
	700.000		Aufzüge Betreffend Vergütungsregelungen, Ausmassbestimmungen und Begriffsdefinitionen gelten die Bedingungen in Pos. 000.200.			
	800.000		Gebühren und Arbeiten nach Aufwand (Regie) Betreffend Vergütungsregelungen, Ausmassbestimmungen und Begriffsdefinitionen gelten die Bedingungen in Pos. 000.200.			

Figure 11. A catalog that contains different works (Messerli Software)

On the right side of the document, there is a special space for the competing companies to write their prices for each subtask and logically, at the end of the document there is a final price, the total sum for which the company would do the whole task. Then, of course, there is space for possible discounts and there are also automatic tax reductions according to the Swiss legislation. Not to forget is the fact that every task and subtask has its specific number in Messerli and those numbers are based on the "BPK Catalog", the official catalog that labels each construction task with a specific number. This facilitates the construction companies in the whole Switzerland, regardless of the canton, to know a task just by seeing the number.

For example, if you are dealing with outdoor works in Switzerland, that work will always be found under number 221 in every construction document in the whole country so that companies will not get confused. Messerli, which is updated every year and there is a payment that should be done for that update, has all the tasks labelled with numbers according to the official catalog, which makes the RFP writing faster and even more efficient.

After the companies received the RFP documents, they offered a price based on their calculations for each work that had to be done. At the end of the document, there was a total sum, which normally shows for which sum of money in total the company will have the whole task done. Naturally, the sum can change in small margins later during the process, but it will not differ much from what was documented in the filled-in RFP document.

Then, the necessary steps, which will be described in the next chapters, took place, so that the final decision could be reached and the most suitable contractor for each task could be chosen.

An example of an offer from a competing company is shown in Figure 12 below.



[1808] Port - MesserliBAUAD (Version 2019.6)

Projekte Start Bearbeiten

Projektmanager Einstellungen NPK-Katalog KAG-Katalog Verwaltung Zugriffsrechte Einstellungen Termine E-Mail

Projekt Meldungen Plotauftrag Projekt Bau-Plattform Katalog Benutzer Optionen Pendenzen Fälligkeiten

[1808] Port

Firmen- und Objektdaten Projektadressen Formulartexte Kostenermittlung KV-Original / Baubeschrieb KV-Mutiert Auftragsliste Bauleitung Leistungsverzeichnis Ausschreibung Angebotsvergleich Verträge erfassen Ausmass erfassen Zahlungen erfassen Baubuchhaltung Terminplan Drucken SIA 451-Import SIA 451-Export Bau-Plattform Dokumentenmanagement Designer Honorarberechnung

[1808] Angebotsvergleich: Auftrag 211: Baumeisterarbeiten, U 543: Müller Aarberg AG

Auftragsliste Angebotsunternehmer BKP-Preise Devisenpreise Protokoll Unternehmertexte Zusammenstellung Ausgabe

[211] Baumeisterarbeiten 244.00 / 726'371.40  
[15] Erdarbeiten 244.00 / 24'469.20

BKP NPK	Bezeichnung	Vorausmass	P	Preis	Betrag
151 151 121.001	Normal grabbar	2,000		122.00	244.00
122.004	v.Hand,leichte Verdichtung	2,000		36.50	73.20
221.111	1 bis m 1,50	88,000		18.80	1'654.40
221.211	1 bis m 1,50	3,000		122.00	366.00
231.111	1 bis m 1,50	6,000		18.80	112.80
231.211	1 bis m 1,50	1,000		122.00	122.00
251.213	Aushubmaterial	110,000		16.00	1'760.00
261.113	Aushubmaterial	110,000		17.30	1'903.00
321.101	Grabtiefe bis m 1,50	20,000		15.00	300.00
322.101	Spezifikation	12,000		33.00	396.00
351.301	Feine Gesteinskörnung 0/4	2,000		106.00	210.00
411.112	DNID 80	80,000		5.00	400.00
411.113	DNID 100	100,000		5.90	590.00
415.212	DNID 80,r mm 800	8,000		27.80	222.40
415.313	DNID 100	2,000		41.20	82.40
415.517	Uebrige Nennweiten	8,000		6.20	49.60
416.101	Spezifikation	8,000		215.00	1'720.00
416.201	Spezifikation	8,000		225.50	1'804.00
421.002	DNID 61-100	180,000		5.85	1'053.00
431.113	DNID 80	8,000		12.20	97.60
432.113	DNID 80	16,000		9.15	146.40
432.114	DNID 100	4,000		9.15	36.60
432.173	DNID 80*100	8,000		9.15	73.20
435.001	Spezifikation	8,000		18.30	146.40
461.001	Spezifikation	4,000		125.00	500.00

Mengengliederung (F3)

Mengengliederung

Positionen sortiert nach:  
BKP  
NPK  
OGL

Sortierung ändern...

Betragskontrolle

Auswerten Schliessen

Figure 12. An offer received for a specific task from a competing company (Messerli Software)

According to the schedule of invitation to tenders, every RFP was sent to the respective companies between April and June 2019.

In the PORT project, the construction management company had to write the invitation to tenders for 19 different works. Starting with bearing construction works and going on with facade scaffolding, wood constructions, window wood-metal framing, exterior insulation plastering, sun protection, interior plastering, metal works, interior wooden doors, carpentry, the floor construction, tiling, wooden flooring, interior painting, post boxes, door keys, and site cleaning. The other necessary works, such as electricity, sanitary installations and similar tasks, were taken care of by specific engineers chosen by the investor and the architectural company.

Figure 13 below shows the work that had to be written and sent to the companies for PORT project.

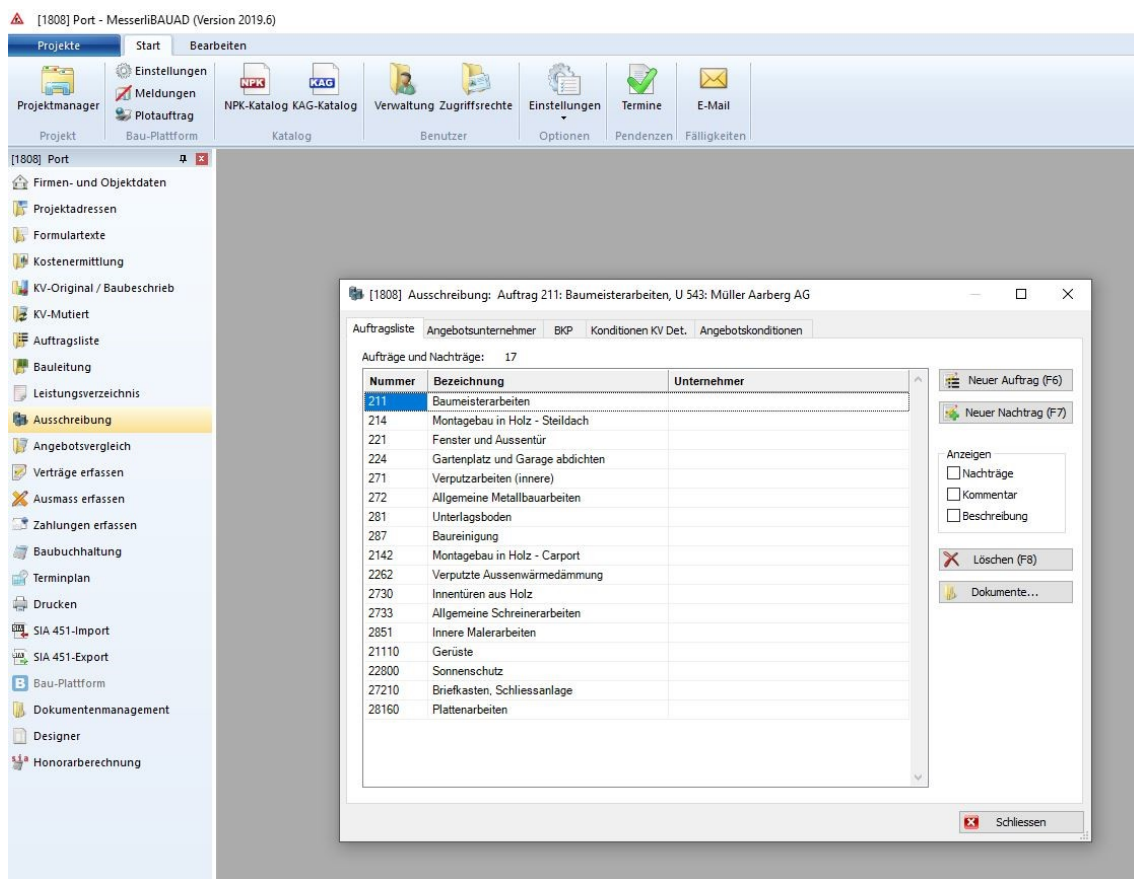


Figure 13. List of RFP documents in PORT project (Messerli Software)

Not to forget is the fact that in this construction project, the whole parquet works will be done by a single company chosen directly by the investor at the beginning of the construction project. Since it was a private project, the investor had the right to decide on a company even without a tendering process and in this case, the company that had to deal with the parquet works was chosen directly by the investor. Hence, only the floor measurements were sent to the already chosen company to know how much are of parquet they had to assemble.

### 3.2.5 RFP schedule

In this project, the invitation to tenders or the “Request for Proposal” was one of, if not the most, the most important tasks of our company.

