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ABSTRACT

APPROXIMATE COST PREPARATION IN A BIM- BASED ARCHİTECTURAL MODELLING PROGRAM.

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Developments in our country's construction sector and the ever-increasing human needs have brought along the new necessities.

Construction of such buildings under today's conditions requires different specialties and technologic abilities in all stages of the building lifecycle, from the design up to application. As the cost of specialties and consultancies are higher and scarce, this creates a serious obstruction for building design and construction.

Building information modeling (BIM) is perceived as a technology, methodology and process integrity which can support integrated design and project delivery processes basically and which introduce specific advantages when compared to existing information technologies.

Combination of open source approaches on building design and construction with BIM procedures involves big potentials in terms of the management of all these processes. Due to BIM based open source information system, it is possible that especially small scaled architecture offices and small scaled construction companies with the same understanding may reach information and expertise in this important issue through the assistance of information technologies. In this survey, Autodesk Revit is used as main platform. In this modeling, it is hereby planned to prepare an approximate cost by using the bills of quantities obtained from Revit and to accelerate the workflow.

Key Words: BIM, Revit, Modeling, Approximate cost, Yardage, Progress Payment

ÖZET

BIM TABANLI MİMARİ MODELLEME PROGRAMINDA YAKLAŞIK MALİYET HAZIRLAMAK.

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72 sayfa

Ülkemizin inşaat konusunda gelişmekte olan bir ülke olması ve insanların temel ihtiyaçlarının giderek artması yeni ihtiyaçları kendisi ile birlikte getirmiştir.

Günümüz koşulları ile bu tür yapıların yapılması tasarımdan uygulamaya kadar bina yaşam döngüsünün her aşamasında farklı uzmanlıkları ve teknolojik kabiliyetleri gerektirmektedir.Uzmanlıkların ve danışmanlıkların maliyetlerinin yüksek ve az oluşu yapı tasarımı ve inşaatı konusunda ciddi bir engel oluşturmaktadır. Bina bilgi modellemesi (BIM) temel anlamda entegre tasarım ve proje teslim süreçlerini destekleyebilen ve mevcut bilgi teknolojilerine gore karşılaştırıldığında belirgin avantajlar sunan bir teknoloji, metodoloji ve süreçler bütünü olarak algılanmaktadır.

Bina tasarımı ve yapımı konusunda açık kaynak yaklaşımlarının BIM yöntemleri ile birleştirilmesi, tüm bu süreçlerin yönetimi açısından büyük potansiyeller içermektedir.BIM tabanlı bir açık kaynak bilgi sistemi sayesinde özellikle küçük ölçek mimarlık ofisleri ile geleneksel anlayışta iş modellerine sahip küçük ölçekli inşaat firmalarının bu önemli konuda bilgi ve uzmanlığa bilgi teknolojileri yardımı ile ulaşılabilir hale getirilmesi mümkündür. Bu çalışmada Autodesk Revit ana platform olarak kullanılmıştır.Yapılmış olan modellemede Revitten alınan metraj cetvellerinden faydalanarak yaklaşık maliyet çıkarılması ve iş akışının hızlandırılması planlanmaktadır.

Anahtar Kelimeler: BIM, Revit, Modelleme, Yaklaşık maliyet, Metraj, Hakediş.

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Dolayısıyla öncelikle, benim bu kararı alamamda önemli rol oynayan ve öğrenim hayatım süresince beni yönlendiren, desteği ve olumlu yaklaşımlarıyla bu tezin hazırlanmasına önemli katkı sağlayan, tez danışmanım Prof.Dr. Yusuf Arayıcı'ya, yanımda olduğunu her zaman hissettiren hayat arkadaşım Ceylan Tezcan'a, benden hiçbir zaman yardımını esirgemeyen sabır ve anlayışlarıyla bana destek olan dostlarıma, sonsuz teşekkürler ederim.

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LIST OF ABBREVIATIONS

2D	Two Dımensıonal
3D	Tree Dımensıonal
4D	Four Dımensıonal
BIM	Building Information Modeling
CAD	Computer Aided Deisng
ÇSB	Ministr of Environment and Urbanızation
DSİ	State Hysdraulic Works
DWG	File Format That Stores 2 or 3-D Disgng data
KGM	General Directorate of Highways
NBIM	USA National Building Information Model Standard Project Committee
TMMOB	Union of Chambers of Turkish Engineers and Architects

CHAPTER 1

INTRODUCTION

Advances in the technology penetrate into every part of the life rapidly as the days pass and change the life. Besides its impacts on the daily life, it brings new tool and procedures into all sectors and facilitate various operations. Especially computers take big role in every filed and at every level. Informatics technologies which will include the innovations in the computer based hardware or in the field of software, more frequently, are named as, that's to say, information technologies.

Computers which were being used for the solution of more limited and general problems in the previous years are today in such a position to be capable of accomplishing very different and complex functions and capable of producing different data.

Today, computer based design tools have been already adopted by the construction industry, which are affecting the project and project processes directly. In the past, operations which were being conducted under though conditions and restrictions are able to be performed more conveniently, rapidly and in a better quality today. Yet, today, the developing technologies have taken out these numerical industries from being a tool of design and converted into a design environment.

Architects and engineers are trying to recognize and explore the new tools which are introduced by this new advancement and trying to adapt the opportunities, which are being committed, into the design processes. Use of advancing technologies in the construction sector hereby play an important role for the design of sustainable structures in line with the principals of sustainability (Eskin, 2011).

1.1. Problem Definition and Goal

As the Law No. 4734 entered into force, the obligation of compliance with unit prices which are determined by the public institutions has been abolished. However, administrations which go out to tender are using the unit prices which are published by various public institutions such as ÇSB , KGM , DSİ, while they are calculating the approximate cost of these projects.

As we are living in an age where technology is at the forefront, unit price lists should be renewed within the scope of technological developments. New analysis which include new technology and machines, are required to be developed. Private sector or a public institution should undertake this process and should guide the bidders.

Even in a simple plastering work, for making necessary calculations and for giving offers; existence of documentation according to bleeding edge technologies shall introduce reliability both in terms of the administration and contractors.

During the process of the calculation of approximate costs, the unit prices lists which are being followed up by the administrations insistently should be renewed in line with the technological developments. Analyzes which also include the new technology programs should be developed. This work should be undertaken by the Public Procurement Authority in such a manner to give light to the bidders, just like to the administrations. Accordingly, the problems being faced up by the administrations for the calculation of approximate cost shall provide that the bidders will not look to these values with suspicion.

Administrations may not calculate the approximate cost with adequate sensitivity due to technical insufficiency, limited time at the preparation stage and lack of staff. When a wrong figure which has been calculated wrong for the project is announced by the administration, bidders may confused, furthermore the offers to be made by the applicants shall have been directed. Due to the administrations' incapability for the accurate determination of the approximate cost, contractors should make the project to be examined by their engineers and they should prepare the most appropriate offer thereof.

As a summary, in order to overcome these problems, a system should be created and public administrations and private sector should operate this system with a common ground.

This system; should operate with Bim cloud, so that; the construction, electric, mechanic, environment can apply the bills of quantities and can easily prepare the approximate costs

In my post-graduate thesis, the approximate cost calculation of the construction of the integrated state hospital with 10 bed capacity located in Province: Uşak, District: Karahanlı, in which I was acting with the capacity of Construction Site Chief and of which the building supervision is undertaken by the Ministry of Health was being made by the technical personnel who are employing in the Ministry of Health Department of Construction and they were using the manual calculation procedure. On the other hand, as a comparison; in the same project and depending on the same static and architectural dimensions ; I will draw the wall thickness, floor height , door sizes, window sizes, types of materials to be used in locations one to- one in Revit architecture program and I will compare the manual calculation procedure and Revit architecture program automatically in terms of yardages and I will further make the comparison of the bills of quantities which are calculated in either ways.

1.2. Organization and Outline

The thesis is organized into 5 chapters. Chapter 1 introduces general information and submits information regarding the problems and solutions.

Chapter 2 introduces general information on building information modeling and explains the operating principles, as well as the thesis, articles and literature in this respect.

Chapter 3 gives information on Revit architecture program, explains the operating principles thereof, as well as explains how to make modeling in Revit architecture program and what should be taken care of .

Chapter 4 explains how the bills of quantities are preraped and how the approximate cost is being formed

Chapter 5 makes the comparison of the bills of quantities obtained by 2 different procedures and introduces the conclusion thereof.

1.3. Approximate Cost Overview

For awarding a contract on a construction work, the approximate cost is required to be calculated primarily. The estimated cost specified in the Public Procurement Law No. 2886 is the approximate cost in the Public Procurement Law. Economically, the selection of the most advantageous offer, that's to say the selection of the contractor who will undertake the work in health manner depends on the accurate calculation of the approximate cost. If the approximate cost is calculated wrong or deficient; the most advantageous offer in terms of economic aspect shall be selected inaccurate, furthermore disputes shall occur at the implementation stage of the contract. For this reason, we should get familiar with these definitions more closely.

Approximate Cost:

Approximate cost expresses the price which is set forth for the construction of the work which comprises the subject of the tender. Administration hereby makes a determination of quantity/amount and makes a research on prices in compliance with principles and procedures specifiedin the Construction Works Regulation and calculates the approximate cost of the work which comprises the tender excluding VAT which shall be indicated in the approximate cost calculation schedule, along with the justifications thereof.

Approximate cost may be either prepared by the personnel who will be assigned by the administration or by the consultancy service providers in accordance with the 48th article of the Law provided to be approved by the tender authority.

Administrations determine the approximate cost according to the budget programming. Administrations; considering the approximate cost of the construction work, determines whether the tender remains below the threshold price or not. Approximate cost shall be utilized for the determination of tender announcement periods and competence criteria.

Tender commissions shall utilize this approximate cost for the selection of the most advantageous offer in terms of economic aspect as well as for the calculation of the excessive lowest limit thereof.

No tender announcements shall be given place in the approximate cost. They shall be explained to th applicants by the tender commission prior to opening the envelopes. Thus, it is hereby aimed that the applicants should do their own cost calculations and should determine the accurate cost without depending on the unit prices.

1.3.1. Procedures for the Calculation of Approximate Cost

In this article, the most common two procedures for the calculation of approximate cost shall be discussed.

1.3.1.1. Procedure for calculation of approximate cost so as to be used for the budget programming by the Administration (Parametric Procedure)

Parametric procedure is the calculation of the approximate cost for the allocation of allowance into the budget at the stage of including the relevant investment into the investment program prior to the preparation of the application projects. Various public agencies use this procedure to calculate the approximate cost which is necessary for putting an allowance into the budget. This model involves the use of the project properties in a mathematical model in order to calculate and estimate the project costs.

1.3.1.2. Calculation of approximate cost by the unit prices published by the public institutions and agencies

The most common procedure used for the determination of the unit price and current values which are basis for the calculation of the approximate cost is the unit price and current values which are published by the public institutions and agencies.

1.3.2. Calculation of the Approximate Cost

The amount calculated by multiplying the production cost of the production items according to the project and locality lists with the unit price calculated by the basic price and the determined prices is calculated excluding VAT and the approximate cost is determined by adding 25% of the profit and overheads.While the approximate cost is being calculated, it shall be taken into consideration whether the price difference shall be paid or not ; and for the works in which price difference shall be paid; the prices on the date when the approximate price was determined shall be considered, as regards the works if no price difference shall be paid; probable price differences which may occur during the construction period shall be taken into

consideration, thus the prices which will be determined as explained above should be taken basis. Approximate cost calculation/account schedule and approval certificate shall be preserved within the scope o the tender dossier and it is not a tender document.

CHAPTER 2

LITERATURE REVIEW

2.1. Building Information Modeling

For enabling the thesis to achieve its objective, that's to say, for enabling the BIM related contract documents or protocols to be examined and assessed correctly, BIM concept should be understood well. For this reason, a detailed research on BIM shall be take place in this section of the thesis.

2.1.1. What ıs Building Information Modeling

Building Information Modeling process is unique as based on Building Information Model which can be shared, which is digitally based and which acquires the multiple-operability. Thus, as a definition of Building Information Modeling; in terms of the process which provides the information management and in terms of compliance,

USA National Building Information Model Standard Project Committee (NBIM) makes the following definition:

> *Building Information Modeling (BIM) is a digital representative of the physical and functional properties of a plant. BIM is a common information source which creates a reliable basic for the decisions being taken for a plant during its lifecycle; is valid starting from the decision for the construction until the end of the demolition* (NBIMS, 2016).

Building Information Modeling (BIM) building modeling is a developing technology which is created for a common design and integrated project delivery (Yan vd. 2011). Here, integrated project delivery means the delivery of the projects which are prepared by the interdisciplinary parts (infrastructure, superstructure, electric, environment, etc.) of a construction project, whereas the delivery is made by the combination of these projects as a whole. That's to say, it is to create a common

language and to detail the building project as a single project (Akkaya, 2012).

During the building design process, various data is produced in all disciplines of the process, from the primary sketches up to point details. In traditional CAD software, these data are represented in documents which are independent from each other. Plan designs, view and cross sections, details and bills of quantities define the same structure but they are all independent documents. To re-draw, write, place the same information for independent documents takes time and is open for various errors. Changes made in the design are obliged to be processed in these independent documents one by one and again and again. Particularly, as the project delivery period approaches and as the number of documents increase, these changes may get bothersome. Including the revisions which arise during the construction process, it is obvious that traditional procedures will remain unsatisfactory today (Fazli, Fathi, Enferadi, Fazli, Fathi, 2014).

BIM provides us the visual accessibility of real plant during its lifecycle. (Volk, Stengel, Schultmann, 2014). Building information modeling solutions is the creation and execution of the digital data bases in cooperation. When any part of the data base is updated, this alteration is coordinated in all sections and can be controlled by everyone (Autodesk, 2016).

Mostly, BIM is misunderstood by the people. The general wrong opinion is that BIM is thought to be a single model or a data base.

It should be explained that BIM shall not replace the people. BIM decrease unnecessary and ordinary works and facilitates data processing. However, errors are probable in BIM, if wrong data is loaded by the people, errors can occur (Fazlı, vd. 2014)BIM lifecycle is shown in Figure 2.1.

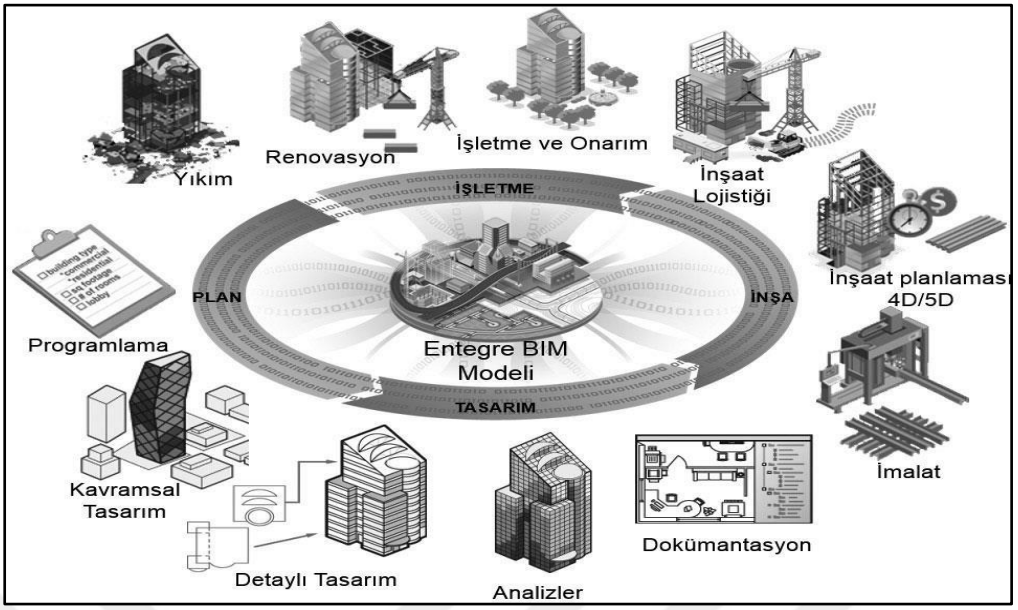

Figure 2.1. Building Information Modeling Lifecycle
Source: Işıkdag, 2010.

Building Information Modeling is able tyo be used in a very wide framework, from the design process up to building operation, within the entire asset cycle of the building. This utilization can be collected under four different headlines (Ofluoğlu, 2009) :

Use in design process

Us ein environmental analyzes

Use in building construction process

Use in building operation

Actors which are required to take place in Building Information Modeling is shown in Figure 2.2.

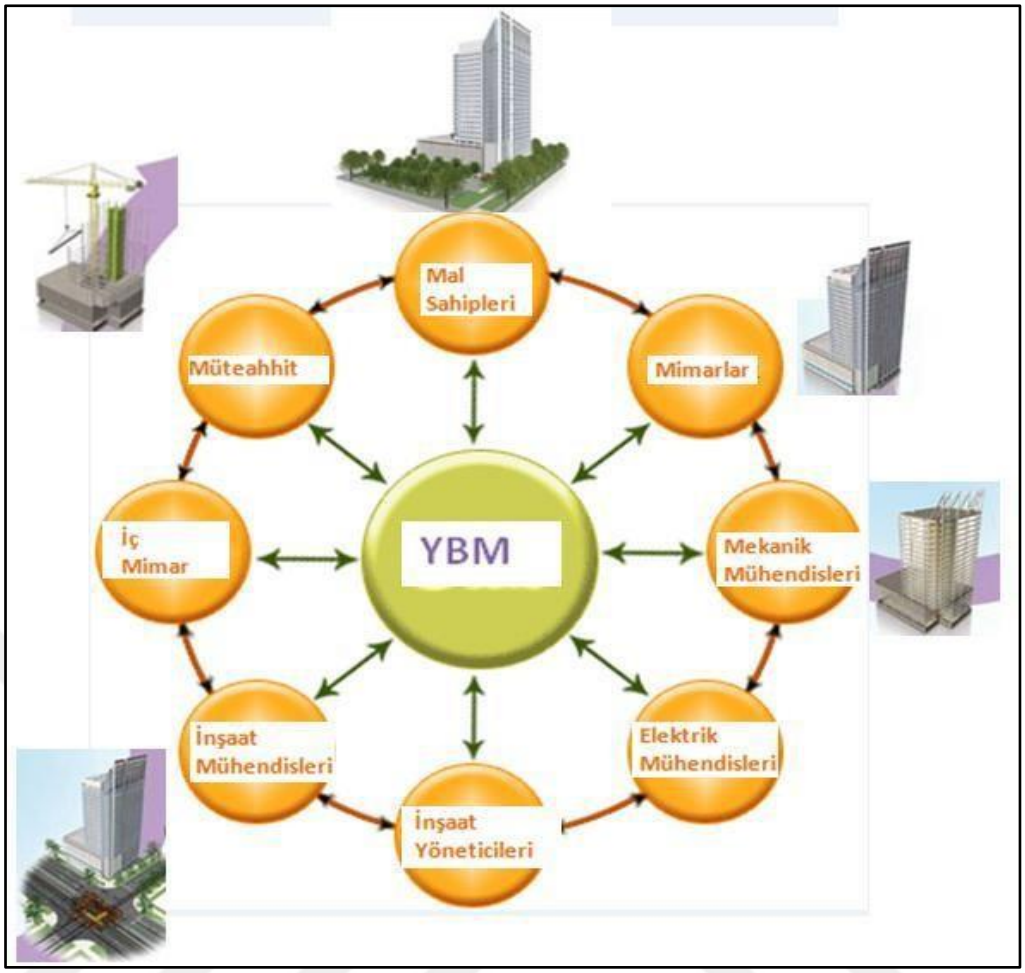

Figure 2.2. Building Information Modeling Actor Relations
Source: Akkaya, 2012.

2.1.2. Areas of use of Building Information Modeling

Building Information Model may be used for the objectives listed below (Forbes, 2010):

Visualization: 3B coverings may be easily formed.

Production/Workplace Drawings: It is easy to form workplace definitions for various building systems. For instance, after the model is completed, metal plate pipe installation drawings may be easily formed.

Automatic Production: In the projects which including developed suppliers technologically, data obtained from BIM files may be used as input for the numerically controlled manufacture material.

Assessments for the Regulation: Fire Authority and other authorities may use this model to review the parts of the building projects which are related with them selves.

Criminal Analysis: BIM may be easily adapted to indicate graphically the potential failures, leakages and discharge plans.

Plant Management: Plant management departments may be used for alteration, space planning and maintenance and repair purposes for BIM.

Cost Account/ Calculation: BIM software has been formed with cost account/calculation property. In case of any change is made in the model, material quantities will be automatically detected and changed.

Building Series: BIM model material order may be used effectively for the formation of delivery programs for manufacture and all building products.

Dispute, Intervention and Overlap research: *BIM* models 3B is produced in scales in 3D space. All big systems should be controlled visually for interaction. In this process, steel girders, channels and walls and piping system overlapping can be controlled(Akkaya, Ceylan, Karahan, Başaraner, 2011).

Building Information Modeling can be used extensively from design process to building operation within the building's entire existence/asset lifecycle. This utilization can vet collected under four main topics:

a. Use in design process: Municipality documents to be added into the system after feasibility, requirement list, preliminary project design, final project design, static-electric-mechanic projects etc.
b. Use in environmental analyzes: Light analysis, thermal insulation analysis etc.
c. Use in building construction process: Materials supply, revision control, warehousing control, etc. ...
d. Use in Building Operation: Trouble shooting, revision control, demolition, etc(Ofluoğlu, 2009).

2.2. Project Management Techniques in BIM Application Plan

There are different project management techniques in BIM application plans worldwide, which are:

2.2.1. Integrated Project Delivery

In this procedure, integration should be made in the beginning of the project, a

developed technology shall be used which would enable the project to be defined flexible and successful. This procedure uses all the participants' ability and understanding under a collaborative environment and provides top level communication, and support intensive cooperation in the project team (Autodesk, 2016).

