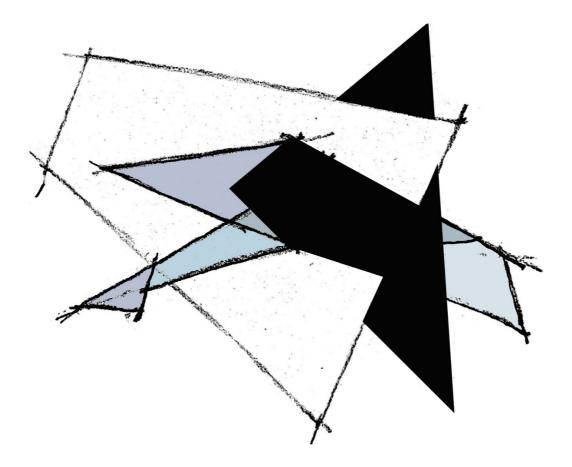
Merging urban layers Budafok Community Gathering



Construction Management

Budapest University of Technology and Economics

Diploma – Department of Urban Planning and Design Gabriel Dantas – SVSGQI Budapest, 15/06/2020

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1. General information about the plot:

The plot used for this urban and architectural proposition is located in the XXII district, in the Városház Square, located between the buildings of the Hungarian Post Office -Budafok, the former mayor's house, the Police of the XXI district and the City Hall. This can be considered an important civic center for the region, in addition, this is also a central hub from the perspective of traffic and public transport lines. The square is bounded on the left by Mária Terézia street and on the right by two important connecting axes: the train line and highway number 6.

geographically, the area is located in a narrow position, between the high relief and the Tanube river and is cut by important lines of urban mobility.From a social and historical perspective, this area has relevant importance, especially in relation to the production of wine. Many family businesses focused on this economic activity are still located in Budafok. The surroundings of the Városház Square are currently an area of intense trade and high flow of people.



Top view from the plot

View from the plot

2. Climate and microclimate

The climate of the Hungary is considered European continental, with warm and dry summers and relatively cold winters. The average temperature in Hungary is 8°C to 11 °C, however the average temperatures can go from -4°C in January to 28°C in July - Based on weather reports collected during 1985–2015.

It is important to emphasize that the local microclimate is influenced by the physical conditions of the surroundings. This is not a densely built area, although it is an area of urban centrality, which influences energy gain and heat buildup, a relevant factor

especially in the summer. The building is also in a special situation, since it is located in the right in middle of a medium scale public square, surrounded by green areas.

The urban characteristic is predominantly uni-residencial with a high percentage of green and permeable areas. Typically, the largest part of the buildings are houses with lateral and frontal spacing, however, there are also modern residential buildings in the immediate surrounds, with height and occupational density much above the average in the area.

Thus, the urban setting is predominantly composed by low-rise buildings (one to three stories high), which allows good quality ventilation and the existing vegetation helps to minimize heat gain and generate shade in public areas during certain months of the year.

In relation to the sun exposure, the building was designed in order to obtain the greatest illumination surface, especially in the coffee house and community room areas, in order to guarantee the quality of use of internal spaces and the highest possible heat gain, for heating energy saving during the winter.



Solar exposure in the site. Reference: SunEarth





Photos from the area by author

3. Building Utilities and Services



• Site description:

- Plot size: 3.637,71m²
- Build up area: 690,68m²
- Topography: flat
- Vegetation: five large trees and nine small / medium size trees all of them will be kept in place
- Soil Mechanics for Budafok central area
 - \cdot 0 1,4 m heterogeneous backfill (ϕ = 28°, c = 10 kPa, γ = 18 kN/m3, Es = 7 MPa)

 \cdot 1,4 – 1,9m silt-sand soil (ϕ = 24°, c = 20 kPa, γ = 19,5 kN/m3, Es = 9,2 MPa)

 \cdot 1,9 – 3,2m silt-sand soil with stone rubble (ϕ = 24°, c = 25 kPa, γ = 19,8 kN/m3, Es = 12,2 MPa)

3,2 – 3,5m silt- soil with stone rubble (ϕ = 23°, c = 30 kPa, γ = 19,8 kN/m3, Es = 11 MPa)

3,5 - 4,8 m silt- with gravel ($\phi = 24^{\circ}$, c = 33 kPa, $\gamma = 20,3$ kN/m3, Es = 12,1 MPa)

- 4,8 5,5m silt-sand soil (ϕ = 25°, c = 10 kPa, γ = 21 kN/m3, Es = 11,1 MPa)
- Groundwater at approx. 9-11 m depth from ground

2. Design Overview

The proposal for requalification for the Városház square is based on a broad intervention project designed for the Budafok region. This network of new buildings has been carefully designed according to the scale, needs and characteristic flow of the place. A system of shared sidewalks and other elements of public infrastructure will connect the entire intervention, prioritizing the pedestrian experience and the reorganization of traffic, especially with regard to public transportation lines.

The proposed building for this Diploma project is a key element for the spatial organization of the region. This square is currently the core of services and transportation and is therefore cut by the main axis of connectors in the area.

A significant change in traffic planned for the area directly impacts the design decisions for Városház tér: Kossuth Lajos Street will become a major promenade for pedestrians, while the traffic will be concentrated on Mária Terézia Street, whatever motivated the tram stop design as well - also in aesthetic harmony with the proposed building. Furthermore, taking into account an existing project to emphasize the connection between the Városház square and the Budafoki Szomszédok Piaca, this street was also especially included in the general considerations in the urban context.