Every construction project contains plenty of works which have to be done separately one after another, but they are related to each other and they chronologically depend on each other. Therefore, scheduling is essential to every construction project.

After deciding about the final architectural plans of the project, there was scheduling that had to be done about the invitation of tenders process. This schedule would show which RFP document when should be written



and sent to the specific companies, who then would apply for the specific task.

After carefully judging and thinking about the time that each RFP might take, the RFP schedule document was issued by the end of March 2019. As seen in Table 3 below, there was a deadline for each of the RFP documents that were going to be written by the construction management company. The first RFP should have been sent to the possible contractors on April 11, 2019, and the last one on May 29, 2019.

Table 3. The RFP schedule

Kontrollblatt Submission  
Objekt: 1808 Port  
Stand: 08.10.2019

BKP	Arbeitsgattung	Submission Versand an Unternehmer	Offerteingang	Abgebotsrunde	Unternehmerrunde	Versand Vergabeantrag an Bauherr	Werkvertrag erstellt und an UN versendet.	Bemerkungen
211	Baumeisterarbeiten	11.04.2019	26.04.2019	30.04.2019	18.06.2019	04.07.2019	22.08.2019	Vergabe an Müller Aarberg
211.1	Fassadengerüst	12.04.2019	26.04.2019	10.05.2019	28.06.2019	04.07.2019	08.10.2019	Vergabe an Heinz Flury AG
214	Montagebau in Holz (Dach, Carport)	29.04.2019	13.05.2019	12.06.2019				bisher keine UN-Gespräche geführt
221.1	Fenster Holz Metall	25.04.2019	28.05.2019	06.06.2019	28.06.2019	04.07.2019		
226.2	Verputzte Aussenwärmeeisparmassen	07.05.2019	22.05.2019	07.06.2019			11.09.2019	Gemäss E-Mail S. Streit Submission erledigt. Verhandlung durch R. Kocher
228	Sonnenschutz	14.05.2019	24.05.2019	11.06.2019	28.06.2019	04.07.2019		Vergabe an Arifi AG.
23	Elektroanlagen	-	-	-	-	-	23.08.2019	Submission durch Fachplaner.
25	Sanitäranlagen	-	-	-	-	-	23.08.2019	Submission durch Fachplaner.
271	Gipsarbeiten	15.05.2019	29.05.2019	07.06.2019			11.09.2019	Vergabe an K. Jörg GmbH Gemäss E-Mail S. Streit Submission erledigt. Verhandlung durch R. Kocher.
272.2	Allgemeine Metallbauarbeiten	20.05.2019	31.05.2019	01.07.2019	01.07.2019	04.07.2019		Vergabe an Marrer Unterlagsboden AG
273.0	Innentüren aus Holz	17.05.2019	31.05.2019	11.06.2019				
273.3	Allgemeine Schreinerarbeiten	17.05.2019	31.05.2019					keine Angebote erhalten.
275	Schliessanlage, Briefkasten	17.05.2019	28.05.2019	11.06.2019				
281.0	Unterlagsboden	22.05.2019	31.05.2019	11.06.2019			04.09.2019	Gemäss E-Mail S. Streit Submission erledigt. Vergabe an Marrer Unterlagsboden AG
281.6	Boden- und Wandbeläge Plattenarbeiten	21.05.2019	31.05.2019	11.06.2019	01.07.2019	04.07.2019		
285.1	Innere Malerarbeiten	29.05.2019	14.06.2019					Gemäss E-Mail S. Streit Submission erledigt.
287	Baureinigung	27.05.2019	07.06.2019	11.06.2019				

In Table 3 above, only the works that would be described and sent to the contractors by the construction management company are listed. Therefore, works like HVAC (Heating, Ventilation and Air Conditioning) and sanitary works that would be described by the respective engineers chosen by the architectural company are not listed.

The columns in Table 3 show specifically each part of the RFP process. For instance, the number in the first column shows the catalog number for each work.

As it was stated above, according to a specific official catalog named “BPK Catalog”, every construction work is labeled by a number and in the first column of Table 3 above, each work has its own number.

The “Submission Versand an Unternehmer” column includes dates when each RFP would be sent to the chosen companies. Then, the “Offerteingang” column shows the latest possible date on which the competing companies could send their offers through the specific RFP document filled out with their prices.

After they have sent their first offers, some matters can be discussed between the construction management company and the competing companies. After those discussions, there could be a change in price. The fourth column in Table 3 called the “Angebotsrunde” column, is for those changes.

The next column is named “Anfrage Pauschalierung und Pauschalofferte”. After the discussions of the “Angebotsrunde” have taken place, the companies have to make a deal about a lump sum, or a so-called plus/minus percentage of the total price of their offer. If small tasks are added to or removed from their list of the works, this plus/percentage covers it, so that there is no need to make a new contract. This percentage usually goes up to 10, but if costly tasks are added to the list and they cannot be covered by this deal, new improved contracts have to be made.

“Unternehmergespräche” column includes dates on which meetings with the competing companies are conducted. At this stage of the process, not all the companies that have sent offers are invited to the meetings. After analyzing the offers of all the competing companies, only two or three of them, the ones with the best offers, are invited to meetings. These meetings tend to clarify every possible doubt that might still be present so that when the final decision is made, the chosen company is aware of everything.

After these meetings, the two or three best offers that have come from the companies are sent to the investor, so that he can make the final decision. A recommendation about the best choice comes from the construction management company, since that is the company that has been conducting meetings, comparing the received offers and is aware of what each company can offer, but the final decision is always made by the investor. The dates on which the offers were sent to the investor are listed in the “Versand und Vergabeantrag an Bauherr” column.

The next step is to inform the companies about the choice of the investor. After the investor makes the decision, it is the duty of the construction management company to inform the chosen company that they have been selected for the specific work. Also, it is always important to inform the other competing companies that they have not been chosen.

Then, the “Auftrag/Vertrag erstellt” column shows the dates on which the contracts with the chosen companies are signed. The Table 3 is completed with the dates on which each task of the project starts to be done. These dates are shown in the last column of Table 3.

### 3.2.6 Contracting the chosen contractors

Succeeding all the above-mentioned phases, there comes the time where all the companies for the specific works have been chosen and a contract with every single one of them has to be signed.

Although it is the construction management company that has been dealing with all the competing contractors for months, it is still the client who gives the final word about the contractor that will be chosen to do the respective job. As previous experiences have taught, it is not always right to choose the company that will do the work for the lowest price, since that might have quality consequences later in the process. The various parameters that lead the construction manager to think that one specific company is a better option than the others will be highly considered by the client, because he is aware that the construction manager is a specialist of the field and has also been in touch with the competitors for months.

Below, Figure 14 shows some offers received from competing companies

Angebotsvergleich					
<b>Projekt:</b>	<b>1808</b> Port / 4 EFH				<b>Druckdatum:</b> 19.06.2019
<b>Auftrag:</b>	<b>2851</b> Innere Malerarbeiten				
Bauherr:	Ventis Immobilien AG, Fischrainweg 20, 3063 Ittigen				
Bauleitung:	RK Bauleitungen AG, Fischrainweg 20, 3063 Ittigen				
Architekt:	Von Graffenried AG, Marktgass-Passage 3, 3001 Bern				
	Frepa Malerei AG Gutenberg-Strasse 3 2504 Biel/Bienne	Groupe- Egli AG Längfeldweg 115 2504 Biel/Bienne	Bemasconi Boden Decke W Ihr Spezialist bei Neubau, U Looslistrasse 16 3027 Bern	Anfi GmbH Statthallerstr. 107 3018 Bern	Schori Malerei AG Malerie Bielstrasse 75 2505 Brugg
	032 / 342 36 50	032 / 331 99 19 032 / 331 99 21	031 / 382 44 00 031 / 382 44 34	031 / 994 01 10 031 / 994 01 12	032 / 373 13 78 032 / 373 16 18
	info@frepa.ch		bem@bemasconi.ch		info@schori-malerei.ch
<b>Brutto</b>	<b>37'585.20</b>	<b>46'012.80</b>	<b>53'337.20</b>	nicht eingereicht	nicht eingereicht
Rabatt	3.00 % -1'127.55	4.00 % -1'840.50	2.00 % -1'066.75		
<b>Zwischentotal</b>	<b>36'457.65</b>	<b>44'172.30</b>	<b>52'270.45</b>		
Skonto	2.00 % -729.15	2.00 % -883.45	2.00 % -1'045.40		
<b>Zwischentotal</b>	<b>35'728.50</b>	<b>43'288.85</b>	<b>51'225.05</b>		
Baureinigung	0.50 % -178.65	0.50 % -216.45	0.50 % -256.15		
Bauschäden	0.40 % -142.90	0.40 % -173.15	0.40 % -204.90		
Energiekosten	0.50 % -178.65	0.50 % -216.45	0.50 % -256.15		
Baureklame	-600.00	-600.00	-600.00		
<b>Zwischentotal</b>	<b>34'628.30</b>	<b>42'082.80</b>	<b>49'907.85</b>		
MWST	7.70 % 2'666.40	7.70 % 3'240.40	7.70 % 3'842.90		
<b>Netto</b>	<b>37'294.70</b>	<b>45'323.20</b>	<b>53'750.75</b>		
Abweichung in %	0.00	21.53	44.12	0.00	0.00
Bemerkung:	Ohne Abgebotsrunde	Ohne Abgebotsrunde	Ohne Abgebotsrunde.		