2.2.2. Design - Build

In this procedure, a single company performs both architecture/engineering works and construction works under a single contract. Such companies commit to the corporation -which it is contracted to- that they shall prepare accurate and full documents without any failure (Autodesk, 2016).

2.2.3. Design - Bid – Build

In this procedure, property owner makes all documents to be prepared by a designer and awards a contract so that the works shall be performed by more than one contractor. This procedure does not let the contractor to use the BIM technology for coordination purpose in full (Autodesk, 2016).

CHAPTER 3

MATERIALS AND METHODS

3.1. Revit Architecture

Figure 3.1. Revit architecture 3D View 1

Revit program has been developed by Autodesk Company and it is a popular BIM program. Due to the parametrical models introduced to its users by Revit program, not the magnitude of the dimensions of the designs but the rate relations with each other has increased, thus the prepared designs were provided to be scaled easily. Between 2000 and 2002 Revit Technology company developed 4 different versions, later on in 2002 the company was purchased by Autodesk Company which was the owner of various developed CAD programs such as AutoCAD and its name was changed as Revit Architecture. In 2013, as other engineering and design disciplines were added into the program by Autodesk company, a further change was mande in the company‘s name and the final name was arranged as Revit which is still being used today.

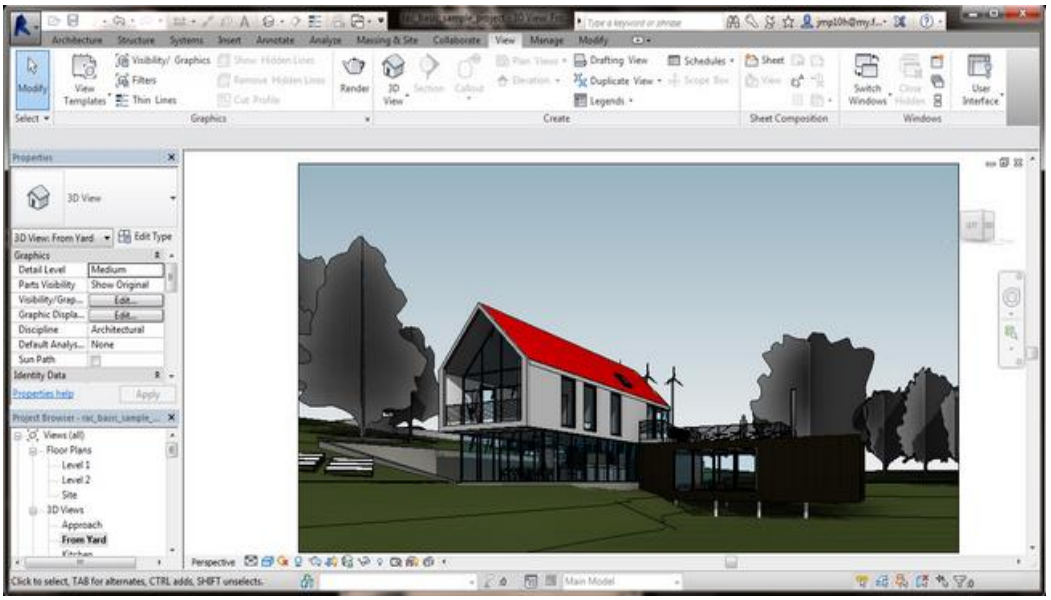

Figure 3.2. Revit architecture 3D view 2

Autodesk Revit is used widely by civil *engineers, architects, designers and the engineers who are dealing with* electric, *mechanic and sanitary installation*. With Autodesk Revit program, building and building components may be designed in three dimensional manner. Remarks and drawings of the 2D elements which are included in the model data base can be used.

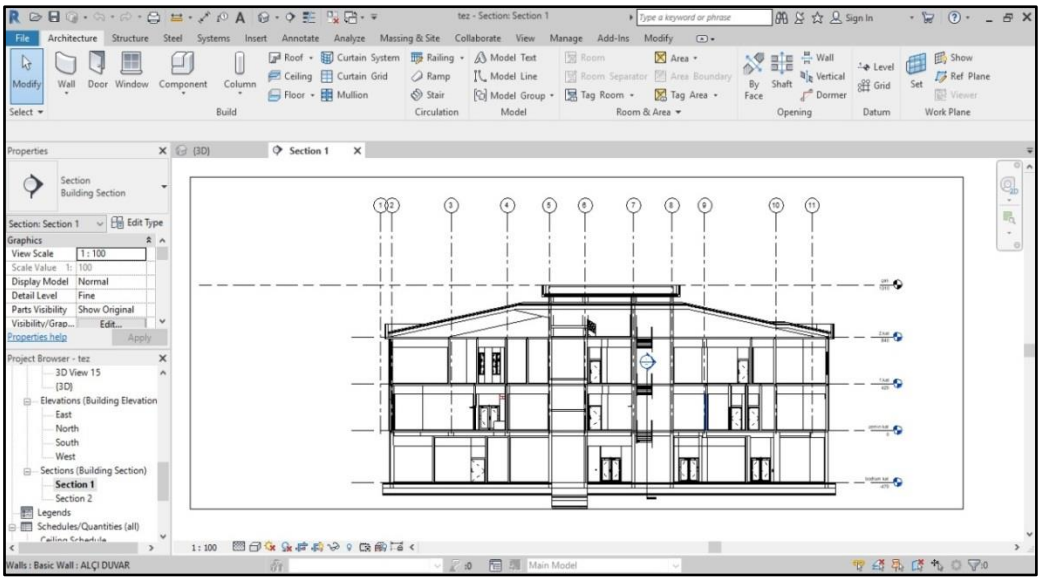

Figure 3.3. Revit Architecture Section

3.2. What does Revit Program do

With Revit program, thanks to building information system, documents and information regarding the project can be obtained automatically. Bills of quantities,

cross sections, view and screw plates are the architectural factors which can be obtained practically and rapidly by the Revit program. When a change is made in the Revit program where the design and design connected information are controlled from the same data base, it enables all related areas to be changed automatically.

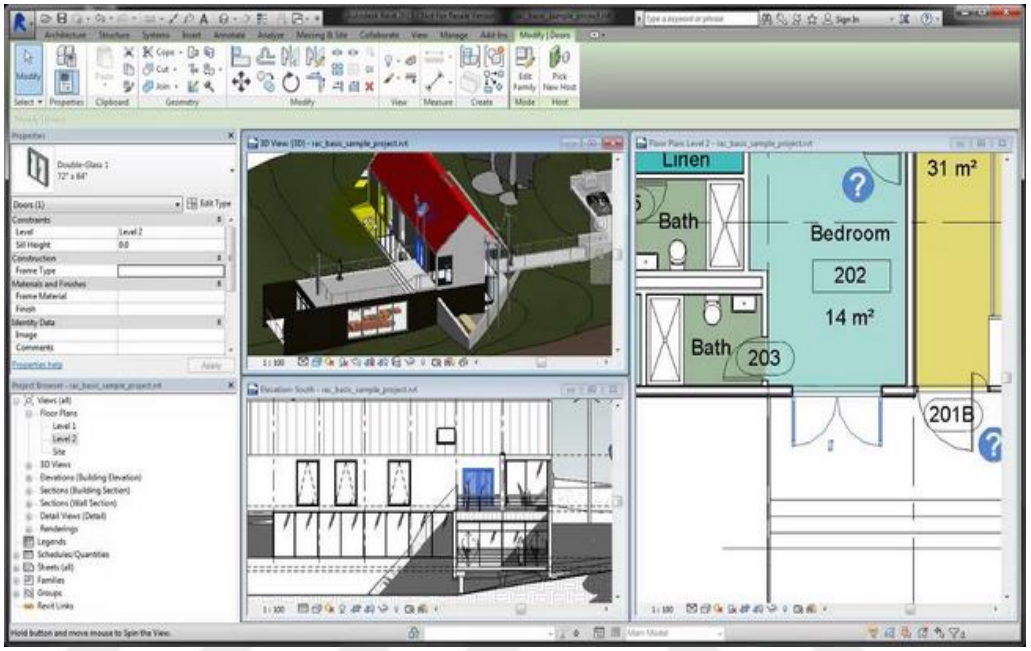

Figure 3.4. Model Image 1

Revit program also alleviates the burden of the users during the documentation process. As the rate of failure shall be lower in the documents which are prepared by Revit, time and cost efficiency shall have been provided. A change which is made in standard CAD programs is required to be processed into all details within the project. With a change to be made on a specific point of the project in the design which is made by Revit, all details shall be seen instantly and they shall reflect automatically. Time shall be saved while using the program.

Drawing of the floor plans, taking the cross section of the designs prepared, preparation of quantity survey and even the land modeling procedures can be rapidly and aesthetically prepared by Revit. With Revit program, 3D designs can bet affectively visualized. . Having the property of attachment, Revit operates in harmonization with render attachments such as Lumion.

Revit program, besides, has a developed *Import/Export* module. With Revit, designs which have been prepared in other programs may be also arranged furthermore it is also possible that the designs which have been prepared on the

program may be also recorded in other formats which are supported by other programs. Thus, the designs may be accessible over various programs such as; 3ds Max, AutoCAD by the users who are not using Revit.

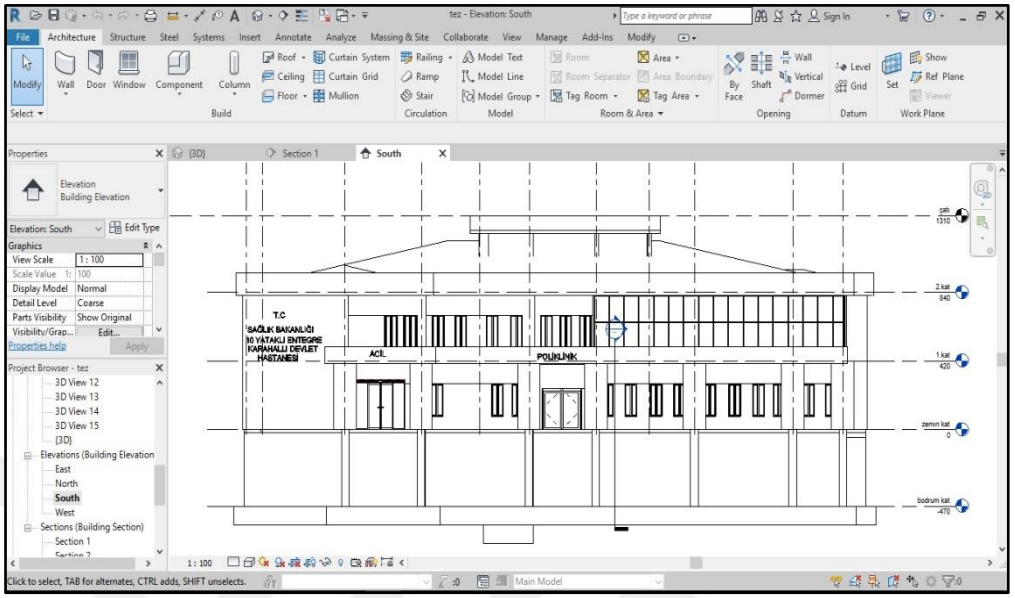

Figure 3.5. Model Image 2

3.3. Modeling with Revit Architecture

The Construction of Uşak Province Karahallı District Integrated Disitrict Hospital with 10 - bed capacity which I have been modeling as any postgraduate thesis was put into tender with tender registration no. 2018/331971 and the Ministry of Health has undertaken the control of the process.

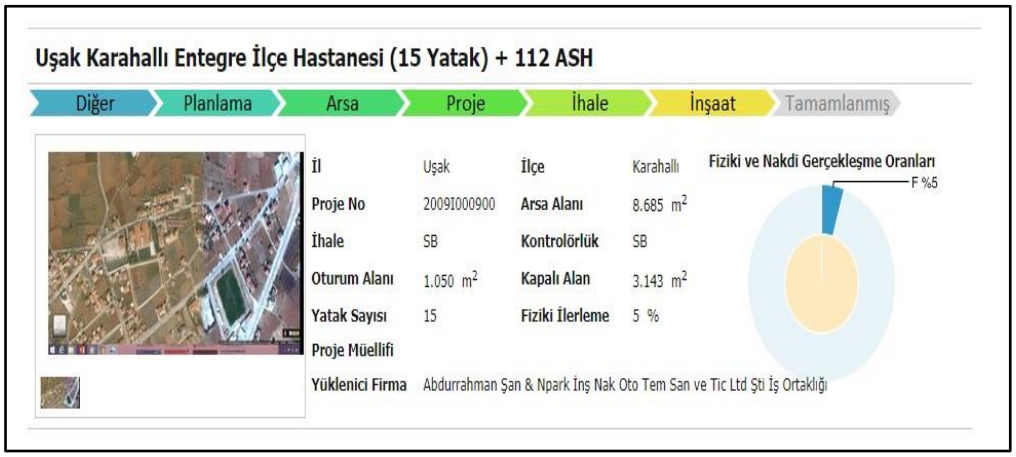

Figure 3.6. Building Information

Figure 3.7. Model Image 3

3.3.1. Program Interface

When you open the Revit program, that's to say when you decide for modeling;

Program is opened as seen below

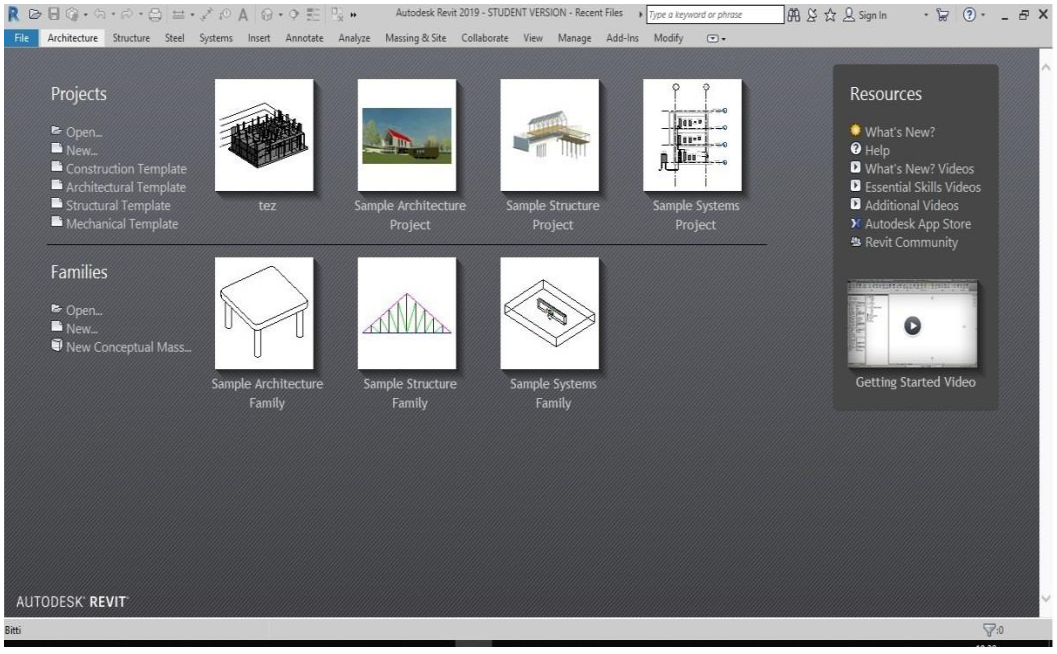

Figure 3.8. Axis drawing

After the program interface is opened, on the left upper edge; template sections take place, whereas families section sar eincluded in the left bottom part. In this section;

a. Construction Template
b. Architecture Template
c. Structure Template
d. Mechanical Template are available.

Architecture Template should be opened as I shall make arcihectrural modeling.

3.3.2. Axis System

After the arcthitectural template is opened, you should change the length unit as " cm" by UN shortcut key and you should initiate axis drawing from the grid taps under the modify screen and you should enter the axis intervals as vertical and horizontal.

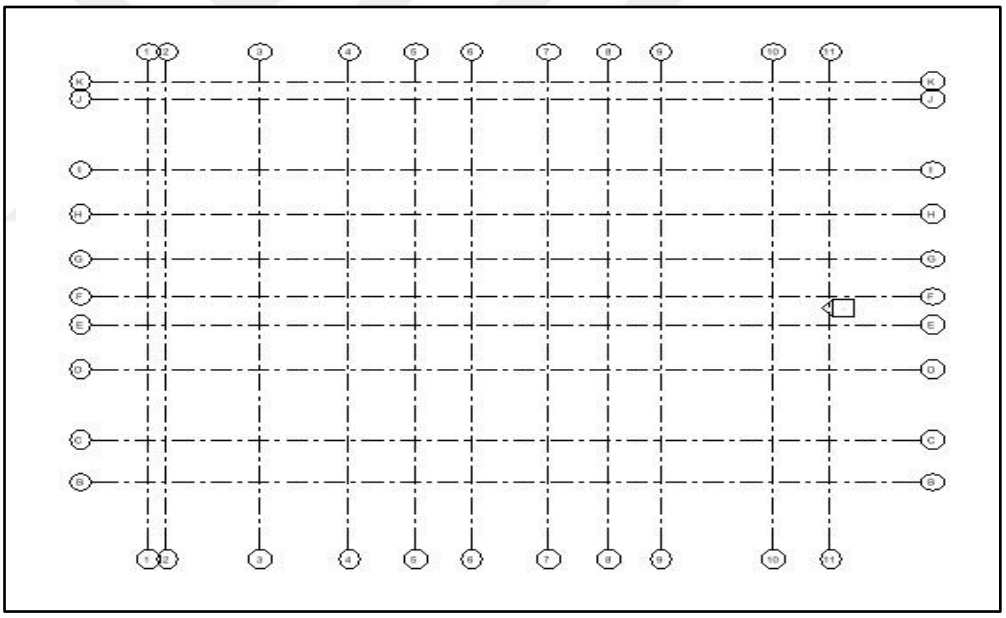

Figure 3.9. Axis drawing

3.3.3. Construction of Raft Foundation

After the placement of axis is completed, you should design a flooring in which you building shall be placed over a ground. You should definer a raft foundation which is specified in the static project

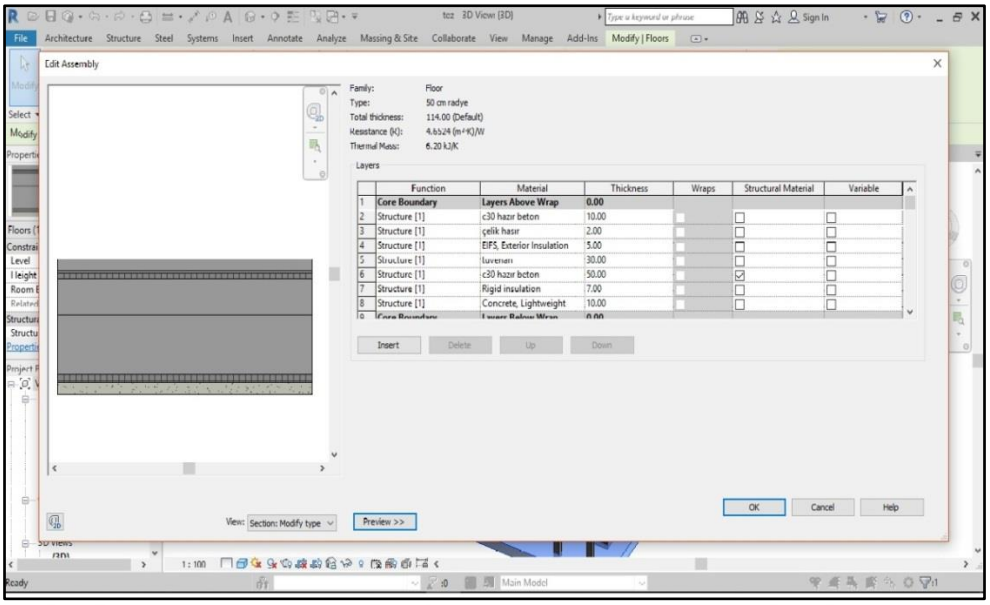

Figure 3.10. Raft foundation

3.3.4. Column Placement

After the axis drawing is completed, column- screen elements shall be placed. For this, depending on your operation system, you will design steel or reinforced steel colums as you wish in compliance with your project from the architecture yor structure tabs Coloumb tabs and you should initiate the placement of column- screen.

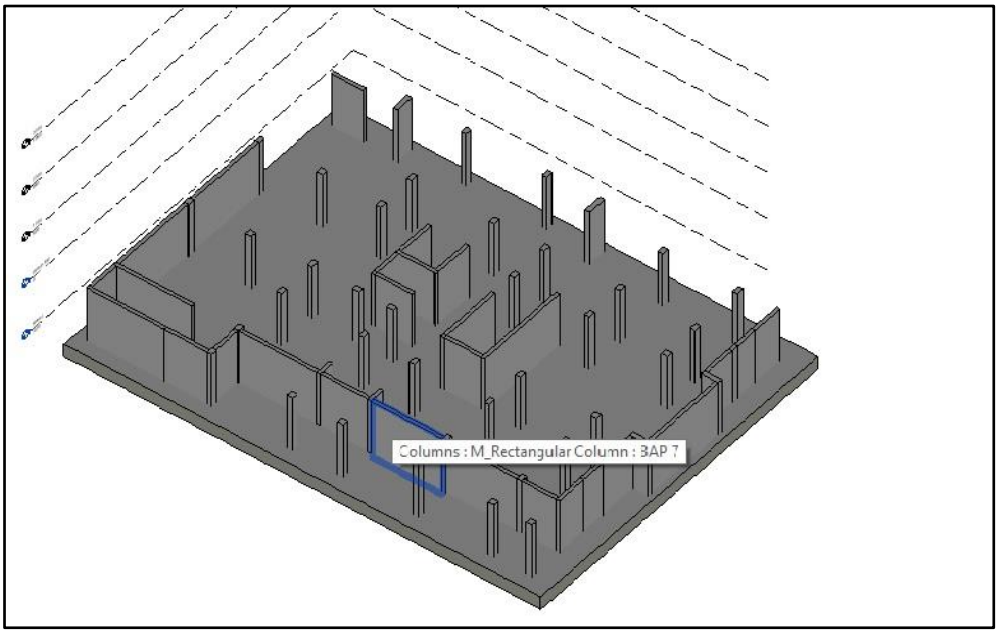

Figure 3.11. Column –screen placement

3.3.5. Wall Placement

After column screen placement is completed, you should place the wall in line with your project. Be noted that there are wall options under the architecture template/ wall taps which are submitted within the program's scope. You should click them to edit type tabs and later on you should duplicate it and you will make a wall modification as you wish to do, so you will place your walls accordingly. In the building construction which I made in my thesis study, gas concrete was used as 15 cm. and 20 cm as the wall types.