The idea is to demolish the building currently existing on the site and give a new meaning to it, maintaining and increasing its program. Basically, the new building will serve three main functions: an office for the public transport company BKK, a room for community use and a coffee shop (since the short-term food trade is perfectly suited to the local situation of high flow of people in a short space of time).

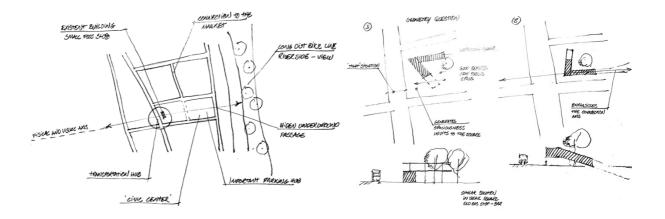
the functions are separated into three well-defined nuclei - which is reflected directly in the spatial articulation of the building conceptually and structurally. Symbolically, the building has the important function of representing a gateway to the axis that connects the Danube to the interior of the district, in addition to being a prominent element in the landscape, strategically positioned in the heart of this civic center, in front of imposing public buildings.

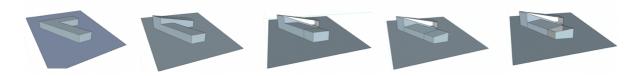
The building's design goes beyond the spatial organization considerations of its immediate surroundings, but in reality, the context is the main modeling element of it. Aesthetically, the architectural elements in the horizontal plane were designed to give the idea of continuity, while the nuclei where the functions are contained, are beacons of the natural flow in the area.

Although it does not function structurally as a shell, conceptually this analogy can be adopted, since the idea is to promote visual continuity, shelter internal activities and create different layers of use for the building, including on its public terrace at different levels.

The materiality of the building is in alignment with the general concept, and in this way, it aims to accentuate the notion of continuity and promote the formal unity of the building. The ramp covered by grass is an extension of the garden that surrounds the building. The pavement has the objective of demarcating the different areas of use of the square, mainly delimiting the areas of main, secondary and permanence flow (rest, leisure and stage areas).

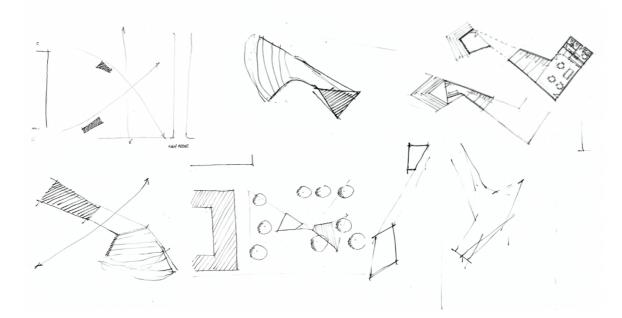
Spatially, the organization created was able to clearly define the areas of proven use (nuclei), semi-public (between) and public (above and around).







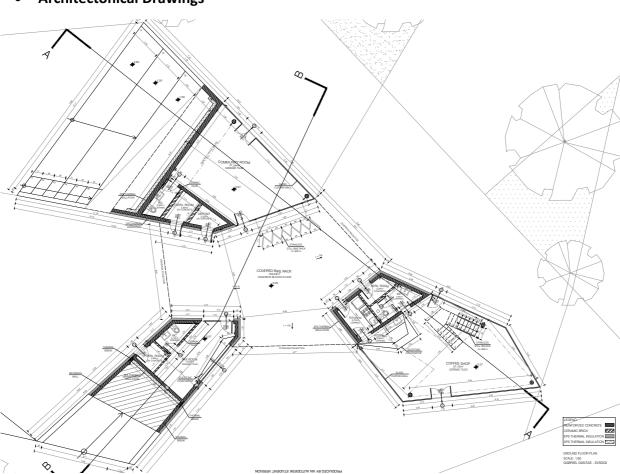
Design process models



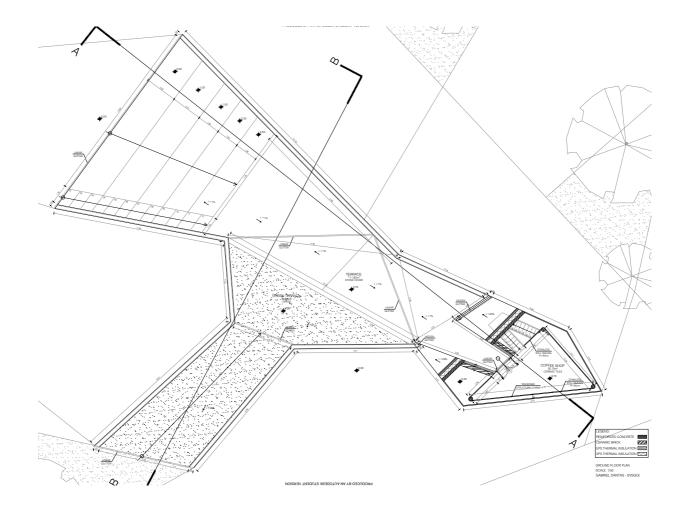
Design process sketches

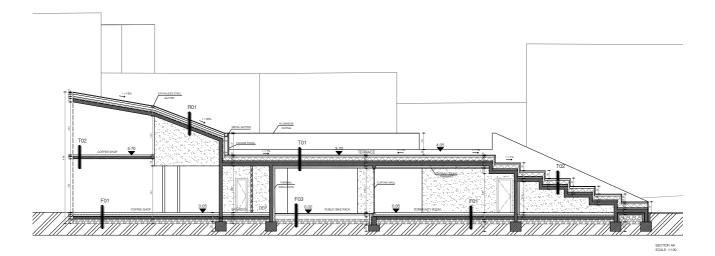


Materiality - pictures by author



• Architectonical Drawings





Im STONE PAVING 10cm CONCRETE SCRED 10DRANNG LAYER 26cm EPS THERMAL INSULATION 1 LAYER SEPARATION POLYESTER 10cm CONCRETE SCREED 1 LAYER GEOTEXTILE 20 cm IN-SITU RC. SLAB 15cm XPS THERMAL INSULATION PL ASTERING