Figure 14. Comparing the offers received from competing companies for a specific task (Messerli Software)

So, after considering everything, all the contractors were chosen and separate meetings were conducted with them. In the meetings the terms of the contracts were discussed and the schedule of the work was presented, so that the contractors could confirm that they could finish their tasks in the required time and everything would go according to the contracts signed.

What needs to be highlighted is the fact that in terms of the contracts, there were specific points that showed what would happen if the contractor does not finish his task according to the schedule or according to the quality standard that was asked. These doubts were regulated by

different types of penalties, which would mostly see the contractor receiving less money if their work was not finished as agreed beforehand. (Romy, Morf, Dürig & Brogini, 2019)

Obviously, contract-forming has to be seriously taken by the construction management company, since any possible errors later in the process are easily handled if everything has been signed on paper previously. With good contracts, it's easier to have control and assurance for every involved party of the project.

### 3.2.7 Site supervision

As long as nothing changes in the meantime, it was predicted that the contractors would be chosen at the beginning of September; meanwhile, the work at the construction site was scheduled to start at the end of October 2019.

To show how much each involved party had to do during this project, according to estimations it could be claimed that around 55% of the project was done by the architectural company, 26% by the construction site managing company, around 10% by the construction management company, and around 8% would belong to the cost estimation that was done by the investor at the beginning of the project.

There are times where the chosen construction management company has to deal with the cost estimation and the site management after the construction has started, but those were not the tasks of the construction management company in this project.

As it was agreed beforehand, the tasks of the construction management company in this project would be finished as soon as the contracts with the contractors are signed. Then, the site management would be done by a company named "RK Bauleitung AG". This company was known and chosen by the client at the beginning of the project. Furthermore, the client was consulted with this company when he chose the competing companies for the works. Therefore, this company knows the chosen contractors.

Although the job of the construction management company was finished as soon as the contracts were signed and from that point, it is the site management company that takes over, there can be times where the construction management company needs to shortly be in touch with one of the contractors or the site management company due to the fact that it was the construction management company the one that drew up the schedule of the project and also signed the contracts. So, if any uncertainties happen, the construction management company should be able to offer its help to the remaining parties of the project.

From the point where its role starts to the end of the project, the site management company has to supervise the work according to the schedule issued by the construction management company and according to the contracts signed with the contractors, which were, of course, done after the green light was issued by the client, the main figure of the whole project.

## 4 ONE-FAMILY HOUSE PROJECTS IN FINLAND

### 4.1 Construction industry in Finland

Historically, the construction sector in Finland has been one of the most active industries in the country in the last decades. (Ilveskoski & Niittymäki, 2015)

In recent years, following the trend that has started to spread across all Europe, construction in Finland has started to advance, too. Building and designing companies have started to incorporate new innovative building methods and strategies in order to improve the quality and cost-effectiveness of the whole building process. (Ottosson, 2013)

The improvement and the detailing of the preliminary planning, the usage of highly sophisticated computer software like Building Information Technology (BIM) in order to almost perfectly visualize every small idea that crosses your mind before a schedule of the building process is decided, the implementation of prefabricated and eco-friendly materials are some of the must-mentioned points when it comes to construction and its development during the last decade.

The gigantic technological progress has also played a significant role in the construction sector, especially when it comes to huge projects. From the fact that the engineering drawings can now be created with a whole new level of accuracy, which reduces the errors and the misunderstanding on the construction site, to the introduction of new roles, like the construction manager role that did not exist before, the construction projects have been constantly improving towards better results, making the end-product more qualitative.

Logically, the chain of the participants in the construction project differs according to the volume of the project and that is clearly visible in Finland.

In Finland, construction is governed by the Land Use and Building Act (132/1999) and the Land Use and Building Decree (895/1999). The National Building Code of Finland is published by The Ministry of the Environment and contains regulations and guidelines that complement the legislation in the Land Use and Building Act. (Ministry of the Environment, 2017)

When it comes to a project delivery method that has to be chosen for a specific project, it is important to mention that the building regulations must be strictly followed, whereas the guidelines are not obligatory. The guidelines can be very helpful and leading, but they are not compulsory. Therefore, the client and designers have a considerable amount of space to be flexible in decision-making, since not everything is strictly regulated by law. As long as the mandatory legislation is not overruled, different

combinations can be made and variable contracts can be signed, with the main target being the completion of the project according to the client's wishes. (Ministry of the Environment, 2017)

#### 4.2 Project delivery methods of one-family houses in Finland

As for one-family house projects in Finland, the most common ways to deal with these projects in Finland are:

- Work by direct labor (omajohtoinen rakentaminen)
- Subcontract/piecework & salary combination (Osaurakka)
- Design and Build contract (KVR urakka)
- Cost reimbursement contracts (kustannusperusteinen laskutyöurakka)
- All-in-one contract/package deal (kokonaisurakka)
- Collective Building (Ryhmärakennuttaminen)

At "Work by direct labor" or "Omajohtoinen rakentaminen" in Finnish, the client himself does the construction or parts of the project with or without outside workforce. In this case, the client acts as the builder as well as the employer and in small projects, this can be a common project delivery method in Finland. Of course, some of the works has to be done by required specialists, but most of the work is done by the owner himself. This type of project delivery leads to a cheaper price, but it can have consequences in quality. Usually, this type of method is used when the project contains the building of only one house. (Jaakkola, 2010, p.13)

At the "Subcontract/piecework & salary combination (osaurakka)" project delivery method, the whole building project is divided into smaller pieces locally or temporally. The client's responsibility is to find subcontractors himself, make payment arrangements with them and make the work schedule for all the subcontractors. This, in turn, leads that the client's role in the project is important, as the client has the main responsibility for the project's success, due to the fact that the subcontractors are not connected to each other and if there are work delays from one of them, everything will become messy and that is all client's responsibility, who has to carefully think about everything. (Jaakkola, 2010, p.10)

In the "Design and Build contract (KVR urakka)" project delivery method, there is one main contractor who is responsible for the designing aspects of the project as well as the building aspects on the site. This is also called ST project delivery method (S = suunnittele (design) T = toteuta (build)). The concept is that in this contract the contractor shall provide the works ready for use at an agreed price and by a fixed date. (Jaakkola, 2010, p.12)

When it comes to "Cost reimbursement contracts (kustannusperusteinen laskutyöurakka)", in Finland there are two different forms for reimbursement contracts:

- Cost and fee contract, where the contractor agrees to execute the building project for a price and later during the project if any changes happen or additions are necessary, the client has to reimburse the contractor according to the agreement signed before the project has started
- Unit price contract, where the costs are based on the amount of work done with defined pricing. Under a unit price contract, a contractor is paid for the actual quantity of each work performed as measured in the field during construction. Each unit price includes all labor, material, equipment, overhead, and profit attributable to that scope of work. This method is more used in civil engineering projects. (Jaakkola, 2010, p.13)

It is important to mention that in Finland it is possible to run into the “ryhmärakennuttaminen” method as well, which in some translations can be found as “Collective Building”. This can be explained as a project being started by a group of people who together act as investors, make their decisions together and at the end of the project are homeowners.

This method was very popular in Finland around the 1950s, but then, when big companies started to take over, the usage of this method started to decrease. However, in recent years its usage has started to increase steadily.

This group of people have decided to cooperate together by forming a group and all the decisions and arrangements are made together. They have more control over the project than a single developer usually has.

Usually, these group projects can be resident based projects or consultant based projects.

On a resident based project, the residents acquire a plot of land or property and then start to do the contracts for design and construction with specific contractors.

On a consultant based project, a consultant acts as the project starter. The consultant finds the plot and acquires the land, collects the members for the group, who are the investors, and then together they start to create plans, contracts and continue the other necessary steps for the rest of the project. (Fira, n.d.)

#### 4.3 The most common project delivery method

Although the above-mentioned methods are all legitimate and possible to happen, if we have to narrow it down to the most common way of dealing with one-family house projects in Finland, we will have to describe the “all-in-one package deal”, but with possible modifications that can be freely made by the client.



This type of deal is typically when a client does not want to spend too much time on the project and leaves the majority of the work to the main contractor, who has to be carefully chosen since most of the responsibility will fall into his arms. In the public sector, the selection of contractors is strictly regulated by law, but in the private sector, the client is freer to select his contractor or contractors, who, of course, will be tied up by the contract that will assure the client that their work will be done as required in the written forms; otherwise there will be penalties, fees or other legislature procedures that follow if the signed contracts are not respected.

Figure 15 below shows a chart that illustrates the most common way of dealing with one-family house projects in Finland.