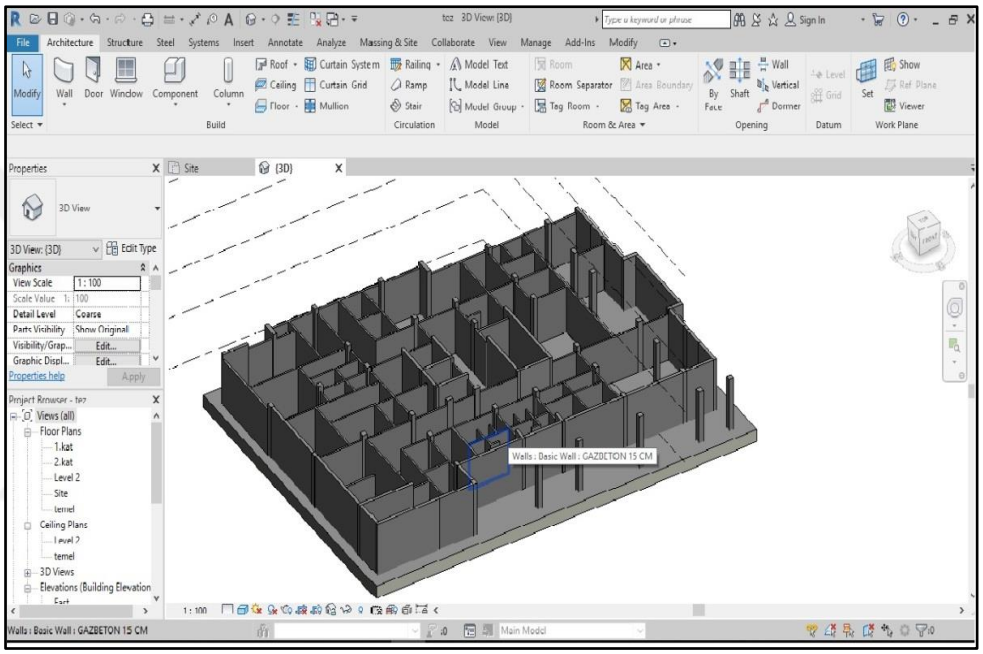

Figure 3.12. Basement floor wall placement

3.3.6. Making Upper Floors

After you prepared the ground of the modeling, you should carry the operations you made to the uppower floors. For this action;

a. Floowing will be defined

b. Column and screen elements will be copied to the upper floor

c. Wall elements will be copoğec to the upper floor

For making copying to the upper floor, in Revit Architecture programı/architecture template, on the Sol alt kısımda bulunan Preject Browser screen which is located in the left bottom part, tyou should open any Elevation section therein and you should add level and you are able to adjust the floor heights of the levels to be aded from

here. These operations who made should be viewed on the project browser screen under the tabs of View/Plan View/Floor Plan.

For enabling the copying to the floors, after you selected the object, you should click the Copy the clipboard tabs located in the top toolbar and click the Aligned to selected levels and you will select the level, than the copyimng will be completed. You can do this for asll objects.

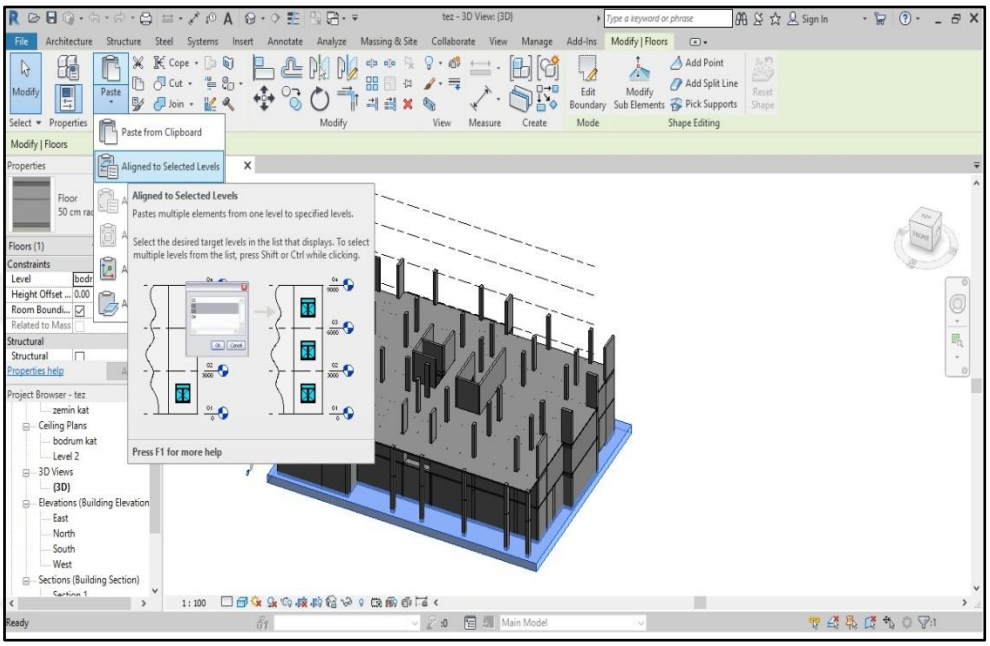

Figure 3.13. Uppoer Floor Copying 1

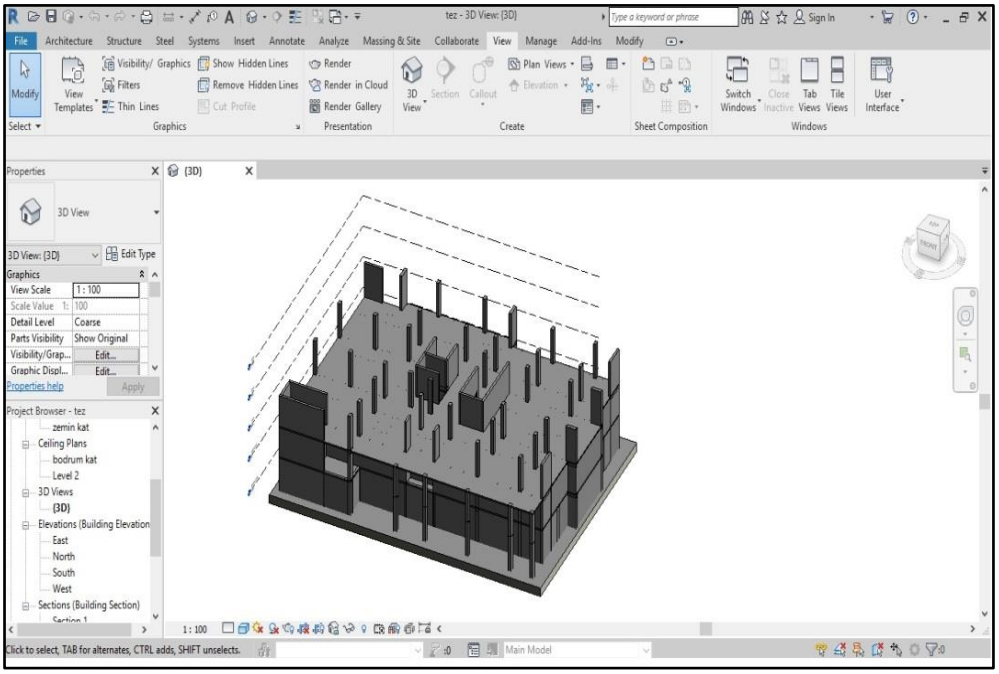

Figure 3.14. Uppoer Floor Copying 2

3.3.7. Formation of the Stairs

You may adjust riser and stairs width in compliance with your project in the Architecture template top toolbar section and you can make your stairs accordingly.

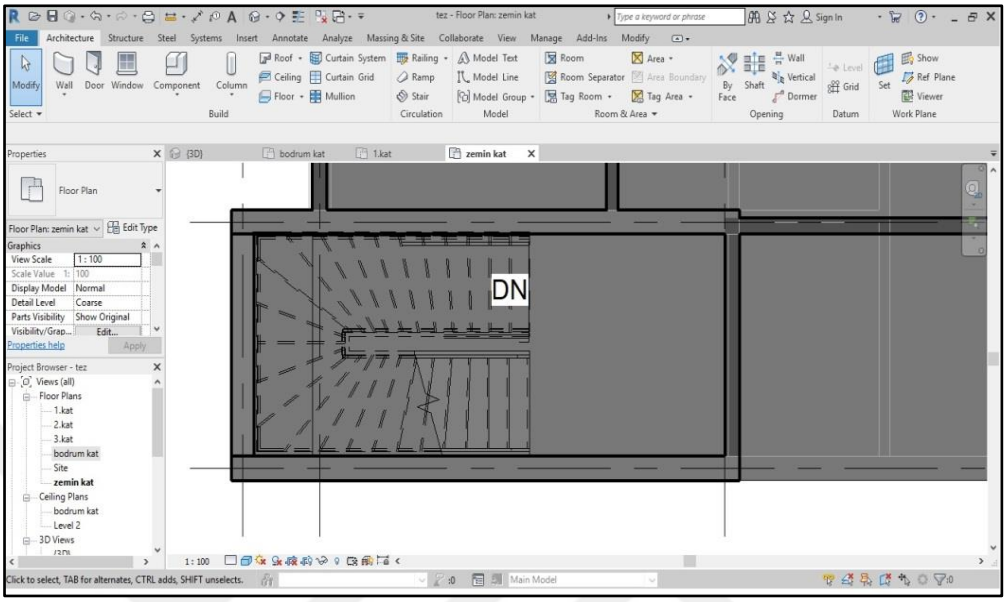

Figure 3.15. Formation of the stairs

3.3.8. Shaft Space

In architecture template top toolbar section, click the shaft tabs in tne opening toolbar, than the drawing screen will appear. If it makes the drawing and approves it, the shaft shall have been formed. It is your choice to determine about up to what floor the shaft will go up.

3.3.9. Plastering Definition

In internal venues, over gas concrete with Y.27.501/04 pose; rough + thin plaster manufacture has been given. In Revit architecture program, 3 cm plastering manufacture is defined over the locations where plastering manufacture will be made over the gas concrete in plain mode.

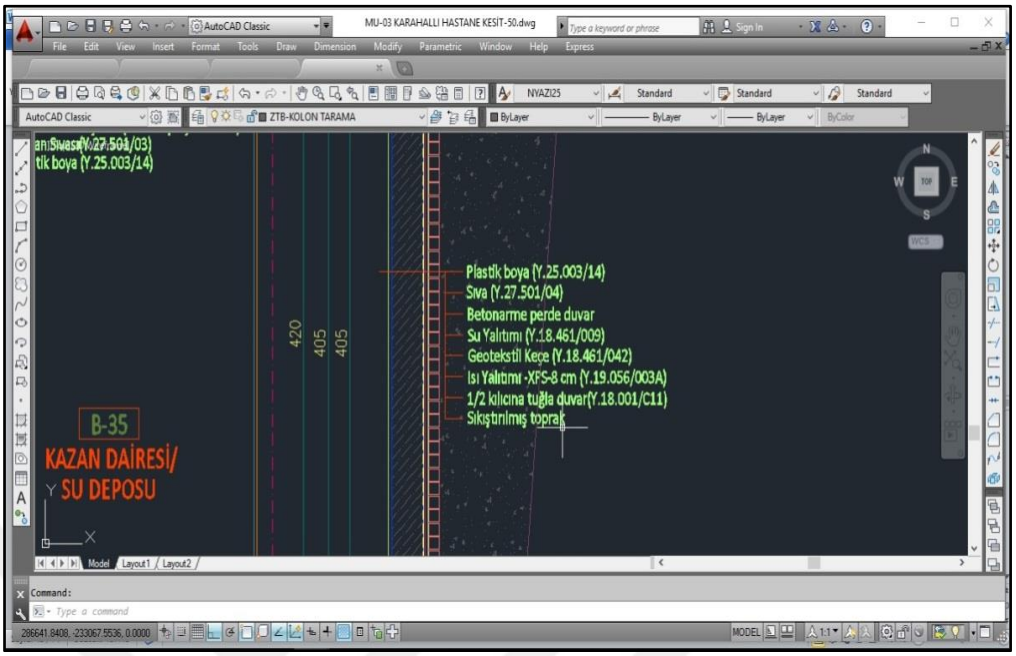

Figure 3.16. Project Detail

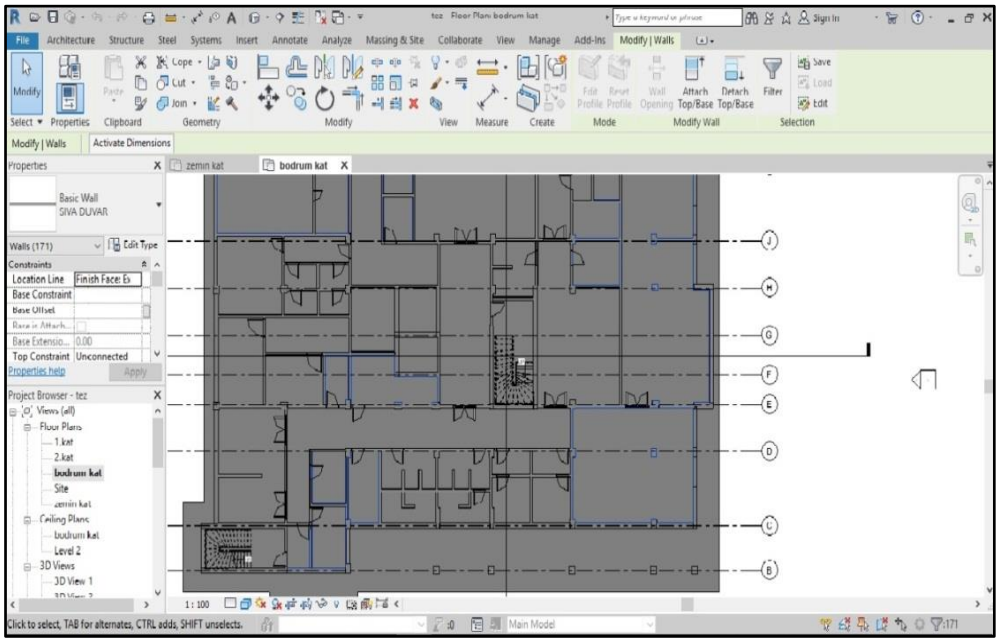

Figure 3.17. Revit architecture plaster locations

3.3.10. Gypsium Plaster

In internal places, over the gas concrete; Gypsium Plaster y.27.525/A2+ Satin Plaster Covering y.27.528/3 + Water based semi- matt anti-bacterial semi- matt paint (y.25.003/28) pose has been given. In Revit architecture program, over the gas concretre in plain manner, 5+1 cm. gypsium plaster manufacture is defined over the locations where gypsium plaster manufacture shall be made,

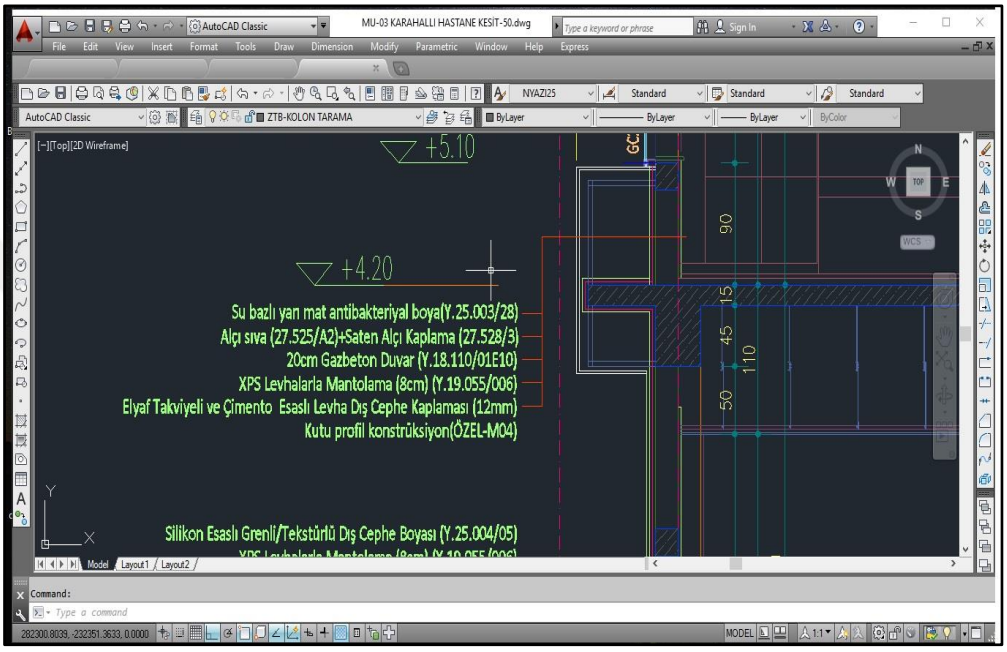

Figure 3.18. Project plaster / satin plaster poze detail

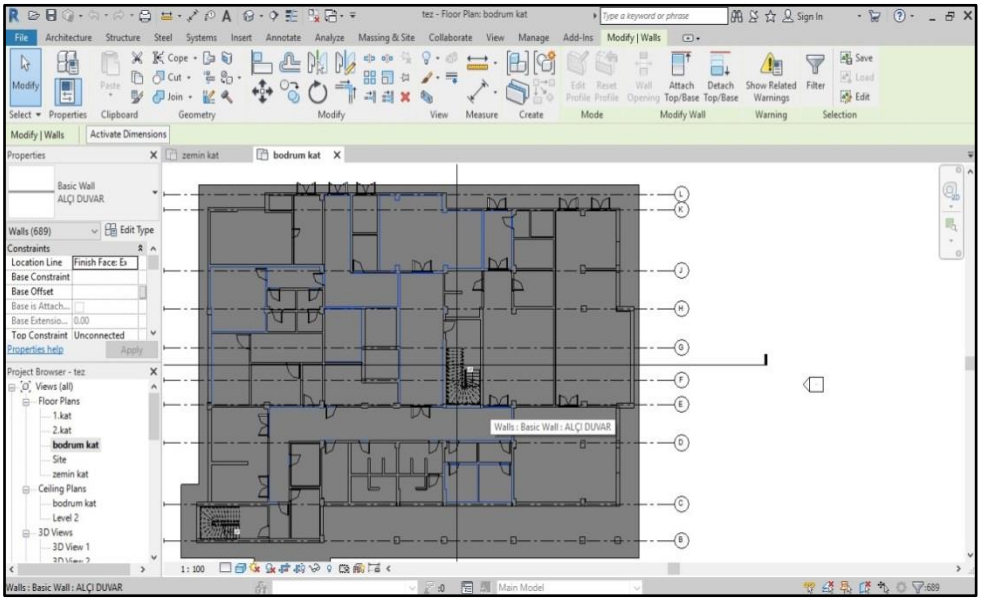

Figure 3.19. Revit architecture gypsium plastered/satin plastered locations

3.3.11. Coating/ Flooring Definition

In our application project;