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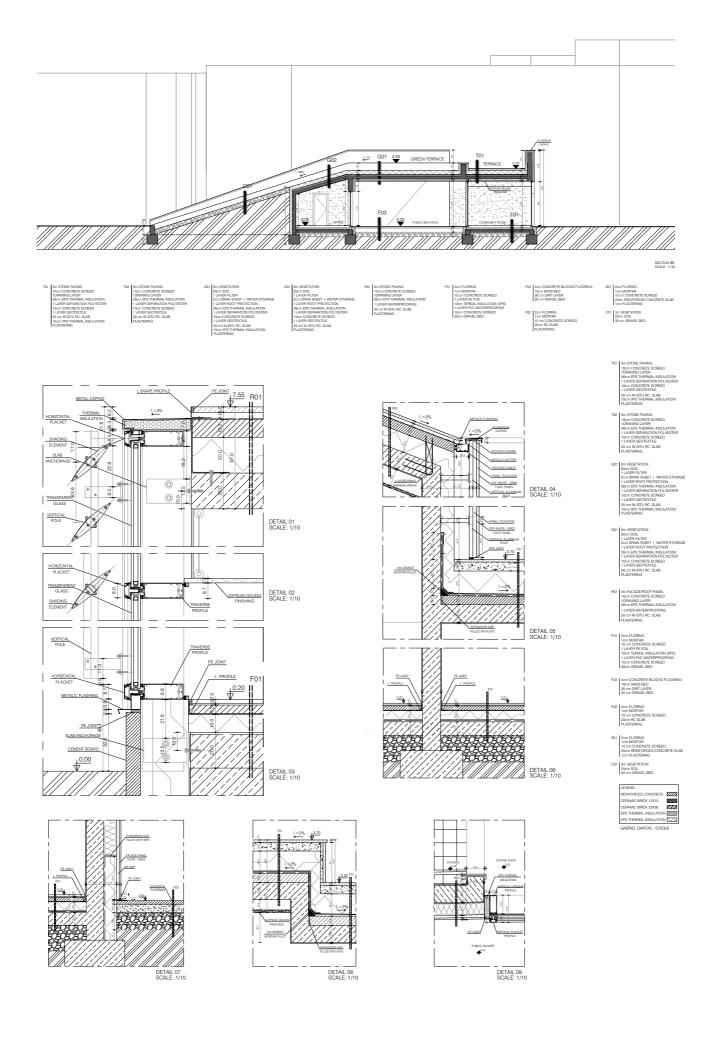
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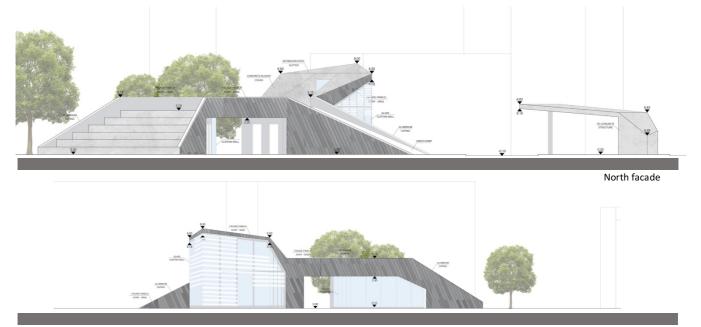
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R01 3m 31 UNIE PAVINA-10cm CONCRETE SCREED 10PANING LAYER 26cm EP3 THERMAL INSULATION 1 LAYER WATERPRODOFING 20 cm IN-SITU RC. SLAB PLASTERING F01 2cm FLORING 1cm MORTAR 10 cm CONCRETE SCREED 1 LAYER FF CIL 10cm TERMAL INSULATION (XPS) 1 LAYER FF CIL 15cm CONCRETE SCREED 30cm GRAVEL BED

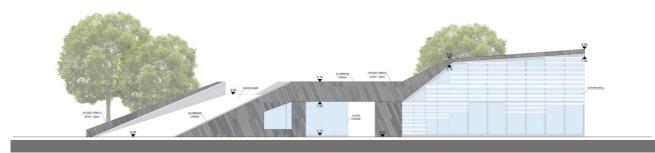
F03 4cm CONCRETE BLOCKS F 10cm SAND BED 30 cm GRIT LAYER 30 cm GRIT LAYER 30 cm GRAVEL BED F02 2cm FLORING 1cm MORTAR 10 cm CONCRETE SCREED

1cm MORTAR 10 cm CONCRETE SCREED 20cm REINFORCED CONCRETE SLAB 1cm FLASTERING CO1 am VEGETATION 20cm SOIL 30 cm GRAVEL BED