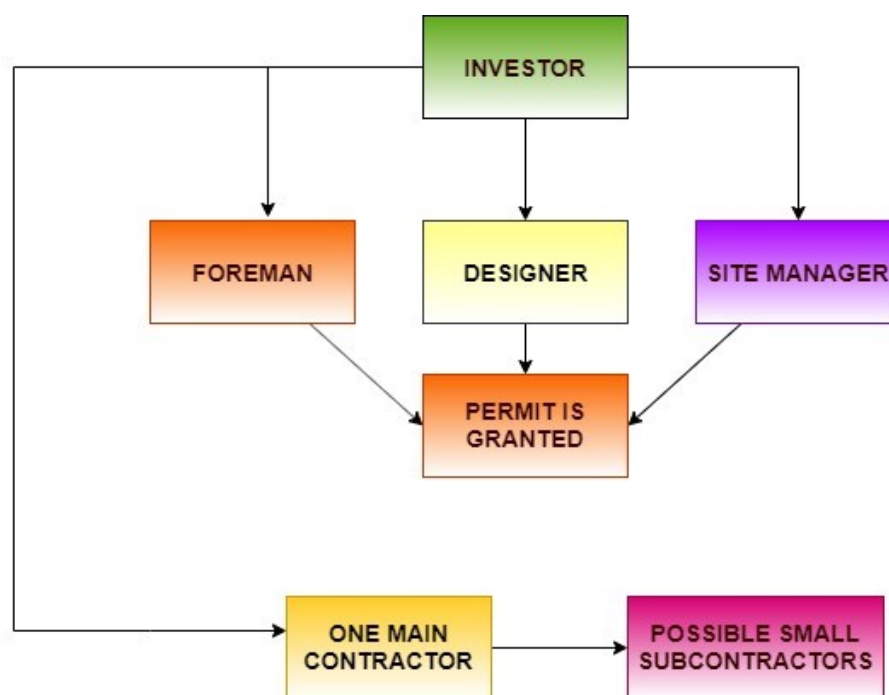


Figure 15. The most common project delivery method in one-family house projects in Finland (Chart formed by using draw.io website)

Before the contractor is chosen, the client has to have the designing company, the site manager and the specialist foreman, who have to be qualified according to the legislation so the permit can be granted. The necessary qualifications of these parties are explained in Sections 70 and 123 of the Land Use and Building Act.

The designing company is responsible for the designing of the project. Its role is to deal with the drawings that include plans, design details, specifications, bills of quantity and design calculations. It is very important that the plans drawn by the designing company are very well explained to the client so that he is sure that everything will be built according to his wishes. They should also be explained to the building company or

companies, since they have to work according to the plans and any misunderstanding can lead to errors.

The site manager's tasks include notifying the building supervision authority about the commencement of the construction work, making sure that construction project is carried out in accordance with the permit granted, making sure that the construction process is on schedule, the updated plans are present on the construction site, the construction workers have all the necessary safety equipment during the working schedule and the building authorities are updated about the progress of the construction process. Furthermore, the site manager can act as a consultant to the client, especially in cases when a construction manager is not part of the project.

As for the specialist foremen, they can be explained as experienced construction workers, who are ranked above the construction workers but under the site manager. They supervise and coordinate the activities of the workers on a construction site and they report to the site manager, who then reports to the client or deals with the authorities. When the construction site is big and there are plenty of subcontractors, it can happen that each subcontractor has its own foreman, who has to make sure that the workers are doing their job how it should be done and then also report to the site manager about the progress of its company's work. (Hyttinen, 2018)

After having the designing company, the site manager and the specialist foreman, since the building permit cannot be taken without having these parties chosen and accepted, in one-family house projects in Finland, the developer usually chooses a contractor by himself. It is possible that the client conducts meetings with different contractors so that he can decide about the most suitable one, but it is not very common that in small projects in Finland the contractor or the contractors are chosen by the invitation to tenders method.

As explained in the chapters above, the invitation to tenders method requires a professional to do it. When it is used, it is usually done by the construction management company or in some cases even the designing company, who takes the responsibility because of the fact that it knows the exact features that the buildings will have and knows all the jobs that have to be done, too. However, in small projects in Finland, this process is mostly ignored, with the client mostly choosing the contractor without going through the bidding process. The advantages and the possible consequences of this will be broadly explained in the coming chapters.

In some occasions, especially when the client is not so aware of the construction sector, it is possible that the site manager or the designer act as consultants of the client so that he can choose the most suitable contractor. The site manager or the designer are both part of the

construction field and they have more experience in the field, therefore the client can benefit from their advice. In small cities, it is quite common that the site manager or the designer knows some specific contractors that can be helpful to the client, especially if he has a limited knowledge of the construction field.

It is important to mention that in Finland sometimes it is possible to run across already designed concept houses, which in Finnish go by the name of "Talopaketti" (A House Package). When the investor decides to build this kind of houses, the presence of the designer is not needed, since the plans are already there and they have been previously accepted by the legislation. That means that the permit for these houses can be granted without a problem.

#### 4.4 Forming the contracts

After conducting meetings with a few contractors, the client has to decide which one is the most suitable one for the job. After the contractor is able to accept the conditions and to officially accept the responsibility of finishing the building according to the designer's plans, legislation and client's exact wishes, a price between the contractor and the client is settled. Since the contracts are not done by a professional construction management company, the client and the contractor can use one of the ready-made contract forms that can be found in the RT cards. Those are forms that have been issued by the Finland authorities so that the participants in the building projects can easily form a contract between them while seeing their rights and their responsibilities according to the Finnish legislation. In most of the cases, the final price is agreed in the beginning, before the contracts are signed. Under the Finnish Contracts Act (228/1929), a contract is concluded when an offer to conclude a contract is accepted. There are no specific requirements that need to be included and it is usual for construction to begin and obligations to be amended before the contract is signed. So, before giving his signature, the contractor has to be really careful if that amount of money that he has agreed to do the whole project for covers everything. Any other job that might show up during the project that was not thought about before the price was agreed and the contract was signed, will not be paid extra by the client since he is only responsible to pay the sum that was agreed in the beginning, unless stated otherwise. (RT Cards, n.d.)

Although the contract-forming legislation in Finland is not strict and any kind of contracts can be signed as long as all the involved parties are in agreement (Jaspers, n.d.), the contracts in the construction sector mostly tend to follow the YSE 1998 (General Conditions for Building Contracts Agreement) document, especially when changes occur during the construction project. These General Conditions for Building Contracts have been established by The Finnish Association of Building Owners and Construction Clients and were completed in cooperation with The

Confederation of Finnish Construction Industries, The Central Association of Earth Moving Contractors in Finland and The Association of Finnish Electrical and Telecommunications Contractors. In most of the cases, "YSE 1998" is used when a potential disagreement between the involved parties of the project occurs. When the original contract signed by the parties does not contain a mechanism to handle changes in the building plans or other additional works, the involved parties try to find a solution in the YSE 1998 document. (YSE 1998, n.d.)

For some works, such as HPAC (Heating, Piping, and Air Conditioning), electrical works, sewerage and sanitary works, geotechnical works and structural design, according to the Land Use and Building Act, the client should have qualified parties who are competent to do the job. After the contractor is chosen and the contractor has accepted to finish the building for a respective amount of money and in a specific schedule, the possible subcontractors that might be employed by the contractor and do the small tasks of the projects, are not client's responsibility. The small subcontractors hired by the contractor are tied by contract with the contractor, not directly to the client. That is one of the main reasons why in Finland the client wants to choose one contractor, who can then decide by himself if he wants to arrange small contractors to do some tasks, or he can simply do all the work by himself, which does not happen very often, since every single small task of a building requires different type of building expertise and experience. But, since the client has agreed on a specific price and has signed a contract only with one contractor, he is only tied to that contractor. It is then the contractor's responsibility to deliver and how he decides to do it, it is up to him.

#### 4.5 Legislative parties

Apart from the parties that have to be selected by the developer, there are also some legislative parties involved.

One of the important parties involved in these projects is the building inspector authority. The building inspector authority is the party that grants the building permit for the developer if everything presented by the developer is in total accordance with the law. It is also one of the building inspector's duties to be a part of the start-up meeting. This meeting is required in the building permit; it has to be arranged before the start of the construction work and its main goal is to ensure that the party undertaking the construction project is able to go through the project according to the plans, to the schedule and without breaking any rules and regulations. The client, the main designer, and the site manager must be present in the start-up meeting and during the meeting notes should be taken about the parties involved in the design and the construction, about the person who will carry out inspections of the work phases and about other reports that are intended to guarantee the quality of the construction.

The legislative parties such as inspectors will be part of the project before, during and after the project is finished. From time to time, there will be inspectors sent to the construction site so that they can check if everything is being done according to the legislation. At the end of the project, the building cannot start to be used without the given green light from the responsible inspectors, who will do that after they are sure that nothing with the building is wrong and all the required terms and conditions are fulfilled. The responsibility of being in touch with the inspector and other authorities mainly remains the site manager's duty, as the leader and the most important person on the construction site. (Hyttinen, 2018)

All in all, the fact that the project delivery can be done in many different ways and there are no strict rules about it, gives clients enough space to be flexible in their decision-making and to choose whatever suits them the best, while the main target remains the best possible end-result, which is based on the cost-effectiveness and quality.

## 5 INTERVIEWS

Due to the fact that the research method of this thesis was a comparable case study, it was of high importance to conduct some interviews with experienced professionals from both respective countries.

The purpose of these interviews was to understand better the reasons why these countries use the above-mentioned specific project delivery methods when it comes to one-family house projects and to hear possible ideas about improvement.