Smooth- surfaced each color and pattern ceramic tile flooring

40x 40 cm Y.26.005/03

Figure 3.20. Flat Ceramic used in modeling

Natural Granite Coating 30 x Free size MSB.671/A

Figure 3.21. Natural Granite used in modeling

Artificial Marble Coating 30 x 30 cm Y.26.015/003

Figure 3.22. Artifical Marble used in modeling

3.3.12. Granite Ceramic Coating

40 x 40 cm. Y.26.007/405A

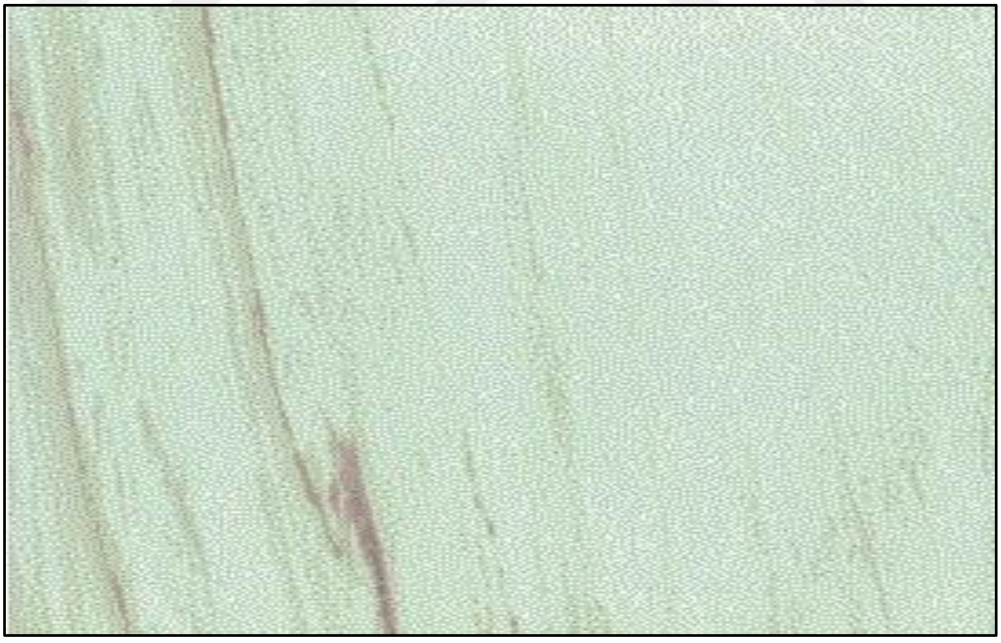

Figure 3.23. Granite Ceramic used in modelling

PVC Coating Y.25.116/A10

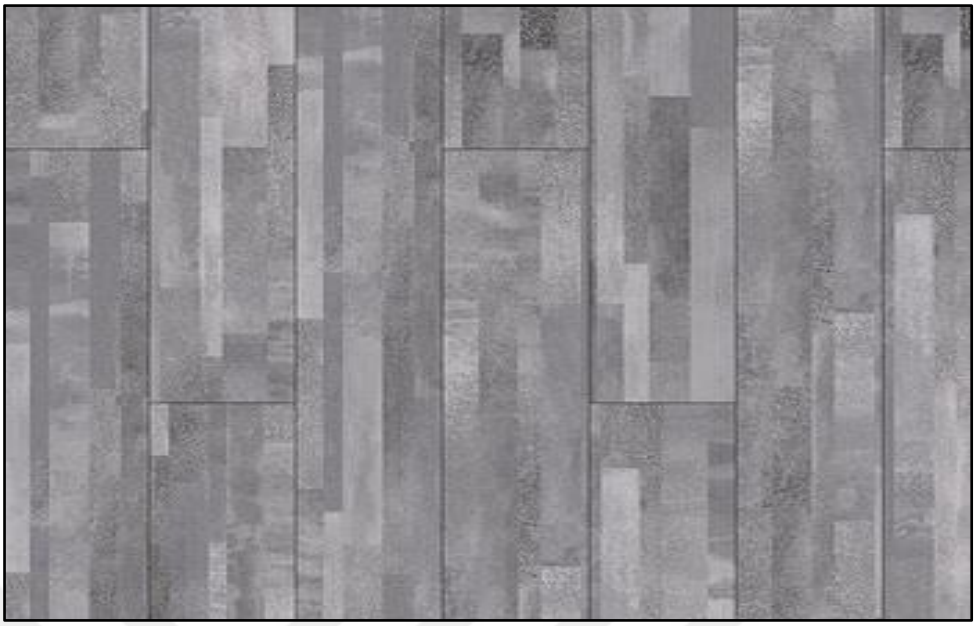

Figure 3.24. Pvc Flooring used in modelling

3.3.13. Epoxy Coating 2- Component – Without Solvent Epoxy Based Coating (SPECIAL -M01)

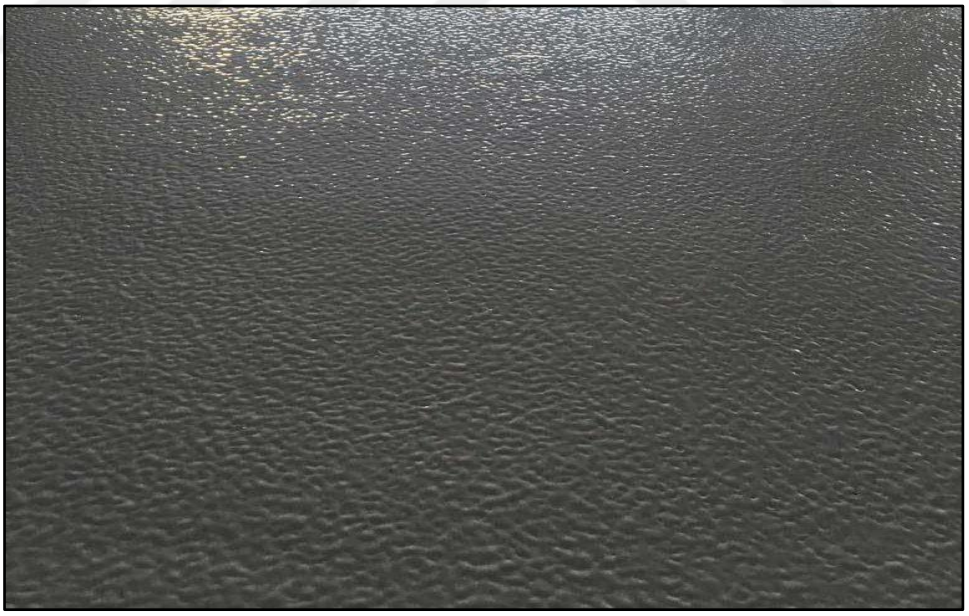

Figure 3.25. Epoxy flooring used in modelling

The flooring definitions which I wrote above along with their photographs and pose numbers in an order are given in the location lists in our application project, and these şpose numbers shall be taken into consideration while approximate cost list is being prepared.

3.3.14. Door Definition

In our application project;

a. Laminated plated doors (LK1 100/220 – LK2 110/220 – LK3 130/220) – Y.22.009/3

b. Fire doors (110/220 – 100/220) – SPECIAL-M11A

c. Iron doors (DK1 110/220 – DK2160/220 – DK3 80/150)

d. Door covered with lead (KK1 160/220)

e. Aluminum doors (ALCK2, ALCK3….) Y.23.244/L

In Revit Architecture program, I clicked the Door tabs undr Architecture Template, the standard door types will be shown for you within the scope of the program. If you do not find any type of door you prefer, as I experienced, than I found types of door window and furnitures from a site through web and I placed them into Revit and I arranged the sizes appropriately in compliance with my project, finally I placed the elements thereto.

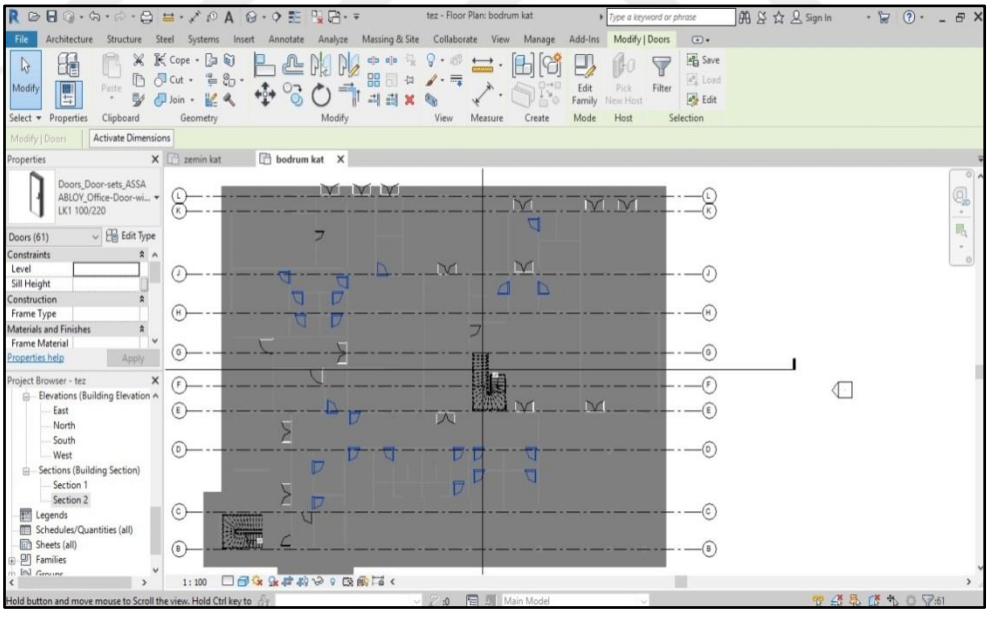

Figure 3.26. Door Locations in Modelling

3.3.15. Facade Definition and Drawing

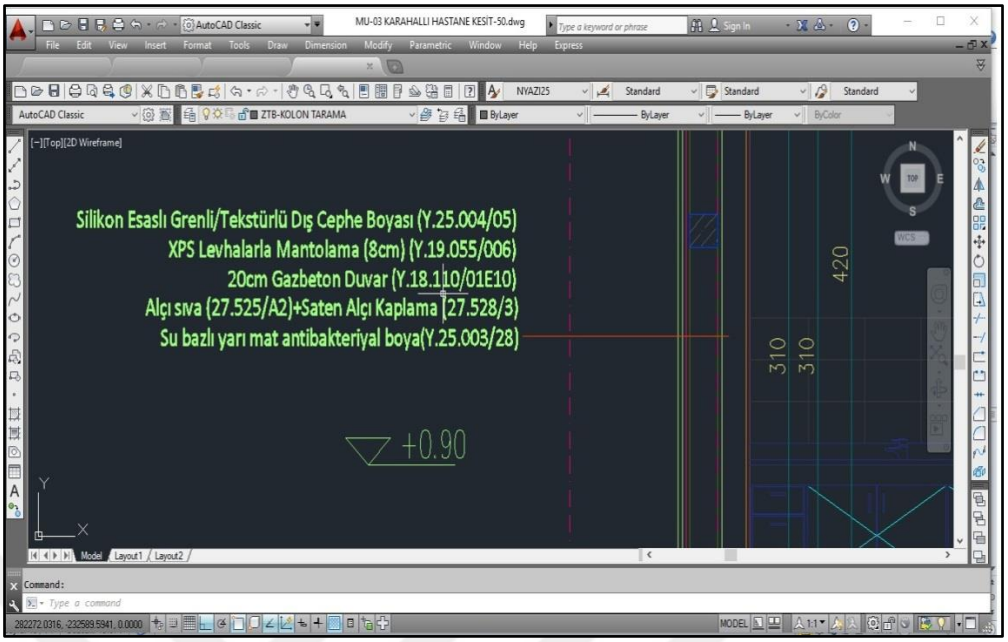

Figure 3.27. Facade application detail 1

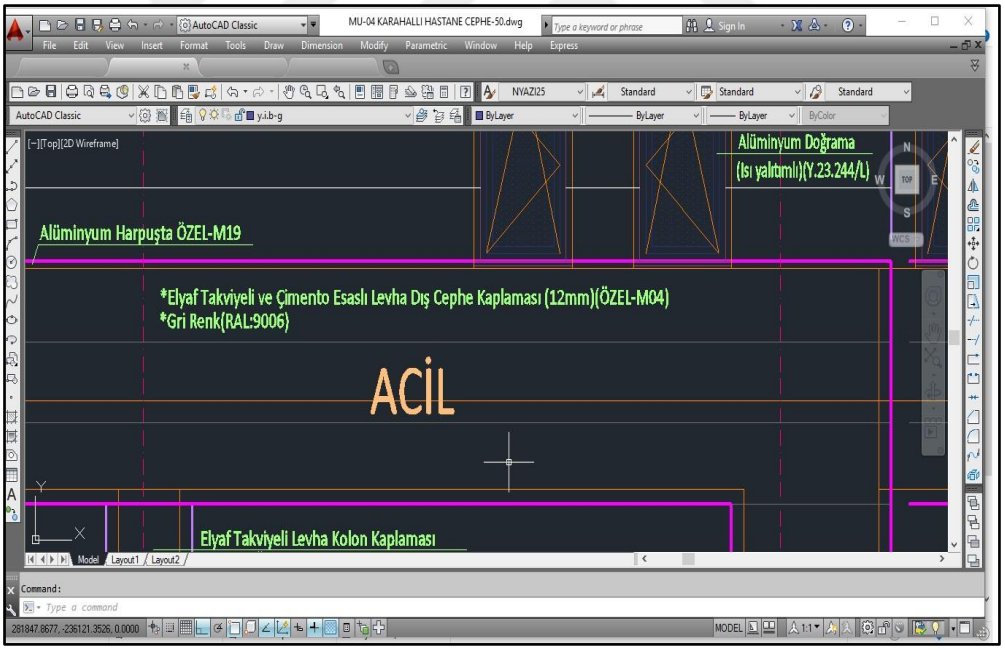

Figure 3.28. Facade application detail 2

Our facade material is fiber supported and cement based plate facade covering, with a thickness of 12 mm Ral: 9006, in order to draw this facade in Revit architecture program, I defined as a wall and I placed Y.19.055/006 Poze with a thichnesss of 8 cm into the internal part, thus I completed my drawing by making a new wall of which the thicknes is 100 mm in total.

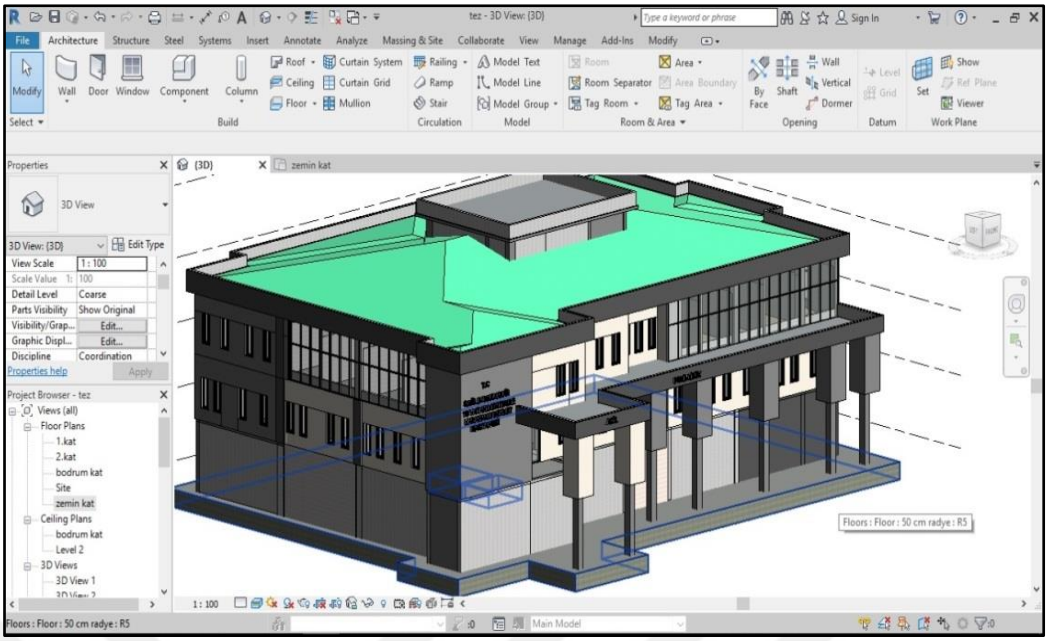

Figure 3.29. Revit architecture facade fibercement application

3.3.16. Aluminum Facade Definition and Drawing

In Revit architecture program, After clicking Storefront on the screen Properties under the wall tabs in Architecture template, I clisked edit type and entered Horizontal Grid and Vertical Grids and I placed the window panels, which consists of 3 parts, between +4,20 - +8,40 – elevations.

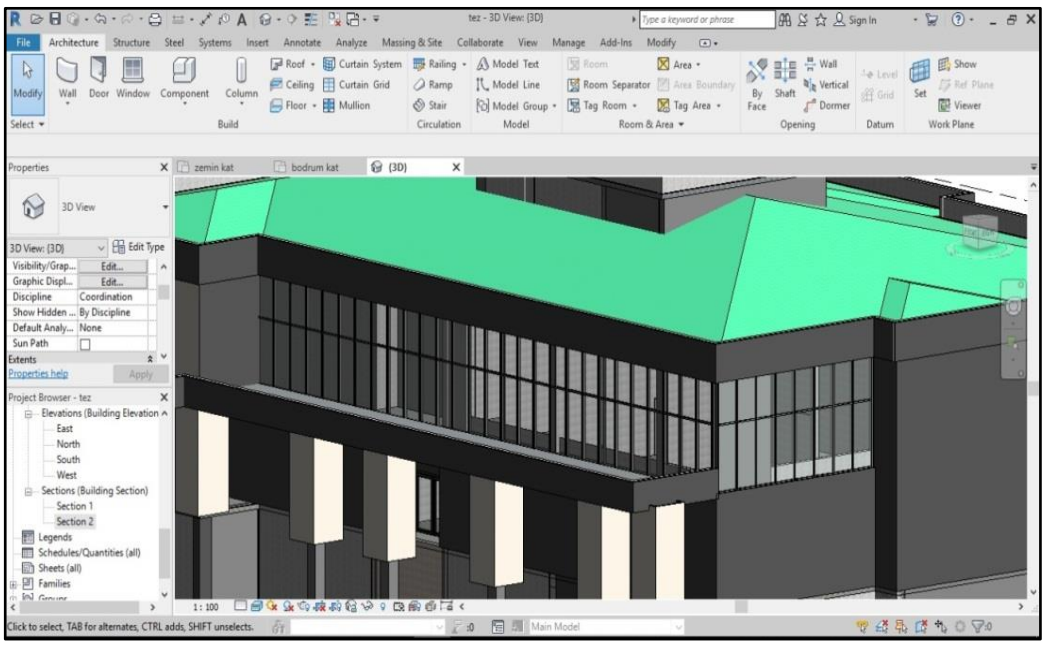

Figure 3.30. Revit architecture aluminum cladding facade

3.3.17. Windows Definition and Placement

The windows specified in our project are; suppoerrted with aluminum 50x50 profiles, P1 80/200 coded windows with a height of 80 cm. from the floor and they were placed into their places in line with the project.

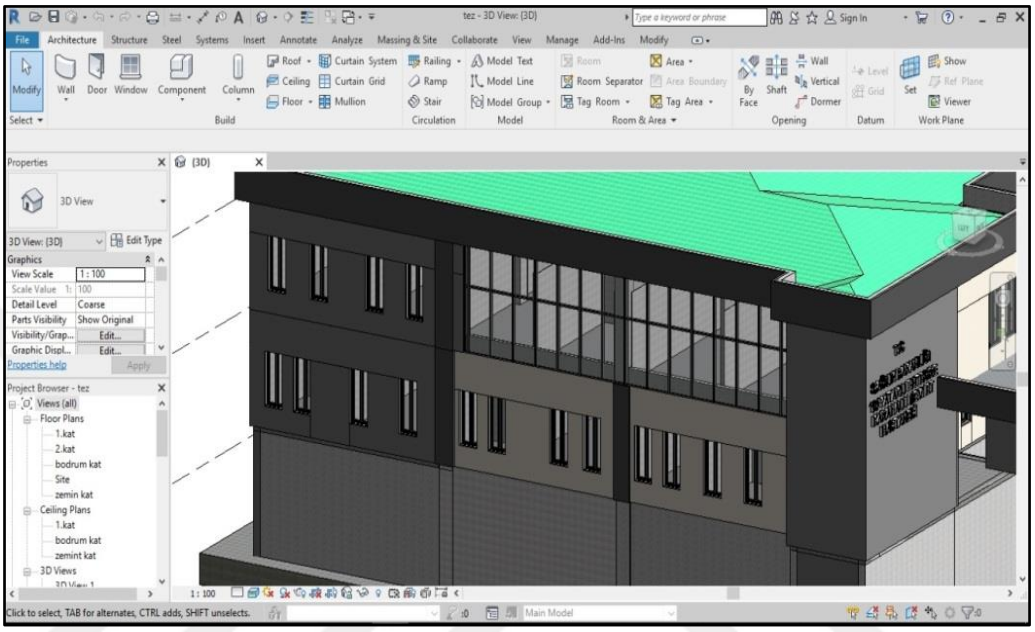

Figure 3.31. Revit architecture aluminum window appearance

3.3.18. Suspended Ceiling Definition and Placement

To be able to make a drawing of suspended ceiling, you should complete all architectural details and you should beging to draw the suspended ceiling. In the hospital project which I made the drawing, 60x60 cm Aluminum Perforated Suspended Ceiling (23.243/21) was used.

To be able to make the drawing in Revit Architecture Program, I clicked the Ceiling tabs over Architecture template and selected 600x600 mm grid, all places within the project site list have been drawen. The suspended ceiling drawn here can be seen inside the Ceiling on the Project browser screen.

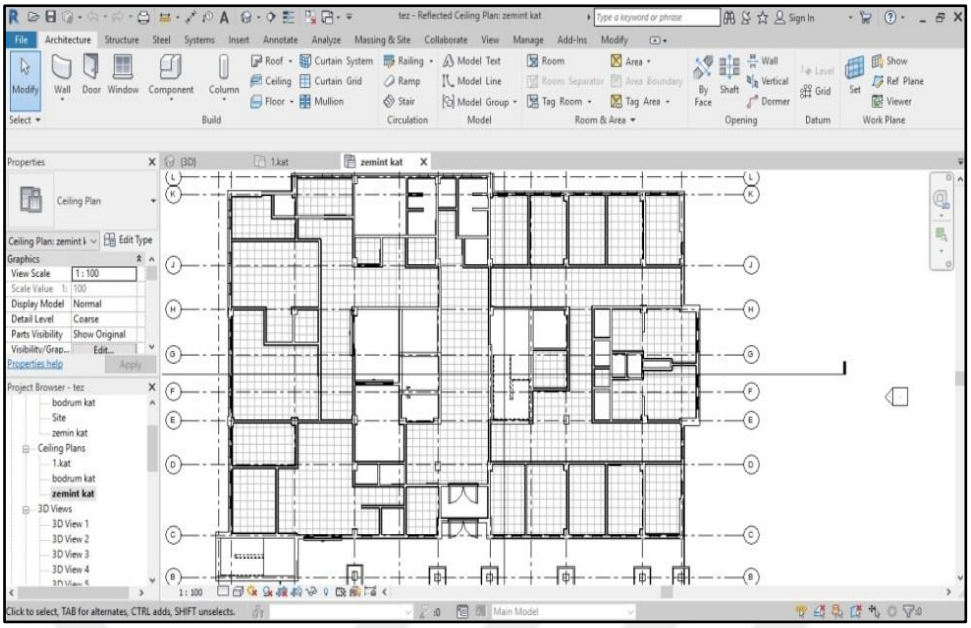

Figure 3.32. Revit architecture ceiling plan / ground floor

Our architectural medeling is hereby completed, after this stage of my thesis, I took the yardages/ bills of quantities and I found the unit prices for 2018 along with these yardages/bills of quantities and I foud the approxizmate cost in this respect.