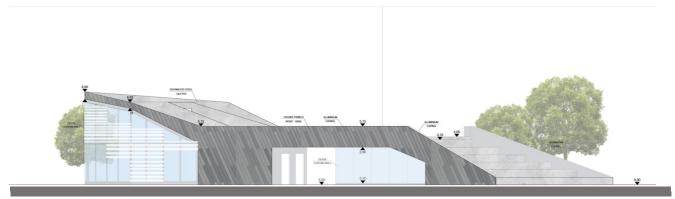




South facade

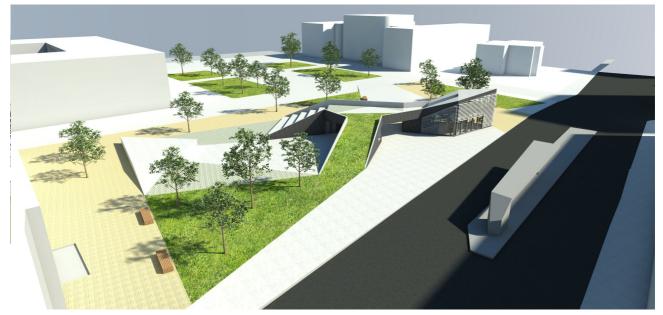


west facade



East facade

3D views







3. Structural analysis

The concept of visual fluidity and different layers of use has posed interesting structural challenges in order to make this an achievable idea. The building does not have a traditional mesh of pillars and beams, but a set of structural solutions that together make its viability possible.

Basically, the building is divided into three different user centers (coffee shop, Budapest Public Transport Company office and community use room), all separated by an open covered space for public use. this roof, although it does not function structurally as a shell, conceptually this is the role it plays, unifying the building both functionally and aesthetically.

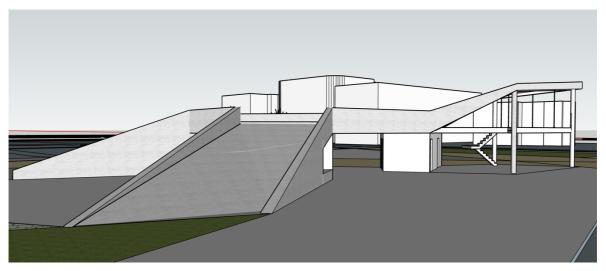
This roof is also walkable and has different types of paving. A beam was specially positioned in the largest span of this roof, supporting a large part of the dead forces of the structure and the weight of the green roof that covers part of the building. This beam also has a strategic function in separating the layers from the roof, facilitating and simplifying the construction details of the building.

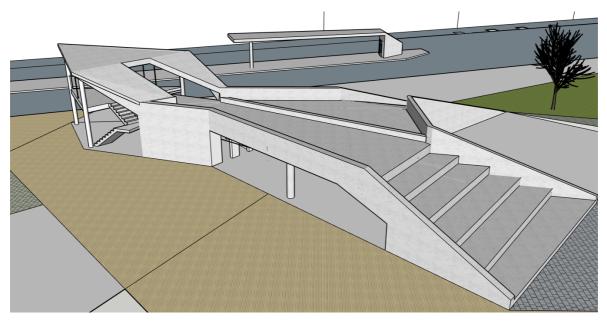
The external walls will be made of reinforced concrete, in order to support the weight of the structure more efficiently, allowing for larger spans. The concrete wall that borders the access ramp to the first floor also functions as a retaining wall, since part of the ramp will be filled with soil. The partition walls will not have a structural function. Based on this, the best option for foundation is the strip.

The slab on the first floor of the coffee shop has a triangular shape and is supported by pillars only in its vertex, which is also structurally challenging. thus, the solution adopted to make the architectural decision viable, without negatively impacting the appearance and the wide atmosphere of this environment, was to hoist the "rods" of this triangular slab with structural cables attached to the beams above it.

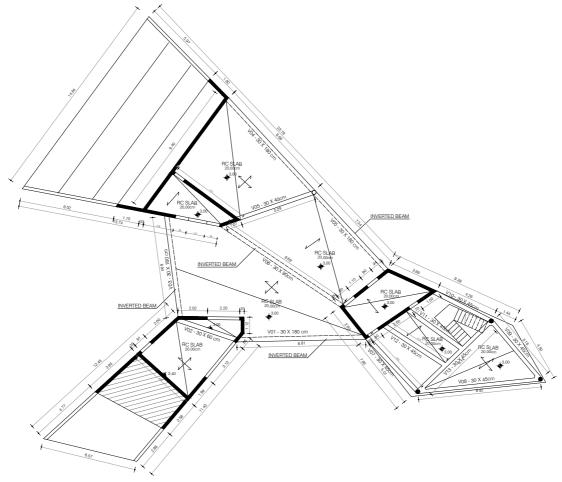
The public area located on the ground floor, between the private use areas, will have a permeable type pavement, without reinforced concrete slab, which will reduce the cost of construction, facilitate the drainage of rainwater and reinforce the idea of visual continuity, since this way it is possible to use the same materials and technology thought for the rest of the square







Structural scheme - 3D visualization made by author



Structural scheme Floor plan

1. Participants and tasks

Considering that it is a commercial building, but also with of social interest, founded by the Budapest Public Transport Company (BKK), there are specific procedures that must be followed in order to meet the demands required. Thus, as far as it is also a project a that will benefit the community of Budafok, the local prefecture will also be involved, donating the land and collaborating with the construction of the square around the building. Understanding this background, the participants involved are:

• Competition:

Organizer

- o Defining aim and type of competition
- Ensuring the financial background
- o Invitation of the jury
- o Defining the assignment of the competition
- Making the competition announcement
- Organizing the competition
- o Announcing the results, offering awards
- o Utilization of the plans

Jury

- Selection of the most valuable plans (according to the aim of the competition)
- Evaluation with justification
- o Opening the "envelops" of the awarded plans
- o Recommendations for the future design phases

Participants

- o Submission of the plans
- Client
 - o Provide financial background, liquidity of the project
 - o Dispose with the construction site
 - Procure the rights to build (attain building consent)
 - Establish contract with the architect, consultant, contractor, etc.
 - o Share rights and risks
 - o Attain permission of use
- Designer architect
 - Help the client in professional way to attain building permit