The first interview was conducted with Gökhan Öksüz, the co-founder of the “g2y baumanagement” company based in Switzerland. Since he has been working for a long time in different kinds of projects in Switzerland and Germany, Mr.Öksüz claimed that the usage of a construction manager has been very beneficial in construction projects recently. He mentioned that the architectural companies do not want to deal with writing RFP documents lately and in Switzerland, this task had been mostly done by the architectural companies before the introduction of the construction manager. Hence, the usage of the construction manager has made architects’ jobs easier and more qualitative, since nowadays they only have to deal with designing. Furthermore, the fact that the work schedule is now planned by the construction manager and not by the contractor who is supposed to do the work site tasks, has proven to be more efficient. This has happened because numerous examples have proven that the contractors have been taking more time than necessary and consequently, that has led to the client paying more money. (Öksüz, interview 7 July 2019)

Asked for the BIM usage in Switzerland, Mr.Öksüz said that only 20% of the projects in Switzerland tend to use BIM. They usually prefer “Microsoft Project”. (Öksüz, interview 7 July 2019)

In addition to that, contract-forming by a construction manager has been proven to be very economical according to Mr.Öksüz. Especially when the investor is not from the construction field, contractors tend to get away from their errors or lack of quality results. Therefore, a well-formed contract with, what he calls, a well-thought “Konventionalstrafe” - a fee that the contractor has to pay in case his required tasks are not properly fulfilled, gives the investor warranty that the project will be finished according to his wishes and in a good budget. (Öksüz, interview 7 July 2019)

To get a clearer view from the workers perspective, another interview was conducted with François Clément, a member of the board of the structural works sector of UNIA, the largest trade union in Switzerland, representing

the interests of all employees and offering its members individual advice, legal protection, and other services.

Mr. Clément, who was asked about his opinion on the project delivery methods used in Switzerland, claimed that as long as a strong contract is formed so that the client feels protected and cannot be financially damaged, the project delivery method is not a big problem. His personal and his union's concerns were more about the employees' safety and interests, and according to him, the only way to have everything under control and no involved party to end up damaged is by prioritizing well-formed contracts. (Clément, interview 16 July 2019)

In addition, Ivan Bocchio, who is a lecturer in the ETH Zürich, one of the highest-ranked universities in Europe, was interviewed. In order to improve the results, Mr. Bocchio claimed that the usage of prefabricated elements should be used more in Switzerland and the usage of BIM should increase as well. (Bocchio, interview 20 August 2019)

Besides the interviews conducted in the Swiss labor, it was important to delegate questions to someone from the Finnish construction sector. Interviewees in Finland were Harri Malaja, the CEO of Sonell Oy, a company in Finland and Olli Palosaari, a production engineer at SRV Rakennus Oy.

"If a private investor builds a house or some houses, it is not very common to have a management company. There are an architect and subcontractors. Some tasks, easy ones like painting or cleaning, can be done by the client himself, especially if we are talking about only one house. There is one supervisor hired that helps to ensure the quality and sometimes he helps with subcontracting, city officials and getting the necessary permits as well." – said Mr. Malaja, answering the question about the construction manager's usage in small projects in Finland. (Malaja, interview 24 September 2019)

Furthermore, he added that the construction management companies tend to be expensive in Finland and they are not interested very much in small projects. (Malaja, interview 24 September 2019)

Mr. Palosaari was asked about his opinion on the most efficient way of building family houses in Finland. According to him (Palosaari, interview 15 October 2019), the most efficient way for these kinds of projects is to find a contractor who can also handle the designing part. Then, the contractor can use small subcontractors for different tasks if he wants to.

## 6 CONCLUSIONS

### 6.1 Differences and similarities

As it was thoroughly explained in the chapters above, the most common way of building one-family houses in Switzerland includes the presence of the construction manager as the most important chain between the client and contractors, whereas, in Finland, the presence of a construction manager is usually seen in bigger projects.

On the contrary to the PORT project, a project that has the investor as its main character, since he will be the one making a profit from the house-selling, in Finland's most common project delivery methods, the investor is mostly building the houses for himself, for his own usage, regardless of the additional involved parties in the construction project. This difference plays a role cost-wise since the houses tend to be always more expensive when someone is building them in order to make a profit than for his own usage.

Figure 16 below shows the differences between the PORT project's delivery method and a typical one-family house project done in Finland.

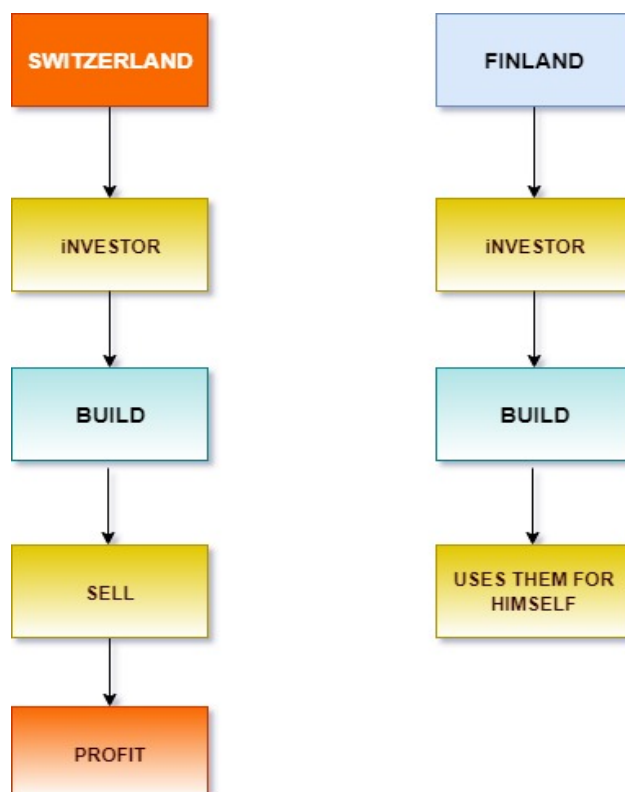


Figure 16. The differences between the PORT project and a typical one-family house project in Finland (Chart formed by using draw.io website)

The number of noteworthy projects that have been completed while having a construction management company present in recent years is



high in Switzerland, which has led this country to use this kind of project delivery method more and more, even in smaller projects. Especially in projects when the investor does not come from the construction industry, the presence of a construction manager tends to simplify things and tends to make the contractors' work be done more efficiently and with better quality. This is due to the fact that the main contractor or the subcontractors are chosen by a specialist, the construction management company, with the invitation to tenders method.

The invitation to tender documents that are sent to the competing contractors from the construction management company include a detailed list of tasks that need to be done during the project. Everything is measured and calculated with high accuracy and nothing is left to chance so that every work can be done for a good price and the client will not overpay for anything. After receiving the offers from the competing companies, the client can clearly see how much every task will cost and with the advice of the construction manager, he can decide which contractor is offering the best services for a better price. The client may have to pay more for the work of the construction management company, but this has proven to be worth it in the long-term since in the absence of the construction management company or in projects where invitation to tender method was not used, the client has been constantly overpaying contractors, since it was easier for them to manipulate and ask for more money when tasks were not written in a detailed form by sophisticated software in a single file. The assurance that the invitation to tender method has given Swiss clients in recent years has led them to use this method even in small projects.

The presence of a construction management company or the usage of invitation to tender method in Finland can be found only in bigger projects but in smaller projects, Finnish clients tend to use the project delivery methods explained in Chapter 4.

What is important to mention is that when they receive the plans, the contractors that are competing for the jobs through RFP sometimes can share their opinion and even help in improving the plans, because they can be experienced professionals and they can also have designing knowledge. Therefore, their opinions are taken into consideration and the drawings, after discussing the with the designing company and the client, can be edited.

An analogy point between these two countries when it comes to one-family houses can also be made about the contractors and subcontractors chosen in projects. In Finland, since there is no construction management company present, the client usually goes with one big contractor, who can then choose different subcontractors to do the tasks but they are only tied to the main contractor, not to the client. Meanwhile, in Switzerland, the presence of a construction management company has led the projects to

have plenty of small subcontractors and the presence of one big contractor responsible for everything has started to be seen less and less. Since the client has hired a construction management company, he prefers that the project's tasks must be done by respective specialists. Choosing a specialized subcontractor for each task leads to better results than having one big contractor responsible for everything. Even though the one main contractor can choose its own subcontractors for some small tasks, too, the client feels more assured when the subcontractors are chosen by the construction management company and are tied by contract to him directly, not to the main contractor.

On the negative aspect, having plenty of small subcontractors can lead to timing problems, since the subcontractors are not tied to each other. This problem relies on the construction management company, who is responsible for the work schedule of all the subcontractors. On the other hand, when the client has chosen one main contractor, as it happens in Finland, the scheduling is not a big problem, since there is one main contractor responsible for everything and even if he hires small subcontractors, they are all his responsibility.

Another similarity between these countries can be found in the forming of the contracts. In both countries, the contracts can be formed freely, as long as all the involved parties are happy with what they are signing.

In Finland, YSE 1998 document tends to be followed, especially when misunderstandings occur during the project (Ministry of the Environment, n.d.), whereas in Switzerland SIA (Swiss Society of Engineers and Architects) legislation is followed. Different liabilities, force majeure and other problems such as material delays, for instance, can all be regulated how the involved parties want, without having to follow strict rules. (SIA 118, n.d.)

Although the focus of this thesis is not on the costing aspect, it is important to mention that between these two countries, there are differences when it comes to the prices of one-family houses.