CHAPTER 4

RESULTS AND DISCUSSIONS

4.1. Preaparation of Bills of Quantities from Revit Architecture Program

In Revit Architecture program, in order to take the bills of quantities of our hospital project which we modeled over architecture template architecture, I clicked Schedules/ Quantities from the View menu and I determined the manufacture which I wish to take its yardage from the coming list and later on I clicked Family-Family type- Level – Cost which I wish it to be viewed in the bills of quantities, and my bill of quantities comes to the screen. Here, you can export all the yardages of the manufacture items which you have added into the modeling through an excel file.

Please find below the bills of quantities of the modelled Uşak Province Karahallı 10 – bed capacity Integrated Hospital project;

	Family	Family and Type	Area
185	Basic Wall	Scattering Plaster	1.95 m²
186	Basic Wall	Scattering Plaster	3.50 m²
187	Basic Wall	Scattering Plaster	3.49 m²
188	Basic Wall	Scattering Plaster	1.05 m²
189	Basic Wall	Scattering Plaster	3.49 m²
190	Basic Wall	Scattering Plaster	2.05 m²
191	Basic Wall	Scattering Plaster	1.87 m²
192	Basic Wall	Scattering Plaster	0.27 m²
193	Basic Wall	Scattering Plaster	3.50 m²
194	Basic Wall	Scattering Plaster	1.21 m²
195	Basic Wall	Scattering Plaster	3.50 m²
196	Basic Wall	Scattering Plaster	0.60 m²
197	Basic Wall	Scattering Plaster	1.12 m²
198	Basic Wall	Scattering Plaster	1.85 m²
199	Basic Wall	Scattering Plaster	0.25 m²
200	Basic Wall	Scattering Plaster	1.83 m²
201	Basic Wall	Scattering Plaster	0.90 m²
202	Basic Wall	Scattering Plaster	1.82 m²
203	Basic Wall	Scattering Plaster	0.18 m²
204	Basic Wall	Scattering Plaster	2.52 m²
205	Scattering Plaster: 204	27.501/04	1352.95 m²

Figure 4.1. Revit architecture Scaterring Plaster quantities

	Family	Family and Type	Area
1222	Basic Wall	gypsum plaster	1.18 m²
1223	Basic Wall	gypsum plaster	0.39 m²
1224	Basic Wall	gypsum plaster	0.63 m²
1225	Basic Wall	gypsum plaster	3.62 m²
1226	Basic Wall	gypsum plaster	0.39 m²
1227	Basic Wall	gypsum plaster	0.40 m²
1228	Basic Wall	gypsum plaster	1.20 m²
1229	Basic Wall	gypsum plaster	0.64 m²
1230	Basic Wall	gypsum plaster	0.40 m²
1231	Basic Wall	gypsum plaster	0.64 m²
1232	Basic Wall	gypsum plaster	4.00 m²
1233	Basic Wall	gypsum plaster	0.40 m²
1234	Basic Wall	gypsum plaster	0.63 m²
1235	Basic Wall	gypsum plaster	2.33 m²
1236	Basic Wall	gypsum plaster	0.40 m²
1237	Basic Wall	gypsum plaster	0.64 m²
1238	Basic Wall	gypsum plaster	1.65 m²
1239	Basic Wall	gypsum plaster	0.39 m²
1240	Basic Wall	gypsum plaster	0.64 m²
1241	Basic Wall	gypsum plaster	0.67 m²
1242	gypsum plaster: 1241	Y.27.525/A2	4642.21 m²

Figure 4.2. Revit architecture gypsum plaster quantities

	Family	Family and Type	Area
1222	Basic Wall	satin plaster	1.18 m²
1223	Basic Wall	satin plaster	0.39 m²
1224	Basic Wall	satin plaster	0.63 m²
1225	Basic Wall	satin plaster	3.62 m²
1226	Basic Wall	satin plaster	0.39 m²
1227	Basic Wall	satin plaster	0.40 m²
1228	Basic Wall	satin plaster	1.20 m²
1229	Basic Wall	satin plaster	0.64 m²
1230	Basic Wall	satin plaster	0.40 m²
1231	Basic Wall	satin plaster	0.64 m²
1232	Basic Wall	satin plaster	4.00 m²
1233	Basic Wall	satin plaster	0.40 m²
1234	Basic Wall	satin plaster	0.63 m²
1235	Basic Wall	satin plaster	2.33 m²
1236	Basic Wall	satin plaster	0.40 m²
1237	Basic Wall	satin plaster	0.64 m²
1238	Basic Wall	satin plaster	1.65 m²
1239	Basic Wall	satin plaster	0.39 m²
1240	Basic Wall	satin plaster	0.64 m²
1241	Basic Wall	satin plaster	0.67 m²
1242	satin plaster: 1241	Y.27.528/3	4642.21 m²

Figure 4.3. Revit architecture satin plaster quantities

	Family	Family and Type	Area
1222	Basic Wall	Water Based Semi Paint	1.18 m²
1223	Basic Wall	Water Based Semi Paint	0.39 m²
1224	Basic Wall	Water Based Semi Paint	0.63 m²
1225	Basic Wall	Water Based Semi Paint	3.62 m²
1226	Basic Wall	Water Based Semi Paint	0.39 m²
1227	Basic Wall	Water Based Semi Paint	0.40 m²
1228	Basic Wall	Water Based Semi Paint	1.20 m²
1229	Basic Wall	Water Based Semi Paint	0.64 m²
1230	Basic Wall	Water Based Semi Paint	0.40 m²
1231	Basic Wall	Water Based Semi Paint	0.64 m²
1232	Basic Wall	Water Based Semi Paint	4.00 m²
1233	Basic Wall	Water Based Semi Paint	0.40 m²
1234	Basic Wall	Water Based Semi Paint	0.63 m²
1235	Basic Wall	Water Based Semi Paint	2.33 m²
1236	Basic Wall	Water Based Semi Paint	0.40 m²
1237	Basic Wall	Water Based Semi Paint	0.64 m²
1238	Basic Wall	Water Based Semi Paint	1.65 m²
1239	Basic Wall	Water Based Semi Paint	0.39 m²
1240	Basic Wall	Water Based Semi Paint	0.64 m²
1241	Basic Wall	Water Based Semi Paint	0.67 m²
1242	Water Based Semi Paint: 1241	Y.25.003/28	4642.21 m²

Figure 4.4. Revit architecture interior wall paint quantities

	Family	Family and Type	Area
184	Basic Wall	Water Based Semi Antibac.Paint	1.86 m²
185	Basic Wall	Water Based Semi Antibac.Paint	1.95 m²
186	Basic Wall	Water Based Semi Antibac.Paint	3.50 m²
187	Basic Wall	Water Based Semi Antibac.Paint	3.49 m²
188	Basic Wall	Water Based Semi Antibac.Paint	1.05 m²
189	Basic Wall	Water Based Semi Antibac.Paint	3.49 m²
190	Basic Wall	Water Based Semi Antibac.Paint	2.05 m²
191	Basic Wall	Water Based Semi Antibac.Paint	1.87 m²
192	Basic Wall	Water Based Semi Antibac.Paint	0.27 m²
193	Basic Wall	Water Based Semi Antibac.Paint	3.50 m²
194	Basic Wall	Water Based Semi Antibac.Paint	1.21 m²
195	Basic Wall	Water Based Semi Antibac.Paint	3.50 m²
196	Basic Wall	Water Based Semi Antibac.Paint	0.60 m²
197	Basic Wall	Water Based Semi Antibac.Paint	1.12 m²
198	Basic Wall	Water Based Semi Antibac.Paint	1.85 m²
199	Basic Wall	Water Based Semi Antibac.Paint	0.25 m²
200	Basic Wall	Water Based Semi Antibac.Paint	1.83 m²
201	Basic Wall	Water Based Semi Antibac.Paint	0.90 m²
202	Basic Wall	Water Based Semi Antibac.Paint	1.82 m²
203	Basic Wall	Water Based Semi Antibac.Paint	0.18 m²
204	Basic Wall	Water Based Semi Antibac.Paint	2.52 m²
205	Water Based Semi Antibac.Pa	Y.25.003/22	1352.95 m²

Figure 4.5. Revit architecture interior wall paint quantities

	Family	Family and Type	Area
419	Basic Wall	Basic Wall: 25x40 ceramic wall	0.46 m²
420	Basic Wall	Basic Wall: 25x40 ceramic wall	1.00 m²
421	Basic Wall	Basic Wall: 25x40 ceramic wall	0.65 m²
422	Basic Wall	Basic Wall: 25x40 ceramic wall	2.30 m²
423	Basic Wall	Basic Wall: 25x40 ceramic wall	0.99 m²
424	Basic Wall	Basic Wall: 25x40 ceramic wall	0.65 m²
425	Basic Wall	Basic Wall: 25x40 ceramic wall	1.11 m²
426	Basic Wall	Basic Wall: 25x40 ceramic wall	0.40 m²
427	Basic Wall	Basic Wall: 25x40 ceramic wall	0.41 m²
428	Basic Wall	Basic Wall: 25x40 ceramic wall	1.29 m²
429	Basic Wall	Basic Wall: 25x40 ceramic wall	1.45 m²
430	Basic Wall	Basic Wall: 25x40 ceramic wall	0.36 m²
431	Basic Wall	Basic Wall: 25x40 ceramic wall	0.65 m²
432	Basic Wall	Basic Wall: 25x40 ceramic wall	1.46 m²
433	Basic Wall	Basic Wall: 25x40 ceramic wall	0.62 m²
434	Basic Wall	Basic Wall: 25x40 ceramic wall	1.56 m²
435	Basic Wall	Basic Wall: 25x40 ceramic wall	1.43 m²
436	Basic Wall	Basic Wall: 25x40 ceramic wall	0.64 m²
437	Basic Wall	Basic Wall: 25x40 ceramic wall	0.70 m²
438	Basic Wall: 25x40 ceramic wall : 437	Y. 26. 006/405	1915.63 m²

Figure 4.6. Revit architecture ceramic wall quantities

	Family	Family and Type	Area
268	Basic Wall	Basic Wall: Gas Cancrete 15 CM	7.14 m²
269	Basic Wall	Basic Wall: Gas Cancrete 15 CM	9.93 m²
270	Basic Wall	Basic Wall: Gas Cancrete 15 CM	10.21 m²
271	Basic Wall	Basic Wall: Gas Cancrete 15 CM	15.71 m²
272	Basic Wall	Basic Wall: Gas Cancrete 15 CM	15.89 m²
273	Basic Wall	Basic Wall: Gas Cancrete 15 CM	14.30 m²
274	Basic Wall	Basic Wall: Gas Cancrete 15 CM	7.18 m²
275	Basic Wall	Basic Wall: Gas Cancrete 15 CM	12.85 m²
276	Basic Wall	Basic Wall: Gas Cancrete 15 CM	6.49 m²
277	Basic Wall	Basic Wall: Gas Cancrete 15 CM	7.54 m²
278	Basic Wall	Basic Wall: Gas Cancrete 15 CM	7.20 m²
279	Basic Wall	Basic Wall: Gas Cancrete 15 CM	15.04 m²
280	Basic Wall	Basic Wall: Gas Cancrete 15 CM	5.30 m²
281	Basic Wall	Basic Wall: Gas Cancrete 15 CM	5.61 m²
282	Basic Wall	Basic Wall: Gas Cancrete 15 CM	5.61 m²
283	Basic Wall	Basic Wall: Gas Cancrete 15 CM	5.61 m²
284	Basic Wall	Basic Wall: Gas Cancrete 15 CM	5.39 m²
285	Basic Wall	Basic Wall: Gas Cancrete 15 CM	3.07 m²
286	Basic Wall	Basic Wall: Gas Cancrete 15 CM	4.02 m²
287	Basic Wall: Gas Cancrete 15 CM: 286	Y.18.110/01E07	3680.25 m²

Figure 4.7. Revit architecture gas concrete quantities

	Family	Family and Type	Area
73	Basic Wall	Basic Wall: Gas Cancrete 20 CM	4.28 m²
74	Basic Wall	Basic Wall: Gas Cancrete 20 CM	6.30 m²
75	Basic Wall	Basic Wall: Gas Cancrete 20 CM	5.18 m²
76	Basic Wall	Basic Wall: Gas Cancrete 20 CM	6.78 m²
77	Basic Wall	Basic Wall: Gas Cancrete 20 CM	1.44 m²
78	Basic Wall	Basic Wall: Gas Cancrete 20 CM	21.60 m²
79	Basic Wall	Basic Wall: Gas Cancrete 20 CM	1.50 m²
80	Basic Wall	Basic Wall: Gas Cancrete 20 CM	19.80 m²
81	Basic Wall	Basic Wall: Gas Cancrete 20 CM	9.84 m²
82	Basic Wall	Basic Wall: Gas Cancrete 20 CM	1.56 m²
83	Basic Wall	Basic Wall: Gas Cancrete 20 CM	11.04 m²
84	Basic Wall	Basic Wall: Gas Cancrete 20 CM	1.56 m²
85	Basic Wall	Basic Wall: Gas Cancrete 20 CM	9.84 m²
86	Basic Wall	Basic Wall: Gas Cancrete 20 CM	33.84 m²
87	Basic Wall	Basic Wall: Gas Cancrete 20 CM	3.66 m²
88	Basic Wall	Basic Wall: Gas Cancrete 20 CM	15.41 m²
89	Basic Wall	Basic Wall: Gas Cancrete 20 CM	4.86 m²
90	Basic Wall	Basic Wall: Gas Cancrete 20 CM	1.31 m²
91	Basic Wall	Basic Wall: Gas Cancrete 20 CM	29.34 m²
92	Basic Wall: Gas Cancrete 20 CM: 91	Y.18.110/01E010	1202.70 m²

Figure 4.8. Revit architecture gas concrete quantities

	Family	Family and Type	Area
282	Basic Wall	Basic Wall: Fibercement Grey	0.64 m²
283	Basic Wall	Basic Wall: Fibercement Grey	3.07 m²
284	Basic Wall	Basic Wall: Fibercement Grey	0.64 m²
285	Basic Wall	Basic Wall: Fibercement Grey	2.24 m²
286	Basic Wall	Basic Wall: Fibercement Grey	1.47 m²
287	Basic Wall	Basic Wall: Fibercement Grey	2.54 m²
288	Basic Wall	Basic Wall: Fibercement Grey	0.63 m²
289	Basic Wall	Basic Wall: Fibercement Grey	5.46 m²
290	Basic Wall	Basic Wall: Fibercement Grey	12.05 m²
291	Basic Wall	Basic Wall: Fibercement Grey	2.24 m²
292	Basic Wall	Basic Wall: Fibercement Grey	0.64 m²
293	Basic Wall	Basic Wall: Fibercement Grey	2.10 m²
294	Basic Wall	Basic Wall: Fibercement Grey	0.64 m²
295	Basic Wall	Basic Wall: Fibercement Grey	4.90 m²
296	Basic Wall	Basic Wall: Fibercement Grey	0.64 m²
297	Basic Wall	Basic Wall: Fibercement Grey	1.96 m²
298	Basic Wall	Basic Wall: Fibercement Grey	0.64 m²
299	Basic Wall	Basic Wall: Fibercement Grey	3.64 m²
300	Basic Wall	Basic Wall: Fibercement Grey	5.62 m²
301	Basic Wall	Basic Wall: Fibercement Grey	10.42 m²
302	Basic Wall: Fibercement Grey: 99	SPECİAL POSE	1392,61 m²

.**Figure 4.9.** Revit architecture fibercement quantities

Floor Schedule			
Family	Family and Type	Level	Area
Floor	Floor: 8 cm xps	Building Foundation	1220 m²
Floor: 8 cm xps	y.19.057/006		1220 m²

Figure 4.10. Revit architecture XPS Floor Quantities

	Floor Schedule			
	Family	Family and Type	Level	Area
1	Floor	Floor: Granite Flooring	basement	45 m²
2	Floor	Floor: Granite Flooring	ground floor	68 m²
3	Floor	Floor: Granite Flooring	ground floor	52 m²
4	Floor	Floor: Granite Flooring	ground floor	115 m²
5	Floor	Floor: Granite Flooring	ground floor	84 m²
6	Floor	Floor: Granite Flooring	ground floor	9 m²
7	Floor	Floor: Granite Flooring	first floor	115 m²
8	Floor	Floor: Granite Flooring	first floor	87 m²
9	Floor: Granite Flooring: 8	MSB.671/A		576 m²

Figure 4.11. Revit architecture granite floor quantities

	Family	Family and Type	Level	Area
22	Floor	Floor: Flat ceramic	ground floor	2 m²
23	Floor	Floor: Flat ceramic	ground floor	4 m²
24	Floor	Floor: Flat ceramic	ground floor	3 m²
25	Floor	Floor: Flat ceramic	ground floor	3 m²
26	Floor	Floor: Flat ceramic	first floor	2 m²
27	Floor	Floor: Flat ceramic	first floor	4 m²
28	Floor	Floor: Flat ceramic	first floor	5 m²
29	Floor	Floor: Flat ceramic	first floor	4 m²
30	Floor	Floor: Flat ceramic	first floor	4 m²
31	Floor	Floor: Flat ceramic	first floor	4 m²
32	Floor	Floor: Flat ceramic	first floor	4 m²
33	Floor	Floor: Flat ceramic	first floor	6 m²
34	Floor	Floor: Flat ceramic	first floor	6 m²
35	Floor	Floor: Flat ceramic	first floor	10 m²
36	Floor	Floor: Flat ceramic	first floor	3 m²
37	Floor	Floor: Flat ceramic	first floor	9 m²
38	Floor	Floor: Flat ceramic	first floor	5 m²
39	Floor	Floor: Flat ceramic	first floor	5 m²
40	Floor	Floor: Flat ceramic	first floor	5 m²
41	Floor	Floor: Flat ceramic	first floor	7 m²
42	Floor: Flat ceramic: 41	Y.26.005/003		297 m²

Figure 4.12. Revit architecture ceramic floor quantities

	Family	Family and Type	Level	Area
4	Floor	Floor: Artifical Marble Flooring	basement	16 m²
5	Floor	Floor: Artifical Marble Flooring	basement	6 m²
6	Floor	Floor: Artifical Marble Flooring	basement	19 m²
7	Floor	Floor: Artifical Marble Flooring	basement	5 m²
8	Floor	Floor: Artifical Marble Flooring	basement	11 m²
9	Floor	Floor: Artifical Marble Flooring	basement	10 m²
10	Floor	Floor: Artifical Marble Flooring	basement	12 m²
11	Floor	Floor: Artifical Marble Flooring	basement	77 m²
12	Floor	Floor: Artifical Marble Flooring	basement	103 m²
13	Floor	Floor: Artifical Marble Flooring	basement	62 m²
14	Floor	Floor: Artifical Marble Flooring	basement	11 m²
15	Floor	Floor: Artifical Marble Flooring	basement	9 m²
16	Floor	Floor: Artifical Marble Flooring	ground floor	6 m²
17	Floor	Floor: Artifical Marble Flooring	ground floor	6 m²
18	Floor	Floor: Artifical Marble Flooring	first floor	10 m²
19	Floor	Floor: Artifical Marble Flooring	first floor	6 m²
20	Floor	Floor: Artifical Marble Flooring	first floor	6 m²
21	Floor	Floor: Artifical Marble Flooring	second floor	32 m²
22	Floor	Floor: Artifical Marble Flooring	second floor	2 m²
23	Floor	Floor: Artifical Marble Flooring	second floor	114 m²
24	Floor	Floor: Artifical Marble Flooring	second floor	160 m²
25	Floor:Artifical Marble Flooring:	Y.26.015/003		702 m²

Figure 4.13. Revit architecture artifical marble quantities

	Family	Family and Type	Level	Area
9	Floor	Floor: Granite Ceramic	basement	10 m²
10	Floor	Floor: Granite Ceramic	basement	10 m²
11	Floor	Floor: Granite Ceramic	basement	13 m²
12	Floor	Floor: Granite Ceramic	ground floor	2 m²
13	Floor	Floor: Granite Ceramic	ground floor	8 m²
14	Floor	Floor: Granite Ceramic	ground floor	5 m²
15	Floor	Floor: Granite Ceramic	ground floor	4 m²
16	Floor	Floor: Granite Ceramic	ground floor	4 m²
17	Floor	Floor: Granite Ceramic	ground floor	9 m²
18	Floor	Floor: Granite Ceramic	first floor	16 m²
19	Floor	Floor: Granite Ceramic	first floor	16 m²
20	Floor	Floor: Granite Ceramic	first floor	13 m²
21	Floor	Floor: Granite Ceramic	first floor	15 m²
22	Floor	Floor: Granite Ceramic	first floor	18 m²
23	Floor	Floor: Granite Ceramic	first floor	17 m²
24	Floor	Floor: Granite Ceramic	first floor	17 m²
25	Floor	Floor: Granite Ceramic	first floor	38 m²
26	Floor	Floor: Granite Ceramic	first floor	15 m²
27	Floor	Floor: Granite Ceramic	first floor	16 m²
28	Floor	Floor: Granite Ceramic	first floor	16 m²
29	Floor	Floor: Granite Ceramic	first floor	7 m²
30	Floor: Granite Ceramic: 29	Y.26.007/405A		524 m²