- Prepare documentations according the national/international standards and legal prescriptions
- Coordinate the work of the co-operative designers and professionals

• Cooperative designers and professionals

Tasks and duties:

- Prepare documentations according the national/international standards and legal prescriptions
- o Continuous co-operation and communication with the designer architect

• Project Manager or PM team

Tasks and duties:

• Depend on their contract - coordination

Consultants

Tasks and duties:

• Depends on their contract

• Contractor

Tasks and duties:

- Participate in the tendering process
- o Contract with the client and with sub-contractors
- Construct the building according the national/international standards and legal prescriptions
- Co-operation and communication with the designer team, the authority and the client/PM

Quality surveyor

Tasks and duties:

 Control the plans in accordance with the standards and the legal prescriptions

- o Control the assignment of the building
- Ensure the prosecution of the prescribed tests (e.g. soil mechanics)
- Control the construction: the construction logbook, hidden structures, quality, used materials, the volume of the completed work
- o Inform the client if the completed work is according to the contract

Authorities

Tasks and duties:

- Provide building permit
- Provide permission of use
- Give consent for the plans, for the technical solutions, etc., according to the legal prescriptions

• Public utilities, public services

Tasks and duties:

- Give a consent for the plans (capacity, standards, etc.)
- o Verify the finished work

• Financing institute

- o Consider the requests for credit
- o Grant credit by schedule for the project
- Control the use of money
- o plans

2. Cost estimation

The plot will be donated by the local municipality, for this reason, it will not be added to costs. In addition, it is important to mention that the construction of the square that surrounds the building is also included in the construction process, thus, some cost groups have been adapted for this situation.

	Cost groups	Esmation	Cost
100	Plot*	0%	0
200	Infrastructure	10%	HUF 10.660.228,08
300	Building construction		HUF 52.509.750,00
400	Construction of building installations and electrical	100%	HUF 19.815.000,00
500	Outdoor constructions	10%	HUF 10.660.228,08
600	Installations andartwork	3%	HUF 2.663.136,00
700	Additional expenses	10%	HUF 57.725.200,00
	Total	122%	HUF 109.265.416,80

Cost groups		Estimated percent	Estimated cost
310	Earthwork	2,2 %	HUF 1.575.292,00
320	Foundation	11,8%	HUF 8.401.560,00
330	External walls	16,3%	HUF 11.552.145,00
340	Interior walls	2,23%	HUF 1.575.292,00
350	Floors (slabs)	13,85%	HUF 10.501.950,00
360	Roof	16,3%	HUF 11.552.145,00
370	Built-in appliances	8,9%	HUF 6.301.170,00
380	Others	1,4%	HUF 1.050.195,00
	Total		HUF 52.509.749,00

Cost Goups		Estimation	Туре	Cost
410	Water, sewage, gas	4,8%	offices	HUF 4.161.150,00
420	Heating	9,2%	offices	HUF 6.538.950,00
430	Ventilation and AC	9 %	offices	HUF 990.750,00
440+4 50	Electricity, Telecommunication and IT	5,2%	Offices	HUF 6.538.950,00
460	Transportation equipment (elevator)	0%		HUF 0
Total				HUF 18.229.800,00

3. Technical description of the planned construction

• Preparation of the site

As a first step before the construction starts we should prepare a geotechnical report, in order to certify the site conditions. Afterwards, before the construction properly starts, the site cleaning should be provided.

We should locate the gate and place 2.0 m height of fences all around the plot. The idea is to divide the construction in two phases: the building construction and the square construction afterwards. In this way, the fenced area for the building construction would be only the required in order to provide space for the necessary equipment and installations.

After this first step, it will be necessary to prepare the temporary services as the electricity supply, in order to provide the necessary infrastructure to the start of the works. It is also important to provide containers for the workers. In the containers ($2.5m \times 6m$) there should be allocated:

- 1. Office
- 2. Changing rooms
- 3. Storages for materials
- 4. Storage for formworks

On the site there should also be installed temporary WC and guard (control) cabins. Considering that the building will occupy only around 15 % of the total area of the site, it will not be necessary to extend the site to the public space. Storages for the construction materials will be also placed on the construction site.

• Neighboring buildings

Considering that this will be a construction carried out in the middle of an important and busy area, it is especially necessary to be careful with the times of loading and unloading materials and safety at the construction site.

Most of the neighboring buildings house public functions, such as the town hall, the headquarters of the local police and the post office building. Taking this into account, it is necessary to think of ways to reduce noise during working hours during the week and to design traffic to avoid traffic jams.

• Excavation

First of all, the exact border of the building should be demarked in order to start the excavation for the future execution of the foundation (considering that the building does not have a basement floor). For the excavation we will need a loader. The excavation will be made in only one step, considering that the site is plane and the water level is below the lower level of the foundation, in -1m depth.

The excavated material should be loaded into truck and will be send to the appropriated destination. As soon as the excavation of the soil is concluded, the foundation works can start.

Installation of the crane

Although this is not a relatively tall building, the most suitable technical solution for the construction of this building is to use one tower crane, taking in consideration that the size of the plot and the location of the building in relation to the storage areas. It will be placed on the border of the building and will have the radius of 20.00 m. Crane will be installed before foundation work. At the end of the load-bearing constructions the tower crane will be also useful in the process of caring the scaffolding to the different areas of the building and back to the storage place. As far as space limitation is not an issue in this construction site, the crane does not need to be mounted inside the building area. The core of the tower crane will be located five meters away from the building boundaries. The tower crane should be disassembled after the conclusion of the load-bearing structure.