According to statistics released in 2019, in Finland, the prices of one-family houses vary from region to region, with the Greater Helsinki Metropolitan area having the most expensive prices. For one-family houses, the average price per square meter in that central and crowded area is around 3075 €, while in the rest of Finland the average price is around 1484 € per square meter. The prices are increasing in cities like Tampere and Turku, but the Helsinki area remains clearly the most expensive part of the country. Vantaa and Espoo, the two surrounding Helsinki counties, have prices around 2100 € per square meter, meanwhile the rest of the Finland's prices go from 1800 € in the Southern Finland to 1200 € in the Northern Finland. (Tilastokeskus, 2019)

As for Switzerland, the prices of one-family houses in central areas have been growing recently (Luzerner Zeitung, 2019). In Zürich, one of the most expensive cities in Europe, the price per square meter in one-family houses can exceed 11,000 €, whereas in smaller cantons and not centrally-located areas the prices are lower. (Expatica, 2019)

Undoubtedly, there are occasions where a one-family house project in Finland is done in the same way as the PORT project described above, or a project in Switzerland is done without the presence of a construction management company, but the goal of this thesis was to create a view about the most common delivery methods used in both countries, i.e. the methods that are mostly used in this type of projects.

Differences and similarities that can be mentioned if we widen our area of study would include financial aspects, security and contractual protections, projects insurance, energy efficiency, environmental issues, bankruptcy/insolvency, taxes, bank loans, etc., but these factors are not in the scope of this thesis. (Fors, 2019)

## 6.2 Recommendations

After everything is studied and analysed, recommendations regarding the most suitable project delivery method can be made. The fact that there is remarkable flexibility when it comes to choosing a project delivery method, combinations of methods can be made, too.

Figure 17 below shows some necessary aspects to be considered when it comes to project management. These aspects are always thought upon and depending on the type and the volume of the project, decisions are made.



Figure 17. The necessary aspects to consider during project management (wbdg.org)

According to my recommendation, the presence of a construction management company would be an undebatable involved party even in small projects. This opinion is undoubtedly affected by my close observation of the PORT project in Switzerland since I was able to see from a close range how a construction manager can have a huge impact on the quality of the project and can make the client's work easier. The fact that the contractors' selection with the invitation to tender method, the contract-forming, and the work schedule are handled by a professional makes me believe that the importance of a construction management company in projects is undeniable. The possible extra money that has to be given to the construction management company, since a new party is involved, is saved from the correct selection of the contractors because they are chosen by a method that is proven to be very accurate in recent years. In addition to this, even if the involvement of a construction management company will lead to a bigger final cost, the qualitative end result will make everything seem worth it, because, according to my opinion, a proper investor evaluates the quality and is not only interested in the financial aspect. A well-programmed project will continue to provide value throughout its lifetime and will contribute with a wide range of social and economic benefits. Early investment in planning, programming, and design can help deliver these benefits and avoid unnecessary costs and delays, and all these are possible with the right construction management company, who is supposed to be the main chain between the investor, the designer, and the contractors.

One of my modifications in these projects would include the growth in the usage of BIM (Building Information Technology) software, whose usage is not so common in small projects in Switzerland, but it is somewhat more common in Finland. The usage of this 3D-software can make the visualization of the building significantly better before a single coin is spent and this would lead to a better working schedule since the contractors and all the parties involved would be able to know better for how much time a specific job can be done. Ergo, a more accurate working schedule leads to better cost-efficient results.

The usage of BIM might make the designing companies ask for more money, but if we think in the long term, this money can be regained later since the usage of this software will help to have a more qualitative building finished in a better schedule and with reduced errors during the process.

Besides BIM, the utilization of various construction project management software, like "eSub", for instance, can help out the project manager tremendously with different time-consuming tasks that are required. An all-inclusive project management solution will automatically track and store all documents, provide a transparent medium of communication. This exemplary software exclusively focuses on the needs of the subcontractors. Esub, or any other similar construction management

software, bridges the gap between the construction site and the office by giving the involved parties the possibility to access the drawings, to write and check the daily reports from their mobile devices and to simply have whatever information and update they need in their hand. To use this software the workers must finish training before the construction works have begun, but the time spent will be recovered later due to the fact that fewer meetings have to be conducted during the project, since all the necessary materials, drawings, and other documents can be shared through the software. This was just an example that tells that the projects can clearly benefit from the usage of technology, but in small projects like one-family houses, if the software costs a lot, then the involved parties have to be careful if it is worth paying for it. However, in bigger projects, its impact can be truly significant.

Figure 18 below shows the theme of the eSub software, whose usage has started to grow recently.

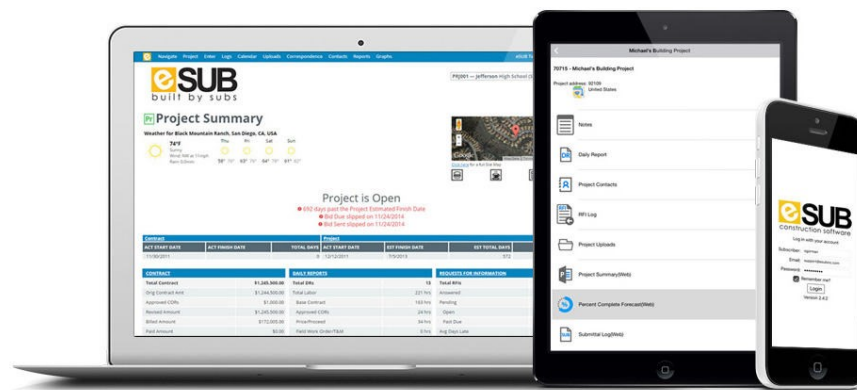


Figure 18. eSub construction management software's theme (esub.com)

In addition to the modifications that include technological software, what is really important is the employees' proper training. A well-known fact is that employees who know exactly what they are doing will get the job done faster. This proposed modification is incorporated with the idea of choosing different subcontractors rather than one contractor for the whole project. Hiring small subcontractors means that you have hired professional and specialized companies to do each respective task and that means your chances of having properly trained workers are bigger. Even if that main contractor chooses his own subcontractors, it is always better and safer to have the subcontractors chosen by yourself and this is possible with the help of the construction management company, who will be responsible for the selection of the right subcontractors.

To sum it up, it is important to mention the fact that the modifications that are proposed to be included in different project delivery methods have to be carefully analyzed, especially cost-wise because many things depend on the volume of the project. All these aspects should be carefully considered when the decisions are made. The fact that there is space for flexibility in

project delivery methods makes it easier for the parties involved, whose decisions have to be always made while having the ultimate goal in mind: the cost-efficient and qualitative end product.