Figure 4.14. Revit architecture granite ceramic floor quantities

	Family	Family and Type	Level	Area
13	Floor	Floor: pvc flooring	ground floor	13 m²
14	Floor	Floor: pvc flooring	ground floor	13 m²
15	Floor	Floor: pvc flooring	ground floor	18 m²
16	Floor	Floor: pvc flooring	ground floor	41 m²
17	Floor	Floor: pvc flooring	ground floor	5 m²
18	Floor	Floor: pvc flooring	ground floor	47 m²
19	Floor	Floor: pvc flooring	ground floor	20 m²
20	Floor	Floor: pvc flooring	ground floor	22 m²
21	Floor	Floor: pvc flooring	ground floor	17 m²
22	Floor	Floor: pvc flooring	ground floor	17 m²
23	Floor	Floor: pvc flooring	first floor	22 m²
24	Floor	Floor: pvc flooring	first floor	23 m²
25	Floor	Floor: pvc flooring	first floor	24 m²
26	Floor	Floor: pvc flooring	first floor	23 m²
27	Floor	Floor: pvc flooring	first floor	23 m²
28	Floor	Floor: pvc flooring	first floor	24 m²
29	Floor	Floor: pvc flooring	first floor	16 m²
30	Floor	Floor: pvc flooring	first floor	20 m²
31	Floor	Floor: pvc flooring	first floor	131 m²
32	Floor	Floor: pvc flooring	first floor	14 m²
33	Floor	Floor: pvc flooring	first floor	19 m²
34	Floor: pvc flooring : 33	Y.25.116/A10		755 m²

Figure 4.15. Revit architecture pvc floor quantities

Floor Schedule			
Family	Family and Type	Level	Area
Floor	Floor: epoxy flooring	basement	35 m²
Floor: epoxy flooring: 1	SPECİAL POSE		35 m²

Figure 4.16. Revit architecture epoxy floor quantities

Floor Schedule			
Family	Family and Type	Level	Area
Floor	Floor: Leveling concrete	Granite Flooring	576 m²
Floor	Floor: Leveling concrete	Artifical Marble Flooring	702 m²
Floor: Leveling concrete: 2	Y.27.581		1278 m²

Figure 4.17. Revit architecture levelling concrate quantities

Floor Schedule			
Family	Family and Type	Level	Area
Floor	Floor: 400 dz screed	Epoxy flooring	35 m²
Floor	Floor: 400 dz screed	pvc flooring	755 m²
Floor	Floor: 400 dz screed	granite ceramic	524 m²
Floor	Floor: 400 dz screed	Flat ceramic	297 m²
	Y.275.583		1611 m²

Figure 4.18. Revit architecture ceiling plan / first floor

Floor Schedule			
Family	Family and Type	Level	Area
Floor	Floor: Tuvenan filler	Building Foundation	488 m³
Floor: tuvenan dolgu	15.140/5		488 m³

Figure 4.19. Revit Architecture fıllıng quantitie

	Family	Family and Type	Area
282	Basic Wall	Sheating XPS 8 cm	0.64 m²
283	Basic Wall	Sheating XPS 8 cm	3.07 m²
284	Basic Wall	Sheating XPS 8 cm	0.64 m²
285	Basic Wall	Sheating XPS 8 cm	2.24 m²
286	Basic Wall	Sheating XPS 8 cm	1.47 m²
287	Basic Wall	Sheating XPS 8 cm	2.54 m²
288	Basic Wall	Sheating XPS 8 cm	0.63 m²
289	Basic Wall	Sheating XPS 8 cm	5.46 m²
290	Basic Wall	Sheating XPS 8 cm	12.05 m²
291	Basic Wall	Sheating XPS 8 cm	2.24 m²
292	Basic Wall	Sheating XPS 8 cm	0.64 m²
293	Basic Wall	Sheating XPS 8 cm	2.10 m²
294	Basic Wall	Sheating XPS 8 cm	0.64 m²
295	Basic Wall	Sheating XPS 8 cm	4.90 m²
296	Basic Wall	Sheating XPS 8 cm	0.64 m²
297	Basic Wall	Sheating XPS 8 cm	1.96 m²
298	Basic Wall	Sheating XPS 8 cm	0.64 m²
299	Basic Wall	Sheating XPS 8 cm	3.64 m²
300	Basic Wall	Sheating XPS 8 cm	5.62 m²
301	Basic Wall	Sheating XPS 8 cm	10.42 m²
302	Sheating XPS: 99	Y.19.055/006	1392,61 m²

Figure 4.20. Revit architecture XPS sheating quantities

Floor Schedule			
Family	Family and Type	Level	Area
Floor	Floor: Felt	Building Foundation	1220 m²
Floor: Felt	Y.18.461/042		1220 m²

Figure 4.21. Revit architecture felt quantities

Floor Schedule			
Family	Family and Type	Level	Area
Floor	Floor: MEMBRANe	Building Foundation	1220 m²
Floor:MEMBRANe	Y.18.461/009		1220 m²

Figure 4.22. Revit architecture membrane quantities

	Family	Family and Type	Level	Area
44	Compound Ceiling	Compound Ceiling: 600 x 600mm grid	ground floor	8 m²
45	Compound Ceiling	Compound Ceiling: 600 x 600mm grid	first floor	131 m²
46	Compound Ceiling	Compound Ceiling: 600 x 600mm grid	first floor	14 m²
47	Compound Ceiling	Compound Ceiling: 600 x 600mm grid	first floor	19 m²
48	Compound Ceiling	Compound Ceiling: 600 x 600mm grid	first floor	116 m²
49	Compound Ceiling	Compound Ceiling: 600 x 600mm grid	first floor	88 m²
50	Compound Ceiling	Compound Ceiling: 600 x 600mm grid	first floor	16 m²
51	Compound Ceiling	Compound Ceiling: 600 x 600mm grid	first floor	16 m²
52	Compound Ceiling	Compound Ceiling: 600 x 600mm grid	first floor	14 m²
53	Compound Ceiling	Compound Ceiling: 600 x 600mm grid	first floor	18 m²
54	Compound Ceiling	Compound Ceiling: 600 x 600mm grid	first floor	16 m²
55	Compound Ceiling	Compound Ceiling: 600 x 600mm grid	first floor	17 m²
56	Compound Ceiling	Compound Ceiling: 600 x 600mm grid	first floor	17 m²
57	Compound Ceiling	Compound Ceiling: 600 x 600mm grid	first floor	38 m²
58	Compound Ceiling	Compound Ceiling: 600 x 600mm grid	first floor	15 m²
59	Compound Ceiling	Compound Ceiling: 600 x 600mm grid	first floor	16 m²
60	Compound Ceiling	Compound Ceiling: 600 x 600mm grid	first floor	16 m²
61	Compound Ceiling	Compound Ceiling: 600 x 600mm grid	first floor	16 m²
62	Compound Ceiling	Compound Ceiling: 600 x 600mm grid	first floor	7 m²
63	Compound Ceiling	Compound Ceiling: 600 x 600mm grid	basement	28 m²
64	Compound Ceiling: 600 x 600mm grid: 63	23.243/21		1779 m²

Figure 4.23. Revit architecture ceiling quantities

The yardages of 25 architectural- construction items of the Uşak Province Karahanlı District 10- bed capacity integrated hospital which I modeled in Revit Architecture Program were modelled in Revit architecture program and have been taken automatically. After this point, the unit prices for 2018 tender year regarding the construction of the hospital shall be multiplied and the approximate cost schedule shall be found. Late ron we will make a comparison with the yardagres which were found by the tender unit within the scope of the Project Investment and Coordination Department of MINISTRY OF HEALTH, as the controller of the construction process.

Table 4.1. Approximate cost table

Date of preparation : 12.04.2019
Work Definition : 10 Bed capacıty hospital
Work Group Main Group > Construction manufactures

Line No	Pose No	Manufacture Type	Unit	Quantity	Unit Price	Amount
1	y.27.501/04	Rough rendering with 250/350 kg cement dosed rough and thin mortar	m²	1352,95	₺22,93	₺31.023,14
2	Y.27.525/A2	Calcareous rough plastering and gypsum plastering (slaked lime-bagged)	m²	4642,21	₺22,01	₺102.175,04
3	Y.27.528/03	Satin plastering over the naced concrete, thin plastered , gypsum plastered surfaces	m²	4642,21	₺8,86	₺41.129,98
4	Y.25.003/28	Application of undercoating over the satin plastered and plasterboard surfaces and two layer water based semi- matt anti-bacterial painting (interior wall)	m²	4642,21	₺15,49	₺71.907,83
5	Y.25.003/22	Application of undercoating over the satin plastered and plasterboard surfaces and two layer water based semi- matt anti-bacterial painting (interior wall)	m²	1352,95	₺14,63	₺19.793,66
6	Y.26.006/405	Wall cladding with (25 x 33 cm) or (25 x 40 cm) nominal sizes, with any kind of pattern and surfaces properties , with ı. quality , colored ceramic wall tiles, with a 3 mm joint gaps (by tile adhesive)	m²	1915,63	₺44,40	₺85.053,97
7	Y.18.110/01E 07	Construction of wall with 15 cm thickness- unequipped gas concrete wall block (by using gas concrete adhesive)) (g4 class) (5,00 n/mm² and 600 kg/m³)	m²	3680,25	₺53,45	₺196.709,36
8	Y.18.110/01E 010	Construction of wall with 20 cm thickness- unequipped gas concrete wall block (by using gas concrete adhesive) (g2 class)(2,50 n/mm² and 400 kg/m³)	m²	1202,7	₺59,44	₺71.488,49
9	Y.19.057/006	Thermal insulation over the floorings on horizontal (placed on the ground- soil contacted-) with 8 cm- smooth surface plates (xps - 300 kpa pressure resistance or over reverse terrace roofs	m²	1220	₺28,83	₺35.172,60
10	MSB.671/A	Flooring with fume granite plate	m²	576	₺340,54	₺196.151,04
11	Y.26.005/403	Flooring, with 3 mm joint gaps, with I quality, colored ceramic tiles of 40 x 40 cm nominal sizes, with all kinds of pattern and surface properties (by using tile adhesive)	m²	297	₺44,38	₺13.180,86
12	Y.26.015/003	Internal space covering/flooring with marble aggregated terrace tiles (breaking load requirements (class 2) surface areas <= 1100cm2 – sizes and breaking resistance > 2,5 kn, honlu o polished)	m²	702	₺77,24	₺54.222,48
13	Y.26.007/405 A	Flooring, with 3 mm joint gaps, with I quality, colored ceramic tiles of 40 x 40 cm nominal sizes, with all kinds of pattern and surface properties (by using tile adhesive)	m²	524	₺56,05	₺29.370,20
14	Y.25.116/A1 0	Flooring with 2 mm pvc based flooring materials (homogenous)(group t-04.443/a2c)	m²	755	₺59,21	₺44.703,55
15	SPECIAL M-01	2 components without solvent epoxy covering	m²	35	₺73,50	₺2.572,50
16	Y.27.581	200 kg cement dosed level layering	m²	1278	₺14,48	₺18.505,44

Table 4.1. Approximate Cost Table Contiuned

Line No	Pose No	Manufacture Type	Unit	Quantity	Unit Price	Amount
17	27,583	Thickness ; 2.5 cm - 400 kg cement dose alum preparation	m³	1611	₺9,23	₺14.869,53
18	15.140/5	Manual sprinkling , irrigation, compaction by supplying raw coal pebble by machine	m²	488	₺13,56	₺6.617,28
19	y.19.055/006	Thermal insulation plastering(cladding) and external thermal insulation over the external walls with extrude polystyrene plates(xps- 200 kpa pressure resistance), whose thickness is 8 cm- with rough surface or rough channeled	m²	1392,61	₺67,40	₺93.861,91
20	y.18.461/042	250 gr/m² - geo- textile may laying	m²	1220	₺3,45	₺4.209,00
21	y.18.461/009	Two layer water insulation with 3 mm - 4 mm thickness- elastomeric based (bended under -20 degree) polyester mat carrying polymer bituminous covers	m²	1220	₺39,40	₺48.068,00
22	23.243/21	Construction of secret carrier system suspended ceiling by 60*60 cm sizes- 0.70 mm thickness- min.20 micron electrostatic dust painted (polyester based) of which the rear face is covered by acoustic fabric perforated aluminum plates (at least aw 3000 series)	m²	1779	₺87,69	₺156.000,51
23	SPECIAL POSE	Fiber supported and cement based plate façade cladding	m²	1392,61	₺212,50	₺295.929,63

TOTAL : 1597543,409 TL

CHAPTER 5

CONCLUSIONS

The approximate quantity prepared by the tender authority is shown in the table below. Comparisons with the yardages found from revit are included as well.

Table 5.1. Usak Karahallı state hospital construction work cost table

Line No	Pose No	Manufacture Type	Unit	Quantity	Unit Price	Amount
1	y.27.501/04	Rough rendering with 250/350 kg cement dosed rough and thin mortar	m²	1352,81	₺22,93	₺31.019,93
2	Y.27.525/A2	Calcareous rough plastering and gypsum plastering (slaked lime- bagged)	m²	4752,25	₺22,01	₺104.597,02
3	Y.27.528/03	Satin plastering over the naced concrete, thin plastered , gypsum plastered surfaces	m²	4429,79	₺8,86	₺39.247,94
4	Y.25.003/28	Application of undercoating over the satin plastered and plasterboard surfaces and two layer water based semi- matt anti-bacterial painting (interior wall)	m²	4630,28	₺15,49	₺71.723,04
5	Y.25.003/22	Application of undercoating over the satin plastered and plasterboard surfaces and two layer water based semi- matt anti-bacterial painting (interior wall)	m²	1348,58	₺14,63	₺19.729,73
6	Y.26.006/405	Wall cladding with (25 x 33 cm) or (25 x 40 cm) nominal sizes, with any kind of pattern and surfaces properties , with ı. quality , colored ceramic wall tiles, with a 3 mm joint gaps (by tile adhesive)	m²	1926,74	₺44,40	₺85.547,26
7	Y.18.110/01E 07	Construction of wall with 15 cm thickness- unequipped gas concrete wall block (by using gas concrete adhesive)) (g4 class) (5,00 n/mm² and 600 kg/m³)	m²	3677,02	₺53,45	₺196.536,72
8	Y.18.110/01E 010	Construction of wall with 20 cm thickness- unequipped gas concrete wall block (by using gas concrete adhesive) (g2 class)(2,50 n/mm² and 400 kg/m³)	m²	1228,08	₺59,44	₺72.997,08
9	Y.19.057/006	Thermal insulation over the floorings on horizontal (placed on the ground- soil contacted-) with 8 cm- smooth surface plates (xps - 300 kpa pressure resistance or over reverse terrace roofs	m²	1116,25	₺28,83	₺32.181,49
10	MSB.671/A	Flooring with fume granite plate	m²	575,94	₺340,54	₺196.130,61
11	Y.26.005/403	Flooring, with 3 mm joint gaps, with I quality, colored ceramic tiles of 40 x 40 cm nominal sizes, with all kinds of pattern and surface properties (by using tile adhesive)	m²	293,47	₺44,38	₺13.024,20
12	Y.26.015/003	Internal space covering/flooring with marble aggregated terrace tiles (breaking load requirements (class 2) surface areas <= 1100cm2 – sizes and breaking resistance > 2,5 kn, honlu o polished)	m²	695,56	₺77,24	₺53.725,05
13	Y.26.007/405 A	Flooring, with 3 mm joint gaps, with I quality, colored ceramic tiles of 40 x 40 cm nominal sizes, with all kinds of pattern and surface properties (by using tile adhesive)	m²	534,67	₺56,05	₺29.968,25
14	Y.25.116/A10	Flooring with 2 mm pvc based flooring materials (homogenous)(group t-04.443/a2c)	m²	743,88	₺59,21	₺44.045,13

Table 5.1.Usak Karahallı state hospital construction work cost table contiuned

Line No	Pose No	Manufacture Type	Unit	Quantity	Unit Price	Amount
15	SPECIAL M-01	2 components without solvent epoxy covering	m²	34,69	₺73,50	₺2.549,72
16	Y.27.581	200 kg cement dosed level layering	m²	1279,37	₺14,48	₺18.525,28
17	27,583	thickness ; 2.5 cm - 400 kg cement dose alum preparation	m³	1611,37	₺9,23	₺14.872,95
18	15.140/5	Manual sprinkling , irrigation, compaction by supplying raw coal pebble by machine	m²	512	₺13,56	₺6.942,72
19	y.19.055/006	Thermal insulation plastering(cladding) and external thermal insulation over the external walls with extrude polystyrene plates(xps-200 kpa pressure resistance), whose thickness is 8 cm- with rough surface or rough channeled	m²	1391,33	₺67,40	₺93.775,64
20	y.18.461/042	250 gr/m² - geo- textile may laying	m²	2469,37	₺3,45	₺8.519,33
21	y.18.461/009	Two layer water insulation with 3 mm - 4 mm thickness- elastomeric based (bended under -20 degree) polyester mat carrying polymer bituminous covers	m²	1514,54	₺39,400	₺59.672,88
22	23.243/21	Construction of secret carrier system suspended ceiling by 60*60 cm sizes- 0.70 mm thickness- min.20 micron electrostatic dust painted (polyester based) of which the rear face is covered by acoustic fabric perforated aluminum plates (at least aw 3000 series)	m²	1750,68	₺87,69	₺153.517,13
23	SPECIAL POESE	Fiber supported and cement based plate façade cladding	m²	1391,38	₺212,50	₺295.668,25

TOTAL : 1644817, 321 TL

Table 5.2. Bill of quantities table
Work Definition : 10 Bed capacıty hospıtal
Work Group Main Group > Construction manufactures

Line No	Pose No	Manufacture Type	Unit	Tender Approximate Quantities	Revit Approximate Quantities	Diffirence Quantity
1	y.27.501/04	Rough rendering with 250/350 kg cement dosed rough and thin mortar	m²	1352,81	1352,95	-0,14
2	Y.27.525/A2	Calcareous rough plastering and gypsum plastering (slaked lime-bagged)	m²	4752,25	4642,21	110,04
3	Y.27.528/03	Satin plastering over the naced concrete, thin plastered , gypsum plastered surfaces	m²	4429,79	4642,21	-212,42
4	Y.25.003/28	Application of undercoating over the satin plastered and plasterboard surfaces and two layer water based semi- matt anti-bacterial painting (interior wall)	m²	4630,28	4642,21	-11,93
5	Y.25.003/22	Application of undercoating over the satin plastered and plasterboard surfaces and two layer water based semi- matt anti-bacterial painting (interior wall)	m²	1348,58	1352,95	-4,37
6	Y.26.006/405	Wall cladding with (25 x 33 cm) or (25 x 40 cm) nominal sizes, with any kind of pattern and surfaces properties , with ı. quality , colored ceramic wall tiles, with a 3 mm joint gaps (by tile adhesive)	m²	1926,74	1915,63	11,11
7	Y.18.110/01E07	Construction of wall with 15 cm thickness- unequipped gas concrete wall block (by using gas concrete adhesive)) (g4 class) (5,00 n/mm² and 600 kg/m³)	m²	3677,02	3680,25	-3,23
8	Y.18.110/01E010	Construction of wall with 20 cm thickness- unequipped gas concrete wall block (by using gas concrete adhesive) (g2 class)(2,50 n/mm² and 400 kg/m³)	m²	1228,08	1202,7	25,38
9	Y.19.057/006	Thermal insulation over the floorings on horizontal (placed on the ground-soil contacted-) with 8 cm- smooth surface plates (xps - 300 kpa pressure resistance or over reverse terrace roofs	m²	1116,25	1220	-103,75
10	MSB.671/A	Flooring with fume granite plate	m²	575,94	576	-0,06
11	Y.26.005/403	Flooring, with 3 mm joint gaps, with I quality, colored ceramic tiles of 40 x 40 cm nominal sizes, with all kinds of pattern and surface properties (by using tile adhesive)	m²	293,47	297	-3,53
12	Y.26.015/003	Internal space covering/flooring with marble aggregated terrace tiles (breaking load requirements (class 2) surface areas <= 1100cm2 – sizes and breaking resistance > 2,5 kn, honlu o polished)	m²	695,56	702	-6,44
13	Y.26.007/405A	Flooring, with 3 mm joint gaps, with I quality, colored ceramic tiles of 40 x 40 cm nominal sizes, with all kinds of pattern and surface properties (by using tile adhesive)	m²	534,67	524	10,67
14	Y.25.116/A10	Flooring with 2 mm pvc based flooring materials (homogenous)(group t-04.443/a2c)	m²	743,88	755	-11,12
15	SPECIAL M-01	2 components without solvent epoxy covering	m²	34,69	35	-0,31
16	Y.27.581	200 kg cement dosed level layering	m²	1279,37	1278	1,37

Table 5.2. Bıll of quantities table contiuned

Line No	Pose No		Manufacture Type	Unit	Tender Approximate Quantities	Revit Approximate Quantities	Diffirence Quantity
17	27,583	Thickness ; 2.5 cm - 400 kg cement dose alum preparation		m^3	1611,37	1611	0,37
18	15.140/5	Manual sprinkling , irrigation, compaction by supplying raw coal pebble by machine		m^2	512	488	24
19	y.19.055/006	Thermal insulation plastering(cladding) and external thermal insulation over the external walls with extrude polystyrene plates(xps- 200 kpa pressure resistance), whose thickness is 8 cm- with rough surface or rough channeled		m^2	1391,33	1392,61	-1,28
20	y.18.461/042	250 gr/m^2 - geo- textile may laying		m^2	2469,37	2440	29,37
21	y.18.461/009	Two layer water insulation with 3 mm - 4 mm thickness- elastomeric based (bended under -20 degree) polyester mat carrying polymer bituminous covers		m^2	1514,54	1513	1,54
22	23.243/21	Construction of secret carrier system suspended ceiling by 60*60 cm sizes- 0.70 mm thickness- min.20 micron electrostatic dust painted (polyester based) of which the rear face is covered by acoustic fabric perforated aluminum plates (at least aw 3000 series)		m^2	1750,68	1779	-28,32
23	ÖBF	Fiber supported and cement based plate façade cladding		m^2	1391,38	1392,61	-1,23

Table 5.3. Approximate cost table

APPROXIMATE QUANTITIES	
TENDER APPROXIMATE QUANTİTİES	**1644817,321 TL**
REVIT ARCHITECTURE APPROXİMATE QUANTITIES	**1597543,409 TL**
	DIFFERENCE: 47273,912 TL

There exists a difference amounting to 47273,912 TL between the yardage made manually according to 23 units of manufacture yardages and the yardages received from the Revit Architecture program. Considering that the manufacture items shall increase, this difference will get bigger which brings to the forefront how sensitive work it is to calculate the approximate cost. To enable the approximate cost to approach towards the actual cost of the work as far as possible; yardages should have been calculated accurate, complete and incompliance with the project and site lists. Primarily, the yardages should be initiated after the project and site lists are examined carefully and unit price tariff of each manufacture item is learnt satisfactorily.