• Foundation

For this building a system of strip foundation has been chosen. For its construction we have to transport concrete by concrete mixer to the exact place required and with the help of tower crane it will be pureed. Steps of the construction process:

- o Earth works compaction of the project site
- Preparation of the site, laying the gravel
- Placing the formworks
- o Protection mesh Placing reinforcement
- Pouring concrete, flattening and vibrating
- Foundation should be watered for the curing of the concrete
- Waterproofing layer placement

Superstructure

The structure of the building consists basically of the following elements: pillars and beams, RC walls, and slabs, all made of reinforced concrete. This structural solution allowed greater flexibility of space usage, considering that this would require a technology that would allow larger spans. The elements exposed to the outside will be properly enveloped with thermal insulation to avoid thermal bridges.

The internal walls have no structural function, so they will be executed in 12cm thick brick. All the walls that have this function will be constructed of clay bricks and mortar.

o RC walls

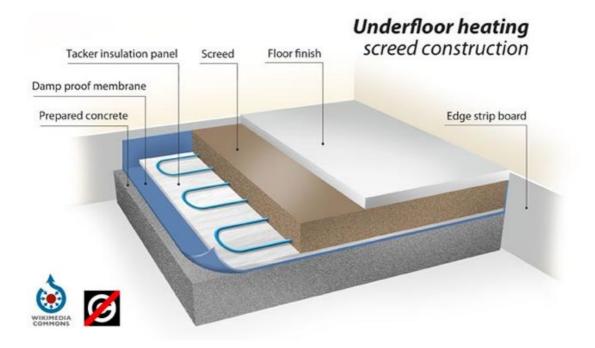
these walls will be responsible for absorbing vertical and horizontal loads.

They are made of RC 20cm. In order to guarantee structural integrity and increase the efficiency of these walls, the openings in them will be limited to the minimum possible.

• Slabs and flooring

In this building there are different types of slabs, as there are four types of technical solutions needed to make architectural planning feasible. The categories differ according to the type of use, which will determine its constitution. It can be an internal slab, terrace, green terrace or roof slab. The RC slab has the same thickness in all circumstances, varying only the other layers needed above. In the most general situation, the slab components are:

- Concrete Base concrete is made from cement, aggregate, and water, mixed in a 3:2:1 ratio. Ingredients are blended to form a fluid mixture, which can be easily applied over different areas. Damp Proof Membranes (DPMs) are used to prevent residual moisture from affecting the screed and final floor. Made of polyethylene, these membranes are placed on top of the concrete base to stop dampness, especially when impermeable floor finishes, which impede the natural dispersion of moisture, are used.
- Sound Insulation Celotex insulation board, delivers the best way to sounds spread.
- Concrete screed free-flowing, self-leveling, fast-drying, or structural screed, it plays a major role in enhancing the durability of the entire sub floor and extending the life of the final floor. For a perfect floor, screeds must be fully dry before laying the floor finish. Finishing will be made from another layer of the fine concrete.
- Interior flooring the floor covering differs according to the usage of the rooms, however the dry areas will have Portobello gray porcelain tiles, as this is a floor suitable for areas with a high flow of people and is also consistent with the aesthetics of the project. The heating system is included in the concrete screed, as in the image below:



Insulation works

Keeping the building envelope constant is one of the architectural challenges for this building, as the three different areas of use are separated by an unheated public space (the covered bike rack). Based on this technical circumstance, these were the construction layers defined for the different areas of the building.

 T01
 3m STONE PAVING

 10cm CONCRETE SCREED

 1DRANING LAYER

 26cm EPS THERMAL INSULATION

 1 LAYER SEPARATION POLYESTER

 10cm CONCRETE SCREED

 1 LAYER GEOTEXTILE

 20 cm IN-SITU RC. SLAB

 15cm XPS THERMAL INSULATION

 PLASTERING

G01 3m VEGETATION 20cm SOIL 1 LAYER FILTER 2cm DRAIN SHEET + WATER STORAGE 1 LAYER ROOT PROTECTION 26cm EPS THERMAL INSULATION 1 LAYER SEPARATION POLYESTER 10cm CONCRETE SCREED 1 LAYER GEOTEXTILE 20 cm IN-SITU RC. SLAB PLASTERING T02 3m STONE PAVING 10cm CONCRETE SCREED 1DRANING LAYER 26cm EPS THERMAL INSULATION 1 LAYER SEPARATION POLYESTER 10cm CONCRETE SCREED 1 LAYER GEOTEXTILE 20 cm IN-SITU RC. SLAB PLASTERING

R01 3m FACADE/ROOF PANEL 10cm CONCRETE SCREED 1DRANING LAYER 26cm EPS THERMAL INSULATION 1 LAYER WATERPROOFING 20 cm IN-SITU RC. SLAB PLASTERING G01 3m VEGETATION 20cm SOIL 1 LAYER FILTER 2cm DRAIN SHEET + WATER STORAGE 1 LAYER ROOT PROTECTION 26cm EPS THERMAL INSULATION 1 LAYER SEPARATION POLYESTER 10cm CONCRETE SCREED 1 LAYER GEOTEXTILE 20 cm IN-SITU RC. SLAB 15cm XPS THERMAL INSULATION PLASTERING

F01 2cm FLORING 1cm MORTAR 10 cm CONCRETE SCREED 1 LAYER PE FOIL 10cm TERMAL INSULATION (XPS) 1 LAYER PVC WATERPROOFING 15cm CONCRETE SCREED 30cm GRAVEL BED

- F03 | 4cm CONCRETE BLOCKS FLOORING 10cm SAND BED 30 cm GRIT LAYER 30 cm GRAVEL BED
- F02 2cm FLORING 1cm MORTAR 10 cm CONCRETE SCREED 20cm RC SLAB PLASTERING

S01 2cm FLORING 1cm MORTAR 10 cm CONCRETE SCREED 20cm REINFORCED CONCRETE SLAB 1cm PLASTERING

C01 3m VEGETATION 20cm SOIL 30 cm GRAVEL BED

• Lightning

Due to the commercial function of the building, It is important to guarantee the highest energy efficiency, aiming to reduce expenses and increase sustainability, since these will be spaces used for long periods and with high energy demand. Considering the technologies currently available, it is understood that the lighting should follow the sustainability guidelines and, therefore, LED lights are indicated, as well as those that will be used in common areas.