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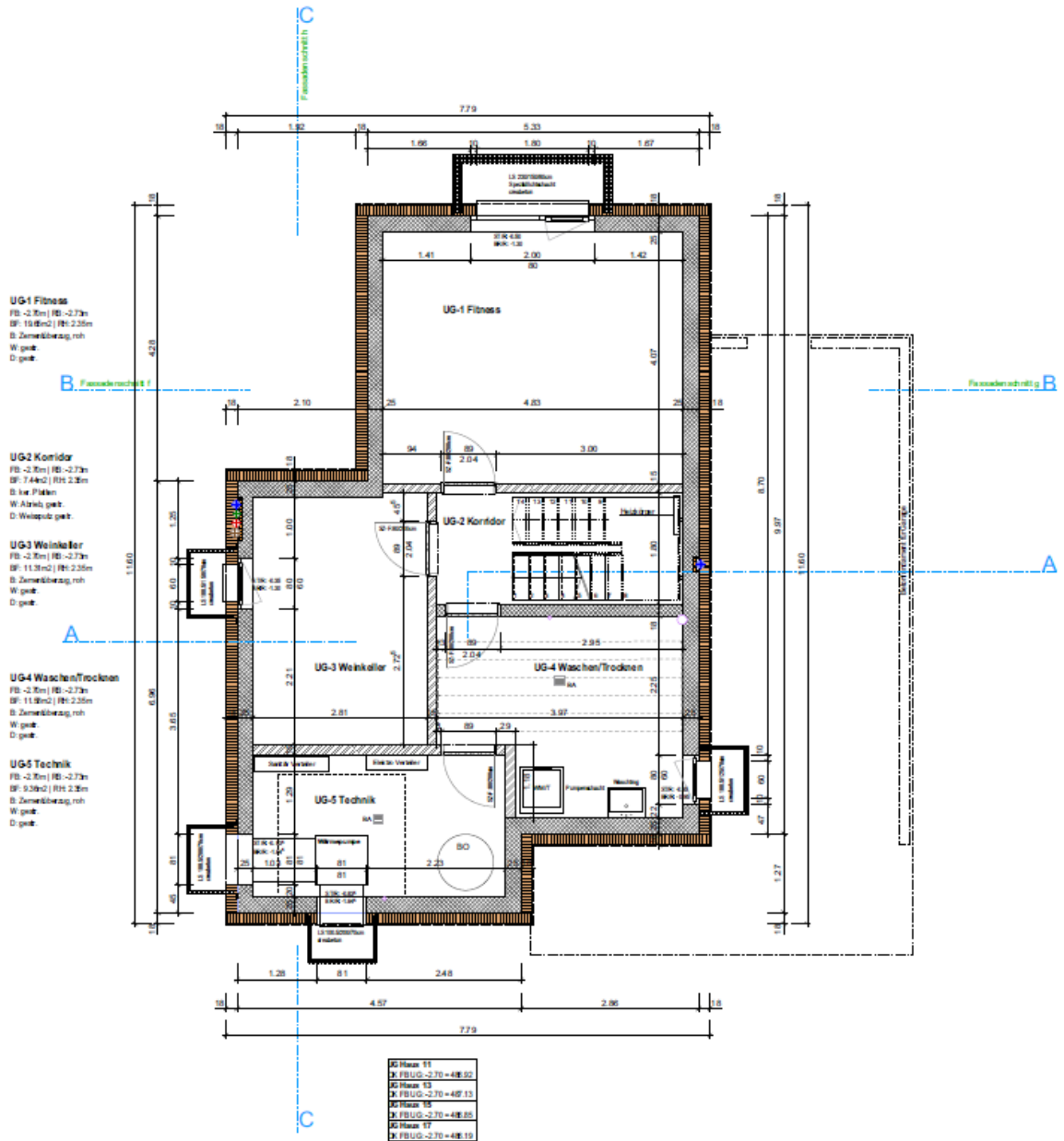
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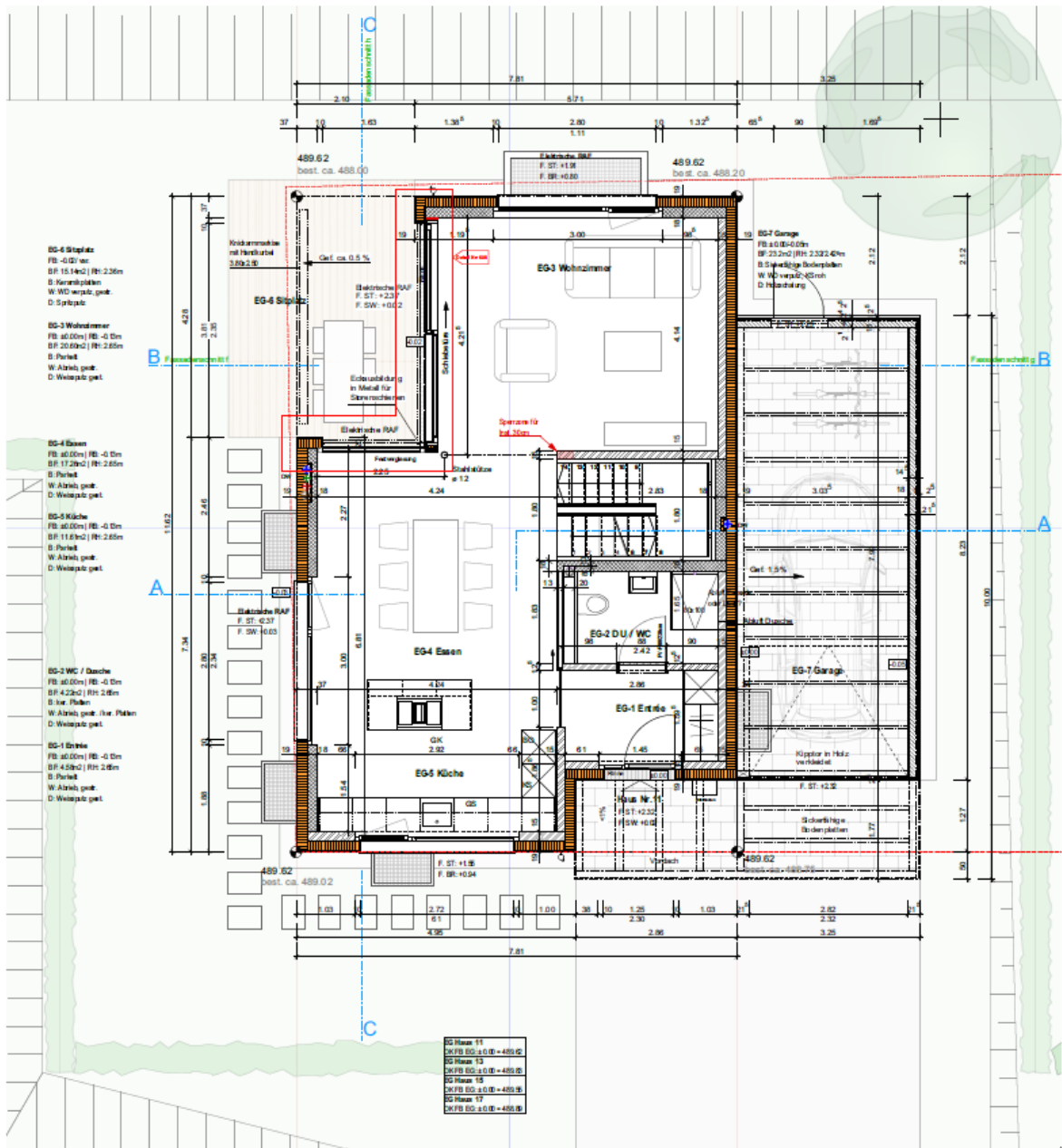
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APPENDIX 1. PORT project – architectural plans (received from “Von Graffenried AG Liegenschaften”, the architectural company of the project)