In every stage of the calculation of the approximate cost, engineers should have building detailed information, should know building manufacture order and should have adequate information about the formation of the manufactures to be used in the building and about the cost. Approximate costs should be prepared by the experienced engineers. However, it is hereby seen from the consequences of the researches that no approximate costs are being calculated in the application. It is hereby seen that; because the work items which comprise the approximate cost are unable to be calculated in compliance with the site lists and because their amounts are not able to be calculated accurate, furthermore because the unit prices are unable to be prepared in compliance with the actual market prices; the approximate costs have been found higher by 3% compared to the actual costs

The unit price of a work item which is basis for the approximate cost should be determined by the procedure which is the most healthy procedure for calculation in compliance with the definition of the unit price. Price offers should be only received for the manufacture items within the scope of the fields of expertise of the experienced persons and institutions who are acting with the capacity of Contractor or Subcontractor, furthermore these prices should be utilized thus the approximate cost should be determined accordingly. It is hereby against the applicable legislation; to award the entire project into three separate contractors and to take the arithmetical mean of the turnkey basis offers thereof and to calculate the approximate cost finally. A a matter of fact, there are tens of decisions where the tenders of which the approximate costs are prepared in this way have been cancelled by the Tender Authority.

There have been serious differences observed between the bills of quantities received by Revit Architecture program and those prepared by the Tender Authority. The Tender Authority added the bills of quantities to those bills of quantities of which the rough construction has been taken from the static program. We are unable to discuss this matter for the architectural bills of quantities. It is inevitable to make various mistakes, as specified below, while making manual calculations.

a. While the yardages/bills of quantities are being prepared, the most frequent error being made is that; the quantities of some building elements seem to be less or more than they should be. This is mostly resulted from forgetting some elements or because of writing them more than one/repeatedly.
b. While the yardages/bills of quantities are being calculated, considering that the workload and problems of the technical personnel, they are unable to dominate and have full command of the subject and they prepare deficient location list accordingly.
c. Tender Authorities are unable to prepare approximate cost according to the project.
d. While the yardages/bills of quantities are calculated, the doubt as to whether minha are deducted or not or to calculate the minha numbers wrong

In the works which are tendered with wrong approximate costs, the contractors will be awarded the tenders with wrong approximate costs and the manufacture yardages/bills of quantities based on wrong approximate costs and real manufacture yardages/bills of quantities shall not overlap and the contractor will earn less money as per its manufacture. If the errors in the bills of quantities are quite high; than the contractor will be unable to proceed the work and the work will reach such a point where the manufacture should be stopped. If the calculations were made within the scope of Building Information Modeling and the yardages were calculated according to the programs; than the Electric Manufacture Items, Electric Manufacture Bills of Quantities, Mechanical Manufacture Items, Mechanical Manufacture Bills of Quantities, Construction Manufacture Items, Construction Manufacture Bills of Quantities would have been corrected and the tendering would have been made without any problem.

However, in our country, as this system has not been implemented yet, the problems were inevitable to have occurred from the errors of bills of quantities, in small scaled works such errors may be absorbed but in larger scaled works such errors are not able to be disregarded.

If the process has been conducted within the scope of the Building Information Modeling System, all the engineering departments would have predicted the projects in advance and would have avoided all the probable problems at the building contract stage.

Tender Authorities has been suffering from the lack of experienced staff and inexperienced technical staff is assigned to work. Such personnel may do wrong attempts due to lack of necessary training. In the tendering process and considering that an approximate cost has been prepared for the building, a probable change on the building may lead to delay in the tender process for approximate 60 days. Further yardages/ bills of quantities are required to be calculated for the changed manufacture items and an approximate- cost should be calculated again, thus the tender will be renewed with a delay of 60 days minimum. But if the Tendering Authority has conducted the process with a packet program within the scope of Building Information Modeling System, the 60 days- delay would be only 3 days.

Considering that this is a construction of hospital, school, etc. public construction, and people will suffer.

In my thesis, the issue which I wish to point out is that; the process should have been conducted through an approximate cost – program, the changes in the project could have been easily changed by feedback, and no feedbacks should be received in the bills of quantities/yardages. Finally; the technical personnel, instead of wasting hours for bills of quantities, should check their applied projects, the contractor would not face up any problem in the project, all works should bee conducted under electronic environment and no problem should exist between the technical personnel and contractor.

CHAPTER 6

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CHAPTER 7

APPENDICES

Table 7.1. Appendix A: Calcareous rough plastering and gypsum plastering(slaked lime- bagged) Y.27.525/A2 scale table of manufacturing pose number

	27.525/A2	Calcareous rough plastering and gypsum plastering	POSE TOTAL			M2	
232	**1-30**	**SICKROOM (TWO PERSON)**	1		20,05	3,30	66,17
233	K2	110/220	-1		1,10	2,20	-2,42
234	K3	130/220	-1		1,30	2,20	-2,86
235	G3	CURTAIN WALL BAY	-1		2,70	2,00	-5,40
236	**1-32**	**SICKROOM (TWO PERSON)**	1		20,05	3,30	66,17
237	K2	110/220	-1		1,10	2,20	-2,42
238	K3	130/220	-1		1,30	2,20	-2,86
239	G3	CURTAIN WALL BAY	-1		2,70	2,00	-5,40
240	**1-34**	**SICKROOM (TWO PERSON)**	1		20,35	3,30	67,16
241	K2	110/220	-1		1,10	2,20	-2,42
242	K3	130/220	-1		1,30	2,20	-2,86
243	G3	CURTAIN WALL BAY	-1		2,70	2,00	-5,40
244	**1-36**	**SICKROOM (TWO PERSON)**	1		20,35	3,30	67,16
245	K2	110/220	-1		1,10	2,20	-2,42
246	K3	130/220	-1		1,30	2,20	-2,86
247	G3	CURTAIN WALL BAY	-1		2,70	2,00	-5,40
248	**1-41**	**NURSE ROOM**	1		17,00	3,30	56,10
249	K1	100/220	-1		1,00	2,20	-2,20
250	K2	110/220	-1		1,10	2,20	-2,42
251	P1	80/200	-2		0,80	2,00	-3,20
252	**1-43**	**DOCTOR ROOM**	1		17,90	3,30	59,07
253	K2	110/220	-1		1,10	2,20	-2,42
254	P1	80/200	-2		0,80	2,00	-3,20
255							0,00
256		**WINDOW BAY / DOORWAY**	-1	1,00	41,64		-41,64
257							0,00
258		**M1 STAIRS**	1		15,85	3,30	52,31
259		**M1 STAIRS**	3		15,85	3,30	156,92
260	YK1	110/220	-1		1,10	2,20	-2,42
261	YDCK1	110/220	-3		1,10	2,20	-7,26
	27.525/A2	Calcareous rough plastering and gypsum plastering	POZ TOPLAMI			M2	4.752,50

Table 7.2. Appendix B: Satin plastering over the naked concrete, thin plastered gypsum plastered surfaces Y.27.528/3 scale table of manufacturing pose number

	27.528/3	Satin plastering over the naced concrete, thin plastered , gypsum plastered surfaces	POSE TOTAL			M2	12
238	G3	CURTAIN WALL BAY	-1		2,70	2,00	-5,40
239	**1-32**	**SICKROOM (TWO PERSON)**	1		20,35	3,30	67,16
240	K2	110/220	-1		1,10	2,20	-2,42
241	K3	130/220	-1		1,30	2,20	-2,86
242	G3	CURTAIN WALL BAY	-1		2,70	2,00	-5,40
243	**1-34**	**SICKROOM (TWO PERSON)**	1		20,35	3,30	67,16
244	K2	110/220	-1		1,10	2,20	-2,42
245	K3	130/220	-1		1,30	2,20	-2,86
246	G3	CURTAIN WALL BAY	-1		2,70	2,00	-5,40
247	**1-36**	**SICKROOM (TWO PERSON)**	1		20,35	3,30	67,16
248	K2	110/220	-1		1,10	2,20	-2,42
249	K3	130/220	-1		1,30	2,20	-2,86
250	G3	CURTAIN WALL BAY	-1		2,70	2,00	-5,40
251	**1-41**	**NURSE ROOM**	1		17,00	3,30	56,10
252	K1	100/220	-1		1,00	2,20	-2,20
253	K2	110/220	-1		1,10	2,20	-2,42
254	P1	80/200	-2		0,80	2,00	-3,20
255	**1-43**	**DOCTOR ROOM**	1		17,90	3,30	59,07
256	K2	110/220	-1		1,10	2,20	-2,42
257	P1	80/200	-2		0,80	2,00	-3,20
258							0,00
259		**EMPTINESS**	-1	1,00	41,64		-41,64
260		**EMPTINESS**	-1	1,00	10,80		-10,80
261							0,00
262		**M1 STAİR**	1		15,85	3,30	52,31
263		**M1 STAİR**	3		15,85	3,30	156,92
264	YK1	110/220	-1		1,10	2,20	-2,42
265	YDCK1	110/220	-3		1,10	2,20	-7,26
266							0,00
	27.528/3	Satin plastering over the naced concrete, thin plastered , gypsum plastered surfaces	POSE TOTAL			M2	4.429,79

Table 7.3. Appendix C : Flooring with fume granite plate (60x60) MSB.671/A scale table of manufacturing pose number

	MSB.671/A	Flooring with fume granite plate	POSE TOTAL			M2	
S.No.	Manufacture Type		NUM.	WIDTH	LENGTH	HEIGHT	TOTAL
1		M1 STAIRS	1	1,00	22,93		22,93
2		M1 STAIRS	3	1,00	11,04		33,12
3	B-01	CORRIDOR 1	1	1,00	45,30		45,30
4	Z-01	WINDBREAK	1	1,00	9,84		9,84
5	Z-02	CORRIDOR	1	1,00	85,24		85,24
6	Z-03	ASM CORRIDOR	1	1,00	116,92		116,92
7	Z-42	ASM LOBBY	1	1,00	54,30		54,30
8	1-01	DAĞILIM HOLÜ	1	1,00	117,99		117,99
9	1-02	TSM CORRIDOR	1	1,00	90,30		90,30
	MSB.671/A	Flooring with fume granite plate	POSE TOTAL			M2	575,94

Table 7.4. Appendix D : 2 components wıthout solvent epoxy covering specıal-M01 scale table of manufacturing pose number

	SPECIAL -01	2 components without solvent epoxy covering	POSE TOTAL			M2	
No.	Manufacture Type		NUM.	WIDTH	LENGTH	HEIGHT	TOTAL
							0,00
1	B-08	AMBULANCE GARAGE	1	1,00	34,69		34,69
	SPECIAL -01	2 components without solvent epoxy covering	POSE TOTAL			M2	34,69

Table 7.5. Appendix E: box profile construction fiber supported and cement external façade cladding special-m04 scale table of manufacturing pose number

	SPECIAL-M04	Fiber supported and cement based plate façade cladding	POSE TOTAL			M2	
NU.	Manufacture Type		NUM.	WIDTH	LENGTH	HEIGHT	TOTAL
1		ALUMINIUM COMPOSITE					
2	+8.25	STOA	1	1,00	86,00		86,00
3	+8.25/+9.60	BULWARK	1		240,52	1,35	324,70
4	+12.05	STOA	1	1,00	48,50		48,50
5	+12.05/+13.10	BULWARK	1		82,40	1,05	86,52
6	+3.50/+5.10	BULWARK	1		80,00	1,60	128,00
7	+0.00/3.50	FRONT FACADE COLUMN	6		8,80	3,50	184,80
8	+0.00/3.50	FRONT FACADE COLUMN	2		8,80	3,50	61,60
9	+0.00/5.10	FRONTAGE	1		11,20	5,10	57,12
10	+5.10/8.25	FRONTAGE	1		18,10	3,15	57,02
11	+4.20/8.25	FRONTAGE	1		9,00	4,05	36,45
12	+4.20/8.25	FRONTAGE	1		25,40	4,05	102,87
13	+3.50/5.10	RIGHT SIDE FACADE	1		26,60	1,60	42,56
14	+3.50/8.25	LEFT SIDE FACADE	1		34,70	4,75	164,83
15	-1.78/3.50	LEFT SIDE FACADE	1		8,30	4,92	40,84
16	+3.50/5.10	REAR FACADE	1		26,00	1,60	41,60
17	+3.50/8.25	REAR FACADE	1		15,50	4,75	73,63
18							0,00
19		EMPTINESS					0,00
20	P1	80/200	-6	0,80	2,00		-9,60
21							0,00
22	GC1	2370/302	-1		23,70	3,02	-71,57
23	GC2	1440/302	-1		14,40	3,02	-43,49
	SPECIAL-M04	Fiber supported and cement based plate façade cladding	POSE TOTAL			M2	1.391,38

Table 7.6. Appendix F: construction of wall with 15 cm thickness-unequipped gas concrete wall block (by using gas concrete adhesive)) (g4 class) (5,00 n/mm² and 600 kg/m³) y.18.110/01e07 scale table of manufacturing pose number

	Y.18.110/01E07	Construction of wall with 15 cm thickness-unequipped gas concrete wall block (by using gas concrete adhesive)) (g4 class) (5,00 n/mm² and 600 kg/m³)	POSE TOTAL			M2	
145			1		4,95	4,05	20,05
146			3		0,55	4,05	6,68
147			2		2,00	4,05	16,20
148			1		4,75	3,60	17,10
149			1		1,30	4,05	5,27
150			1		5,20	4,05	21,06
151			2		3,95	3,60	28,44
152							
153							
154							
155		EMPTINESS					0,00
156	FK1	330/290	-1	3,30	2,90		-9,57
157							0,00
158	ALCK3	110/220	-1	1,10	2,20		-2,42
159	ALCK5	340/290	-1	3,40	2,90		-9,86
160	ALCK6	160/290	-5	1,60	2,90		-23,20
161	ALCK7	230/290	-9	2,30	2,90		-60,03
162							0,00
163	OTM1	140/220	-4	1,40	2,20		-12,32
164							0,00
165	K1	100/220	-67	1,00	2,20		-147,40
166	K2	110/220	-32	1,10	2,20		-77,44
167	K3	130/220	-9	1,30	2,20		-25,74
168	KK1	160/220	-1	1,60	2,20		-3,52
	Y.18.110/01E07	Construction of wall with 15 cm thickness-unequipped gas concrete wall block (by using gas concrete adhesive)) (g4 class) (5,00 n/mm² and 600 kg/m³)	POSE TOTAL			M2	3677,02

Table 7.7. Appendix G: Construction of wall with 20 cm thickness- unequipped gas concrete wall block (by using gas concrete adhesive) (g4 class)(5,00 n/mm² and 600 kg/m³) Y.18.110/01e10 scale table of manufacturing pose number

	Y.18.110/01E10	Construction of wall with 20 cm thickness- unequipped gas concrete wall block (by using gas concrete adhesive) (g2 class)(2,50 n/mm² and 400 kg/m³)	POSE TOTAL			M2	54
53			1		1,70	3,20	5,44
54			1		2,40	3,20	7,68
55					4,10	3,20	13,12
56			1		2,10	3,20	6,72
57							0,00
58		**EMPTINESS**					0,00
59	**P1**	**80/200**	**-92**	0,80	2,00		-147,20
60	**P2**	**80/60**	**-4**	0,80	0,60		-1,92
61							0,00
62	G1	CURTAIN WALL BAY	-1	2,60	2,00		-5,20
63	G2	CURTAIN WALL BAY	-5	1,80	2,00		-18,00
64	G3	CURTAIN WALL BAY	-5	2,70	2,00		-27,00
65							0,00
66	**YK1**	**110/220**	**-1**	1,10	2,20		-2,42
67	**DK2**	**160/220**	**-4**	1,60	2,20		-14,08
68							0,00
69	**FK1**	**330/290**	**-1**	3,30	2,90		-9,57
70							0,00
71	**SK1**	**360/360**	**-1**	3,60	3,60		-12,96
72	**MP1**	**300/60**	**-2**	3,00	0,60		-3,60
73							0,00
74	**ALCK1**	**340/290**	**-1**	3,40	2,90		-9,86
75	**ALCK2**	**230/290**	**-2**	2,30	2,90		-13,34
76	**ALCK4**	**210/290**	**-1**	2,10	2,90		-6,09
	Y.18.110/01E10	Construction of wall with 20 cm thickness- unequipped gas concrete wall block (by using gas concrete adhesive) (g2 class)(2,50 n/mm² and 400 kg/m³)	POSE TOTAL			M2	1228,08

Table 7.8. Appendix H: thermal insulation plastering(cladding) and external thermal insulation over the external walls with extrude polystyrene plates (xps- 200 kpa pressure resistance), whose thickness is 8 cm- with rough surface or rough channeled Y.19.055/006 scale table of manufacturing pose number

		Y.19.055/006	Thermal insulation plastering(cladding) and external thermal insulation over the external walls with extrude polystyrene plates(xps- 200 kpa pressure resistance), whose thickness is 8 cm- with rough surface or rough channeled	POSE TOTAL			M2	
30	-1.78/3.50		LEFT SIDE FACADE	1		6,30	4,92	31,00
31	+3.50/5.10		REAR FACADE	1		16,50	1,60	26,40
32	+3.50/8.25		REAR FACADE	1		7,50	4,75	35,63
33								0,00
34			EMPTINESS					0,00
35	P1		80/200	-92	0,80	2,00		-147,20
36	P2		80/60	-4	0,80	0,60		-1,92
37								0,00
38	G1		CURTAIN WALL BAY	-1	2,60	2,00		-5,20
39	G2		CURTAIN WALL BAY	-5	1,80	2,00		-18,00
40	G3		CURTAIN WALL BAY	-5	2,70	2,00		-27,00
41								0,00
42	YK1		110/220	1	1,10	2,20		2,42
43	DK2		160/220	-4	1,60	2,20		-14,08
44								0,00
45	FK1		330/290	-1	3,30	2,90		-9,57
46								0,00
47	SK1		360/360	-1	3,60	3,60		-12,96
48	MP1		300/60	-2	3,00	0,60		-3,60
49								0,00
50	ALCK1		340/290	-1	3,40	2,90		-9,86
51	ALCK2		230/290	-2	2,30	2,90		-13,34
52	ALCK4		210/290	-1	2,10	2,90		-6,09
		Y.19.055/006	Thermal insulation plastering(cladding) and external thermal insulation over the external walls with extrude polystyrene plates(xps- 200 kpa pressure resistance), whose thickness is 8 cm- with rough surface or rough channeled	POSE TOTAL			M2	1.391,33

Table 7.9. Appendix I : Thermal insulation over the floorings on horizontal (placed on the ground- soil contacted-) with 8 cm- smooth surface plates (xps 300 kpa pressure resistance or over reverse terrace roofs Y.19.057/006 scale table of manufacturing pose number

Y.19.057/006	Thermal insulation over the floorings on horizontal (placed on the ground- soil contacted-) with 8 cm- smooth surface plates (xps - 300 kpa pressure resistance or over reverse terrace roofs		POSE TOTAL		M2	60
NU.	Manufacture Type	NUM.	WIDTH	LENGTH	HEIGHT	TOTAL
	BUILDING FOUNDATION	1	1116,25	1,00	1,00	1116,25
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
Y.19.057/006	Thermal insulation over the floorings on horizontal (placed on the ground- soil contacted-) with 8 cm- smooth surface plates (xps - 300 kpa pressure resistance or over reverse terrace roofs		POSE TOTAL		M2	1.116,25

Table 7.10. Appendix J: Application of undercoating over the satin plastered and plasterboard surfaces and two layer water based semi- mattpainting (interior wall) Y.25.003/22 scale table of manufacturing pose number

	Y.25.003/22	Application of undercoating over the satin plastered and plasterboard surfaces and two layer water based semi- matt anti-bacterial painting (interior wall)	POSE TOTAL			M2	75
23	**B-16**	**MORGUE CORRIDOR**	1		25,60	4,05	103,68
24	ALCK6	160/290	-1		1,60	2,90	-4,64
25	K3	130/220	-2		1,30	2,20	-5,72
26	**B-17**	**COLD STORAGE**	1		20,30	4,20	85,26
27	K3	130/220	-1		1,30	2,20	-2,86
28	**B-21**	**CORRIDOR**	1		81,96	4,20	344,23
29	YK1	110/220	-2		1,10	2,20	-4,84
30	YK2	100/220	-1		1,00	2,20	-2,20
31	ALCK6	160/290	-2		1,60	2,90	-9,28
32	ALCK7	230/290	-2		2,30	2,90	-13,34
33	K1	100/220	-8		1,00	2,20	-17,60
34	**B-32**	**WOMENS ABLUTION**	1		16,40	4,20	68,88
35	K1	100/220	-1		1,00	2,20	-2,20
36	**B-34**	**ABLUTION**	1		18,40	4,20	77,28
37	K1	100/220	-1		1,00	2,20	-2,20
38	**B-41**	**HALL**	1		7,95	4,20	33,39
39	K1	100/220	-3		1,00	2,20	-6,60
40	**B-42**	**KITCHEN HALL**	1		20,00	4,20	84,00
41	K1	100/220	-2		1,00	2,20	-4,40
42	ALCK7	230/290	-1		2,30	2,90	-6,67
43	ALCK2	230/290	-1		2,30	2,90	-6,67
44							0,00
45		**EMPTINESS**	-1	1,00	3,60		-3,60
46							0,00
	Y.25.003/22	Application of undercoating over the satin plastered and plasterboard surfaces and two layer water based semi- matt anti-bacterial painting (interior wall)	POSE TOTAL			M2	1.348,58