• Terraces

Walkable roof terraces cover around 70 % of the total area of the roof in this building, this is an important part of the building conception. It is important to maintain the physical integrity of the thermal envelope and especially the continuity of the waterproof layer to ensure the durability and functionality of this technology. The layer's arrangement of this technical solution is:

- 3cm façade/roof panel

- Metallic uprights for fixation of the panels

- 1 layer 4 mm modified bitumen waterproofing membrane (polyester fiber reinforced), fully bonded by torch applied welding

- 1 layer 4 mm modified bitumen waterproofing membrane (glass fiber reinforced), fully bonded - layer cold bitumen patching compound (about 300 g/m2)

- 10cm concrete screed

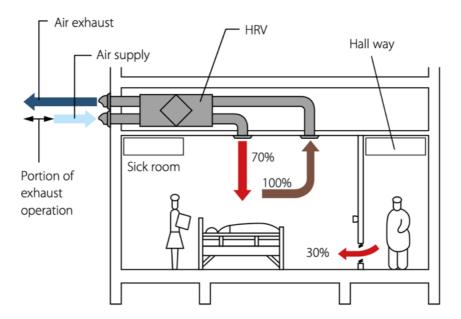
- 20 cm extruded polystyrene foam (XPS) thermal insulation, with staggered joints

- 20 cm monolithic reinforced concrete slab.



• Building services

Considering that this building small scale building, it will be taken in consideration that commercial ventilation units (Vair < 600 m3/h) can be mounted on walls or installed in kitchen cabinets or in cupboards. It will not be necessary to provide a dedicated ventilation room. Ventilation tubes connecting the unit with the exterior (having 160-200 mm tube diameter) will be provided



Taking into account the special feature of the building, which is divided into 3 "use cores", the design decision adopted to solve the energy equipment was to separate the installations for each of the three units. Therefore, there are three separate technical rooms for the equipment needed for heating, cooling and energy meters.

Thus, considering that the building has commercial use with a total area of less than 1000m², the total heating demand is 80Kw. However, this demand will be divided between the three zones of use. This solution reduces the energy loss that could exist if the heating system was centralized and distributed among the different modules.

The building will have three heat pump unities. The system chosen is the Daikin Altherna "Air to water – hybrid heat Pump" with 32kw capacity. This system is capable to provide hot water, heating and cooling for the building with a compact equipment that will be installed in individual rooms.

EHYHBH(X)-AV3(2)+ EVLQ-CV3

Daikin Altherma hybrid heat pump

Hybrid technology combining gas and air to water heat pump for heating and hot water

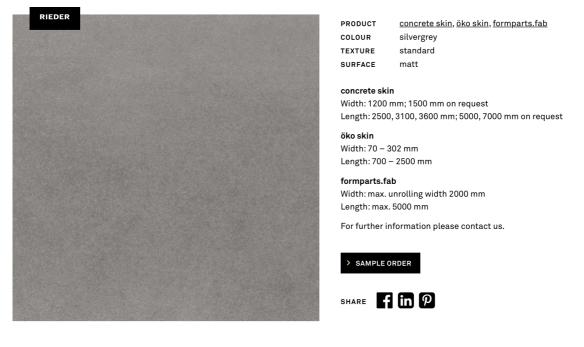
- Daikin Altherma hybrid heat pump combines air-to-water heat pump technology with gas condensing technology
- Depending on outdoor temperature, energy prices and internal heat load, Daikin Altherma hybrid heat pump always selects the most economical mode to operate
- $^{>}$ Low investment cost: no need to replace the existing radiators (up to 80°C) and pipe work
- \diamond Provides sufficient heat in renovation applications as all heat loads are covered up to 32kW
- Easy and fast installation thanks to the compact dimensions and quick interconnections
- Online controller (optional): control your indoor from any location with an app, via your local network or internet and keep an overview on your energy consumption
- Possible to connect to photovoltaïc solar panels to provide energy for your heat pump (optional)



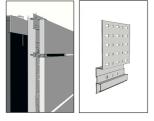
• Facade

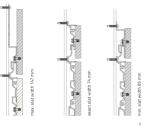
in order to achieve the concept of visual continuity, the materiality of the building must refer to the aesthetic characteristics also adopted for the square around it, in this way some sections of the facade will be covered with plaster and painted in order to simulate the exposed reinforced concrete (as this is an effective, inexpensive and easy to maintain solution), while other sections will have a ventilated facade with the application of panels produced by the company Rieder, with off-white color - GR02, also simulating concrete.

However, most of the facade will be composed of curtain wall, as indicated in details 01.02 3 03. This technological solution allows creating environments with great interaction with the exterior landscape, generating the desired fluidity between public and private spaces.