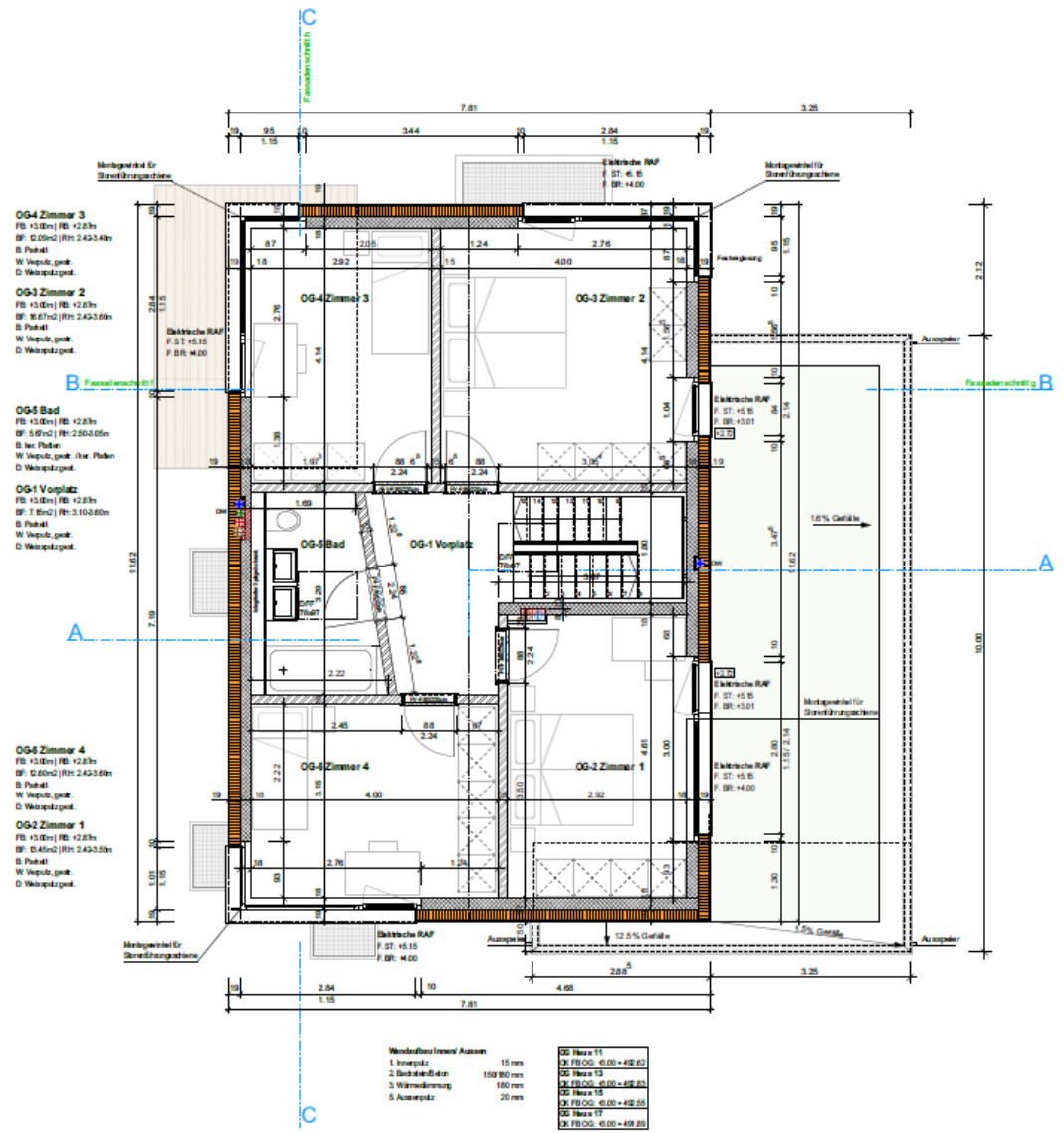
Basement



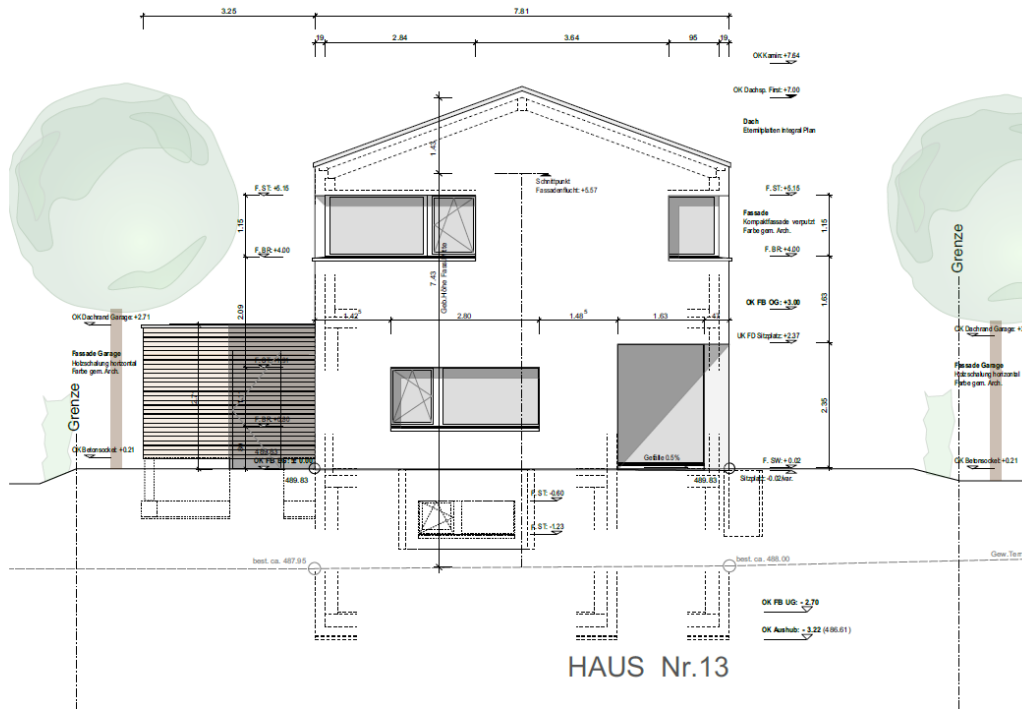
Ground Floor



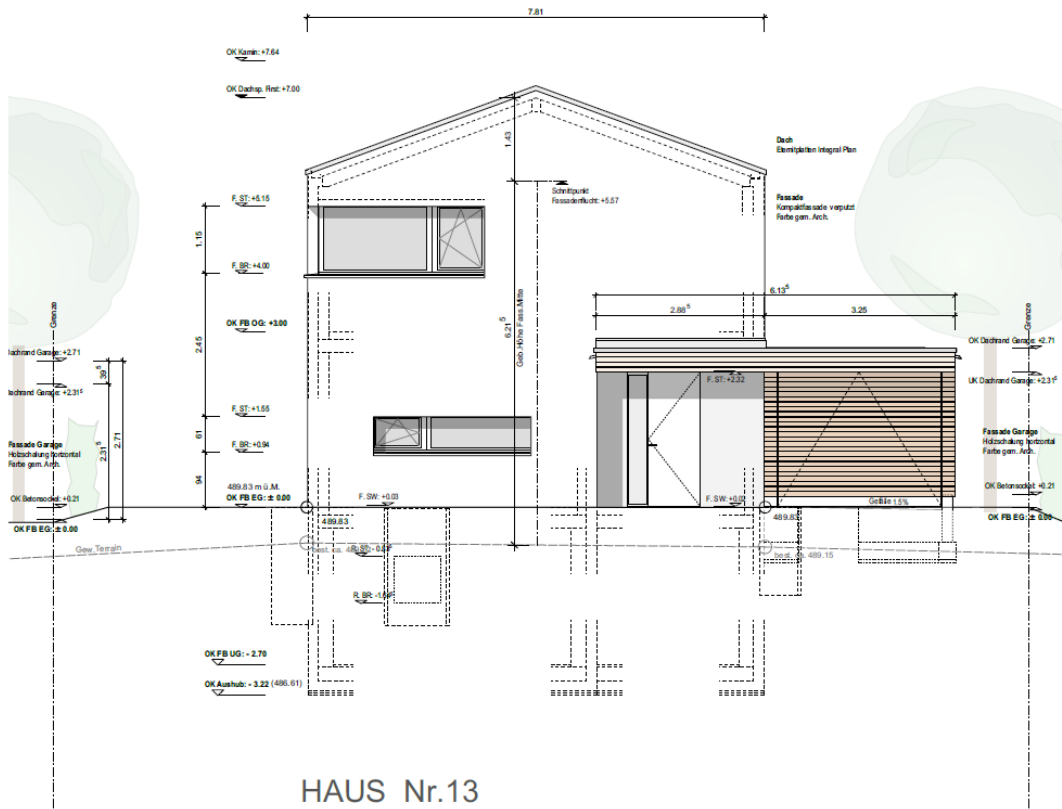
Second Floor



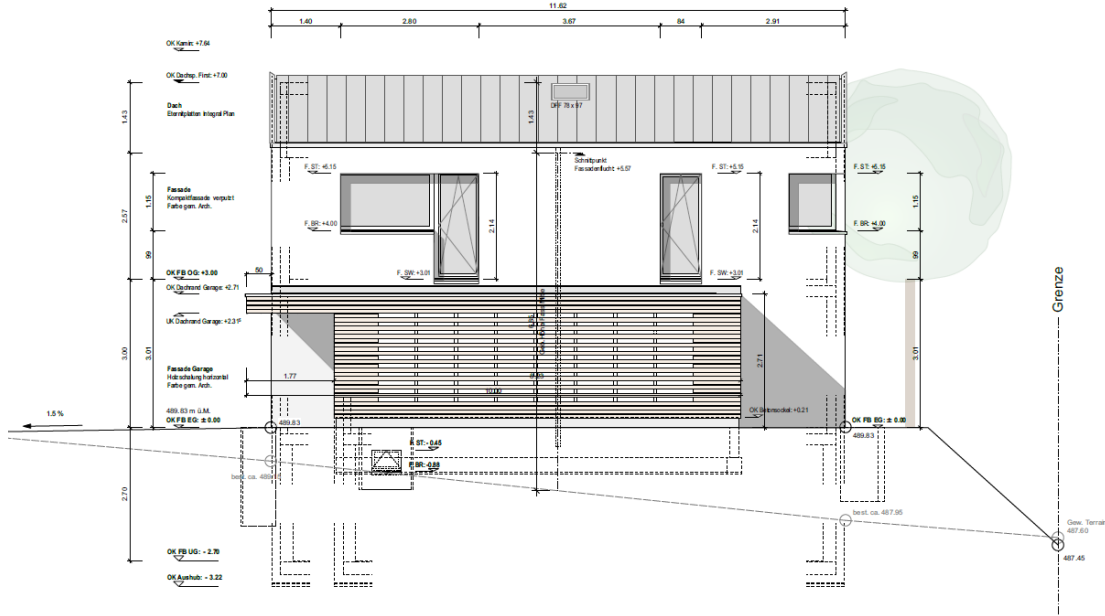
North view of the houses



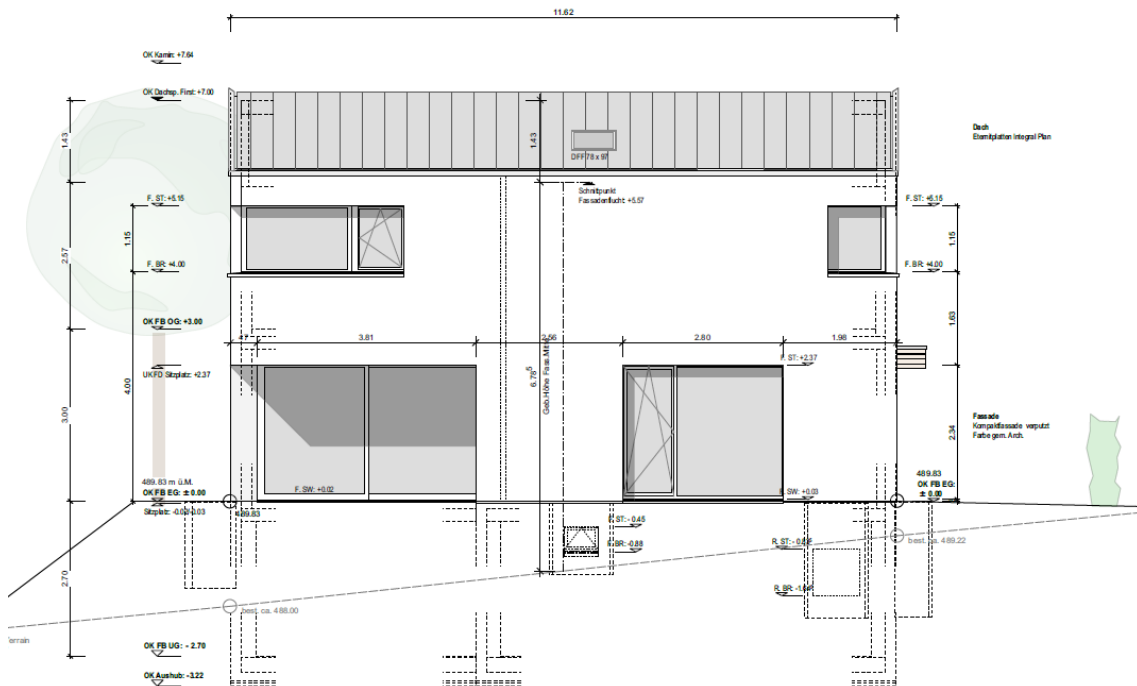
South view of the houses



East view of the houses



West view of the houses





APPENDIX 2. PORT - construction site pictures (personal copyrights, taken before the works started)