Table 7.11. Appendix K: Application of undercoating over the satin plastered and plasterboard surfaces and two layer water based semi- mat antibacterial painting (interior wall) Y.25.003/28 scale table of manufacturing pose number

	Y.25.003/28	Application of undercoating over the satin plastered and plasterboard surfaces and two layer water based semi- matt anti-bacterial painting (interior wall)	POSE TOTAL			M2	
196	K2	110/220	-1		1,10	2,20	-2,42
197	K3	130/220	-1		1,30	2,20	-2,86
198	G3	CURTAIN WALL BAY	-1		2,70	2,00	-5,40
199	**1-34**	**SICKROOM (TWO PERSON)**	1		25,10	4,20	105,42
200	K2	110/220	-1		1,10	2,20	-2,42
201	K3	130/220	-1		1,30	2,20	-2,86
202	G3	CURTAIN WALL BAY	-1		2,70	2,00	-5,40
203	**1-36**	**SICKROOM (TWO PERSON)**	1		25,10	4,20	105,42
204	K2	110/220	-1		1,10	2,20	-2,42
205	K3	130/220	-1		1,30	2,20	-2,86
206	G3	CURTAIN WALL BAY	-1		2,70	2,00	-5,40
207	**1-41**	**NURSE ROOM**	1		20,00	4,20	84,00
208	K1	100/220	-1		1,00	2,20	-2,20
209	K2	110/220	-1		1,10	2,20	-2,42
210	P1	80/200	-2		0,80	2,00	-3,20
211	**1-43**	**DOCTOR ROOM**	1		20,90	4,20	87,78
212	K2	110/220	-1		1,10	2,20	-2,42
213	P1	80/200	-2		0,80	2,00	-3,20
214							0,00
215		**EMPTINESS**	-1	1,00	7,20		-7,20
216		**EMPTINESS**	-1	1,00	41,64		-41,64
217		**M1 STAIRS**	1		20,60	3,50	72,10
218		**M1 STAIRS**	3		20,60	3,50	216,30
219	YK1	110/220	-1		1,10	2,20	-2,42
220	YDCK1	110/220	-3		1,10	2,20	-7,26
221							0,00
222							0,00
							0,00
							0,00
							0,00
	Y.25.003/28	Application of undercoating over the satin plastered and plasterboard surfaces and two layer water based semi- matt anti-bacterial painting (interior wall)	POSEE TOTAL			M2	4.630,28

Table 7.12. Appendix L: With a thickness of 2 mm- ground leveling with cement based self leveling mortar and PVC based flooring with a thickness of 2 mm (homogenous-group - 04.443/a2c) Y.25.116/A10 scale table of manufacturing pose number

6	Z-07	POLYCLINIC -1	1	1,00	16,04		16,04
7	Z-08	POLYCLINIC -2	1	1,00	16,66		16,66
8	Z-09	PREGNANT MONITORING ROMM -1	1	1,00	22,91		22,91
9	Z-11	PREGNANT MONITORING ROMM -2	1	1,00	22,91		22,91
10	Z-19	POLYCLINIC -3	1	1,00	15,56		15,56
11	Z-20	POLYCLINIC -4	1	1,00	14,01		14,01
12	Z-21	POLYCLINIC -5	1	1,00	14,22		14,22
13	Z-22	VACCINATION ROOM	1	1,00	14,52		14,52
14	Z-23	EMERGENCY ROOM	1	1,00	14,83		14,83
15	Z-31	LAB.	1	1,00	13,20		13,20
16	Z-33	STAFF ROOM	1	1,00	12,63		12,63
17	Z-34	MR. MÜŞAHADE	1	1,00	32,00		32,00
18	Z-35	STORE	1	1,00	4,95		4,95
19	Z-36	MRS. MÜŞAHADE	1	1,00	43,63		43,63
20	Z-37	EMERGENCY CORRIDOR	1	1,00	47,85		47,85
21	Z-38	MÜDAHALE ODASI	1	1,00	18,24		18,24
22	Z-39	CPR	1	1,00	20,67		20,67
23	Z-40	POLYCLINIC	1	1,00	16,73		16,73
24	Z-41	AŞI-PANSUMAN ODASI	1	1,00	16,10		16,10
25	1-16	POLYCLINIC	1	1,00	14,58		14,58
26	1-23	SDL	1	1,00	18,58		18,58
27	1-25	SICKROOM CORRIDORS	1	1,00	124,78		124,78
28	1-26	SICKROOM (TWO PERSON)	1	1,00	23,21		23,21
29	1-28	SICKROOM (TWO PERSON)	1	1,00	22,20		22,20
30	1-30	SICKROOM (TWO PERSON)	1	1,00	21,14		21,14
31	1-32	SICKROOM (TWO PERSON)	1	1,00	21,14		21,14
32	1-34	SICKROOM (TWO PERSON)	1	1,00	22,20		22,20
33	1-36	SICKROOM (TWO PERSON)	1	1,00	20,38		20,38
34	1-41	NURSE ROOM	1	1,00	14,19		14,19
35	1-43	DOCTOR ROOM	1	1,00	17,28		17,28
	Y.25.116/A10	Flooring with 2 mm pvc based flooring materials (homogenous)(group t-04.443/a2c)		POSE TOTAL		M2	743,88

Table 7.13. Appendix M : Flooring, with 3 mm joint gaps, with I quality, colored ceramic tiles of 40 x 40 cm nominal sizes, with all kinds of pattern and surface properties (by using tile adhesive) Y.26.005/403 scale table of manufacturing pose number

	Y.26.005/403	Flooring, with 3 mm joint gaps, with I quality, colored ceramic tiles of 40 x 40 cm nominal sizes, with all kinds of pattern and surface properties (by using tile adhesive)	POSE TOTAL			M2	
21	Z-18	FLOOR OFFICE	1	1,00	8,02		8,02
22	Z-24	DIS WC	1	1,00	4,00		4,00
23	Z-25	MRS. WC	1	1,00	7,55		7,55
24	Z-26	CLEAN ROOM	1	1,00	3,34		3,34
25	Z-27	MR WC	1	1,00	8,36		8,36
26	Z-32	WC	1	1,00	2,89		2,89
27	Z-43	MR WC	1	1,00	2,93		2,93
28	Z-44	MRS. WC	1	1,00	3,04		3,04
29	Z-46	DIS WC	1	1,00	3,90		3,90
30	1-11	TEA CENTER	1	1,00	5,26		5,26
31	1-18	DIS WC	1	1,00	4,00		4,00
32	1-19	MRS. WC	1	1,00	8,55		8,55
33	1-20	CLEAN ROOM	1	1,00	3,34		3,34
34	1-21	MR. WC	1	1,00	8,37		8,37
35	1-22	FLOOR OFFICE	1	1,00	4,87		4,87
36	1-24	WC	1	1,00	4,62		4,62
37	1-27	WC	1	1,00	4,41		4,41
38	1-29	WC	1	1,00	4,41		4,41
39	1-31	WC	1	1,00	4,41		4,41
40	1-33	WC	1	1,00	4,41		4,41
41	1-35	WC	1	1,00	4,41		4,41
42	1-37	WC	1	1,00	4,41		4,41
43	1-39	DIRTY WAREHOUSE	1	1,00	6,36		6,36
44	1-40	CLEAN WAREHOUSE	1	1,00	6,47		6,47
45	1-42	WC	1	1,00	2,36		2,36
	Y.26.005/403	Flooring, with 3 mm joint gaps, with I quality, colored ceramic tiles of 40 x 40 cm nominal sizes, with all kinds of pattern and surface properties (by using tile adhesive)	POSE TOTAL			M2	293,47

Table 7.14. Appendix N : Wall cladding with (25 x 33 cm) or (25 x 40 cm) nominal sizes, with any kind of pattern and surfaces properties with I. quality , colored ceramic wall tiles, with a 3 mm joint gaps (by tile adhesive) Y.26.006/405 scale table of manufacturing pose number

	Y.26.006/405	Wall cladding with (25 x 33 cm) or (25 x 40 cm) nominal sizes, with any kind of pattern and surfaces properties , with I. quality , colored ceramic wall tiles, with a 3 mm joint gaps (by tile adhesive)	POSE TOTAL			M2	
86	**1-37**	**WC**	1		8,85	3,97	35,13
87	K2	110/220	-1		1,10	2,20	-2,42
88	**1-39**	**DIRTY WAREHOUSE**	1		10,70	3,97	42,48
89	K2	110/220	-1		1,10	2,20	-2,42
90	**1-40**	**CLEAN WAREHOUSE**	1		10,70	3,97	42,48
91	K2	110/220	-1		1,10	2,20	-2,42
92	**1-42**	**WC**	1		8,15	3,97	24,42
93	K1	100/220	-1		1,00	2,20	-2,20
94							0,00
95	**KTG-01**	**227/60**	1		2,27	0,75	1,70
96	**KTG-02**	**354/60**	1		3,54	0,75	2,66
97	**KTG-03**	**241.5/60**	2		2,42	0,75	3,63
98	**KTG-04**	**269/60**	1		2,69	0,75	2,02
99	**KTG-05**	**264/60**	1		2,64	0,75	1,98
100	**KTG-06**	**379/60**	1		3,79	0,75	2,84
101	**KTG-07**	**189/60**	2		1,89	0,75	2,84
102	**KTG-08**	**289/60**	1		2,89	0,75	2,17
103	**KTG-09**	**244/60**	1		2,44	0,75	1,83
104	**KTG-10**	**514/60**	1		5,14	0,75	3,86
105	**KTG-11**	**179/60**	2		1,79	0,75	2,69
106	**DET-01**	**163/55/220**	12		1,20	0,80	11,52
107	**AT-01**	**253/60**	1		2,53	0,75	1,90
							0,00
							0,00
							0,00
	Y.26.006/405	Wall cladding with (25 x 33 cm) or (25 x 40 cm) nominal sizes, with any kind of pattern and surfaces properties , with I. quality , colored ceramic wall tiles, with a 3 mm joint gaps (by tile adhesive)	POSE TOTAL			M2	1.926,74

Table 7.15. Appendix O: Flooring, with 3 mm joint gaps, with I quality, colored ceramic tiles of 40 x 40 cm nominal sizes, with all kinds of pattern and surface properties (by using tile adhesive) Y.26.007/405A scale table of manufacturing pose number

	Y.26.007/405A	Flooring, with 3 mm joint gaps, with I quality, colored ceramic tiles of 40 x 40 cm nominal sizes, with all kinds of pattern and surface properties (by using tile adhesive)	POSE TOTAL			M2	
126	**1-06**	**CHIEF PHYSICIAN ROOM**	1		17,50	0,08	1,40
127	K1	100/220	-1		1,00	0,08	-0,08
128	**1-07**	**FAMILY DOCTOR ROOM**	1		16,50	0,08	1,32
129	K1	100/220	-1		1,00	0,08	-0,08
130	**1-08**	**CHAMBER OF ADMINISTRATIVE AFFAIRS**	1		17,25	0,08	1,38
131	K1	100/220	-1		1,00	0,08	-0,08
132	**1-09**	**CHAMBER OF ADMINISTRATIVE AFFAIRS 2**	1		17,25	0,08	1,38
133	K1	100/220	-1		1,00	0,08	-0,08
134	**1-12**	**TRAINING HALL**	1		26,10	0,08	2,09
135	K2	110/220	-1		1,10	0,08	-0,09
136	**1-13**	**ROOM 1**	1		16,50	0,08	1,32
137	K1	100/220	-1		1,00	0,08	-0,08
138	**1-14**	**ROOM 2**	1		16,90	0,08	1,35
139	K1	100/220	-1		1,00	0,08	-0,08
140	**1-15**	**ROOM 3**	1		16,80	0,08	1,34
141	K1	100/220	-1		1,00	0,08	-0,08
142	**1-17**	**PROTHESIS LABORATORY**	1		11,20	0,08	0,90
143	K1	100/220	-1		1,00	0,08	-0,08
	Y.26.007/405A	Flooring, with 3 mm joint gaps, with I quality, colored ceramic tiles of 40 x 40 cm nominal sizes, with all kinds of pattern and surface properties (by using tile adhesive)	POSE TOTAL			M2	534,67

Table 7.16. Appendix P : Internal space covering/flooring with marble aggregated terrace tiles (breaking load requirements (class 2) surface areas <= 1100cm2 – sizes and breaking resistance > 2,5 kn, honlu o polished)Y.26.015/003 scale table of manufacturing pose number

	Y.26.015/003	Internal space covering/flooring with marble aggregated terrace tiles (breaking load requirements (class 2) surface areas <= 1100cm2 – sizes and breaking resistance > 2,5 kn, honlu o polished)	POSE TOTAL			M2	
47	DK2	160/220	-1		1,60	1,00	-1,60
48	**B-38**	**DAILY WAREHOUSE**	1		13,70	1,00	13,70
49	K1	100/220	-1		1,00	1,00	-1,00
50	**Z-48**	**ELECTRIC ROOM**	1		10,50	1,00	10,50
51	YK2	100/220	-1		1,00	1,00	-1,00
52	**1-10**	**SYSTEM ROOM**	1		13,10	1,00	13,10
53	YK2	100/220	-1		1,00	1,00	-1,00
54	**1-38**	**FIRE HALL**	1		9,90	1,00	9,90
55	YK1	110/220	-2		1,10	1,00	-2,20
56	**1-44**	**ELECTRIC ROOM**	1		10,50	1,00	10,50
57	YK2	100/220	-1		1,00	1,00	-1,00
58	**2-01**	**ELEVATOR ROOM**	1		31,80	1,00	31,80
59	YK1	110/220	-1		1,10	1,00	-1,10
60	YK2	100/220	-1		1,00	1,00	-1,00
61	**2-02**	**ELECTRIC ROOM**	1		10,30	1,00	10,30
62	YK2	100/220	-1		1,00	1,00	-1,00
63							0,00
64		**YM1 FIRE STAIR**	1	1,00	17,28		17,28
65		**YM1 FIRE STAIR**	1	1,00	9,18		9,18
66							0,00
67	**+4.20**	**TERRACE ROOF**	1	1,00	139,57		139,57
68	**+12.20**	**TERRACE ROOF**	1	1,00	97,44		97,44
	Y.26.015/003	Internal space covering/flooring with marble aggregated terrace tiles (breaking load requirements (class 2) surface areas <= 1100cm2 – sizes and breaking resistance > 2,5 kn, honlu o polished)	POSE TOTAL			M2	695,56

Table 7.17. Appendix R: Rough rendering with 250/350 kg cement dosed rough and thin mortar Y.27.501/04 scale table of manufacturing pose number

	Y.27.501/04	Rough rendering with 250/350 kg cement dosed rough and thin mortar	POSE TOTAL			M2	
26	K1	100/220	-1		1,00	2,20	-2,20
27	**B-35**	**WATER STORAGE**	1		36,80	3,97	146,10
28	YK1	110/220	-1		1,10	2,20	-2,42
29	DK2	160/220	-1		1,60	2,20	-3,52
30	**B-38**	**DAILY WAREHOUSE**	1		13,70	3,97	54,39
31	K1	100/220	-1		1,00	2,20	-2,20
32	**B-39**	**COLD STORAGE -2**	1		12,15	3,97	48,24
33	K1	100/220	-1		1,00	2,20	-2,20
34	**B-40**	**COLD STORAGE -1**	1		9,25	3,97	36,72
35	K1	100/220	-1		1,00	2,20	-2,20
36	**Z-29**	**X-RAY**	1		17,30	3,97	68,68
37	KK1	160/220	-1		1,60	2,20	-3,52
38	KP1	80/120	-1		0,80	1,20	-0,96
39	**Z-48**	**ELECTRIC ROOM**	1		10,50	3,97	41,69
40	YK2	100/220	-1		1,00	2,20	-2,20
41	**1-10**	**SYSTEM ROOM**	1		13,10	3,97	52,01
42	YK2	100/220	-1		1,00	2,20	-2,20
43	**1-38**	**FIRE HALL**	1		9,90	3,97	39,30
44	YK1	110/220	-2		1,10	2,20	-4,84
45	**1-44**	**ELECTRIC ROOM**	1		10,50	3,97	41,69
46	YK2	100/220	-1		1,00	2,20	-2,20
47	**2-01**	**ELEVATOR ROOM**	1		31,80	3,57	113,53
48	YK1	110/220	-1		1,10	2,20	-2,42
49	YK2	100/220	-1		1,00	2,20	-2,20
50	MP1	300/60	-2		3,00	0,60	-3,60
51	**2-02**	**ELECTRIC ROOM**	1		10,30	3,57	36,77
52	YK2	100/220	-1		1,00	2,20	-2,20
53							0,00
54							0,00
55		**YM1 FIRE STAIR**	2		18,20	3,97	144,51
56	YK1	110/220	-1		1,10	2,20	-2,42
	Y.27.501/04	Rough rendering with 250/350 kg cement dosed rough and thin mortar	POSE TOTAL			M2	**1.352,81**

Table 7.18. Appendix S: 200 kg cement dosed level layering Y.27.581 scale table of manufacturing pose number

	Y.27.581	200 kg cement dosed level layering	POSE TOTAL			M2	
108	1-17	PROSTHETİC LABORATORY	1	1,00	7,65		7,65
109	1-18	DIS. WC	1	1,00	4,00		4,00
110	1-19	MRS. WC	1	1,00	10,55		10,55
111	1-20	CLEAN ROOM	1	1,00	3,34		3,34
112	1-21	MR. WC	1	1,00	10,37		10,37
113	1-22	FLOOR OFFICE	1	1,00	4,87		4,87
114	1-23	SDL	1	1,00	21,58		21,58
115	1-24	WC	1	1,00	4,62		4,62
116	1-25	SICK BECK CORRIDOR	1	1,00	133,86		133,86
117	1-26	SICKROOM (TWO PERSON)	1	1,00	25,21		25,21
118	1-27	WC	1	1,00	4,41		4,41
119	1-28	SICKROOM (TWO PERSON)	1	1,00	24,20		24,20
120	1-29	WC	1	1,00	4,41		4,41
121	1-30	SICKROOM (TWO PERSON)	1	1,00	23,14		23,14
122	1-31	WC	1	1,00	4,41		4,41
123	1-32	SICKROOM (TWO PERSON)	1	1,00	23,14		23,14
124	1-33	WC	1	1,00	4,41		4,41
125	1-34	SICKROOM (TWO PERSON)	1	1,00	24,20		24,20
126	1-35	WC	1	1,00	4,41		4,41
127	1-36	SICKROOM (TWO PERSON)	1	1,00	24,38		24,38
128	1-37	WC	1	1,00	4,41		4,41
129	1-38	FIRE HALL	1	1,00	6,02		6,02
130	1-39	DIRTY WAREHOUSE	1	1,00	6,36		6,36
131	1-40	CLEAN WAREHOUSE	1	1,00	6,47		6,47
132	1-41	NURSE ROOM	1	1,00	14,19		14,19
133	1-42	WC	1	1,00	2,36		2,36
134	1-43	DOCTOR ROOM	1	1,00	19,28		19,28
135	1-44	ELECTIC ROOM	1	1,00	6,21		6,21
136	2-01	ELEVATOR ROOM	1	1,00	52,29		52,29
137	2-02	ELETRIC ROOM	1	1,00	6,01		6,01
	Y.27.581	200 kg cement dosed level layering	POSE TOTAL			M2	1.279,37

Table 7.19. Appendix T: Thickness; 2.5 cm - 400 kg. cement dose screed concrete consturction Y.27.583 scale table of manufacturing pose number

	Y.27.583	thickness ; 2.5 cm - 400 kg cement dose alum preparation	POSE TOTAL			M2	93
94	1-19	MRS. WC	1	1,00	10,55		10,55
95	1-20	CLEAN ROOM	1	1,00	3,34		3,34
96	1-21	MR WC	1	1,00	10,37		10,37
97	1-22	FLOOR OFFICE	1	1,00	4,87		4,87
98	1-23	SDL	1	1,00	21,58		21,58
99	1-24	WC	1	1,00	4,62		4,62
100	1-25	HASTA YATAK KORİDORU	1	1,00	15,00		15,00
101	1-26	SICKROOM (TWO PERSON)	1	1,00	25,21		25,21
102	1-27	WC	1	1,00	4,41		4,41
103	1-28	SICKROOM (TWO PERSON)	1	1,00	24,20		24,20
104	1-29	WC	1	1,00	4,41		4,41
105	1-30	SICKROOM (TWO PERSON)	1	1,00	23,14		23,14
106	1-31	WC	1	1,00	4,41		4,41
107	1-32	SICKROOM (TWO PERSON)	1	1,00	23,14		23,14
108	1-33	WC	1	1,00	4,41		4,41
109	1-34	SICKROOM (TWO PERSON)	1	1,00	24,20		24,20
110	1-35	WC	1	1,00	4,41		4,41
111	1-36	SICKROOM (TWO PERSON)	1	1,00	21,38		21,38
112	1-37	WC	1	1,00	4,41		4,41
113	1-39	DIRTY WAREHOUSE	1	1,00	8,36		8,36
114	1-40	CLEAN WAREHOUSE	1	1,00	6,47		6,47
115	1-41	NURSE ROOM	1	1,00	13,56		13,56
116	1-42	WC	1	1,00	2,36		2,36
117	1-43	DOCTOR ROOM	1	1,00	17,28		17,28
	Y.27.583	thickness ; 2.5 cm - 400 kg cement dose alum preparation	POSE TOTAL			M2	1.611,37