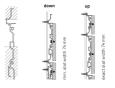






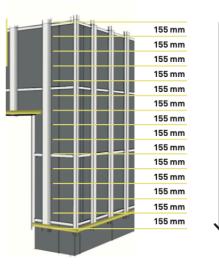


Installation fitted slats with trimmed back clips



Replacement of öko skin slats

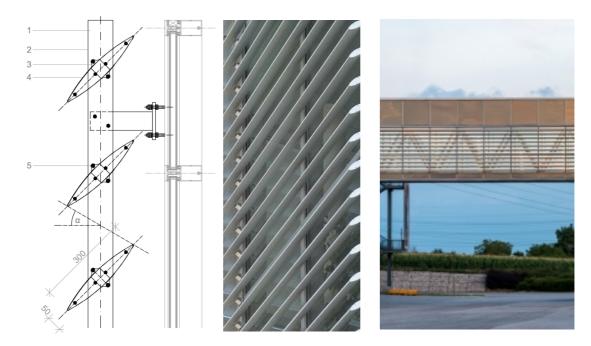




Shading elements: concerning the South glass facade, and the high energy gain caused by the continuous insolation on the glass surface, it was necessary to install shading elements that partially block the entry of sun in the coffee shop area, in addition to being also part of the aesthetic composition of the facade. The elements are produced by KRÜLLUNG, as they offer the desired technical solution, besides being a local manufacturer. This is the technical specification of the product:

KRÜLLUNG SOLONIA AL-1000 AF-80 (100/120/145/150/190/200/250/300/350/400/450) H-V

External shader in vertical position with stationary (unmoving) double-80 skinned horizontal aerofoil fins with mm (100/120/145/150/190/200/250/300/350/400/450 mm) width. Counter-rails with double flat / rectangular / round shaped cross-section (made of extruded aluminium). With extruded aluminium / stainless steel mounting brackets. Both butt-edges of the aerofoil fins are covered by high-pressure water cut endcaps. These endcaps are fixed to the fins with 'D' headed stainless steel screws. Usually the fin's shadow angle is α =20-45°, their angle of incidence is β = 0-45°. The special plastic sliding bearing at the edge of the fin's axel prevents damage caused by linear expansions. All of the visible aluminium surfaces are powder-coated (standard RAL) / anodised matt silver. Stainless steel fastening fixtures.



8. Table of cost estimation

LIST OF ACTIVITIES	QUANTITY	CONSTRUCTIO N STANDARD	TIME (hours)	RESOURCE S (workers)	TIME (days)	CONSTRUCTION	COST
Placement of equipments on the					12	(1)	2.510.420 F
construction site Fence construction	217 m	0,15 h/m	32 h	4	2	3000 Ft/m ³	649.770 F
Placement of					2		
facilities					2		
Public utilities					5		
construction	2100	0.20 h /2	cc h		2	050 5+/2	1 000 000
Land cleaning Earthworks	2189 m²	0,30 h/m²	66 h	4	3 19	850 Ft/m ²	1.860.650 F
Remove top soil	2189 m ²	0,12 h/m²	263 h	4	9	3000 Ft/m ²	6.567.000 F
Excavation to foundation level	200 m ³	0,46 h/m ³	92 h	4	3	2100 Ft/m ³	420.210 F
Loading earth or building rubbish to truck	200 m ³	0,92 h/m³	184 h	4	6	2500 Ft/m ³	500.250 F
Create a temporary path	208 m²	1,50 h/ 10m²	31 h	4	1		
Foundation					19		12.121.400 F
shuttering foundation elements	317 m²	0,80 h/m²	254 h	4	8	150 Ft/m²/nap	380.400 F
Concreting foundation elements Formwork of	57 m³	1,00 h/m³	57 h	4	2	50000 Ft/m ³	2.835.000 F
foundation elements removal	317 m²	0,27 h/m³	85 h	4	3		
Placing foundation insulation	114 m²	0,47 h/m²	54 h	4	2	5000 Ft/m ³	570.000 F
Gravel spread	48 m³	2,26 h/m³	108 h	6	3	7000 Ft/m ³	336.000 F
Make concrete	160 m²	0,14 h/m²	22 h	4	1	50000 Ft/m ³	8.000.000 F
screed Vertical load-bearing							
structures			349 h		25		2.705.100
RC walls construction	39 m³	6,78 h/m³	263 h	3	11	9000 Ft/m ²	1.163.100
Pillars					7		771.000 Ft
Reinforcement of ground floor pillars	0,20 t	63,90 h/t	12 h	2	1	300000 Ft/t	58.500 F
Formwork for ground floor pillars Concreting of	11 m²	1,00 h/m²	11 h	2	1	3500 Ft/db	10.500 F
ground floor pillars Formwork of	13 m³	4,50 h/m³	59 h	2	4	54000 Ft/m ³	702.000 F
ground floor pillars removal	13 m²	0,33 h/m²	4 h	1	1		
Horizontal load-			138 h		10		1.183.182
bearing structures	24.3	6701/3		-		6000 F. (.)	
RC beams Slab construction	24 m³	6,78 h/m³	161 h	3	7 5	9000 Ft/m²	712.800 I 1.158.360 I
Ground floor slab formwork	83 m²	0,84 h/m²	70 h	6	2	150 Ft/m²/nap	24.822
Reinforcement of ground floor slab	0,41 t	63,90 h/t	26 h	6	1	300000 Ft/t	124.110
Concreting of the ground floor slab Ground floor slab	21 m³	0,90 h/m³	19 h	6	1	50000 Ft/m ³	1.034.250
formwork removal	83 m²	0,28 h/m²	23 h	6	1		

Vertical load-bearing structures 1st floor			111 h		12		7.191.000 F
RC walls construction	7 m³	6,78	47 h	3	2	9000 Ft/m²	6.000.000 F
Construction of 1st floor pillars					5		595.500 Ft
Placement of							
reinforcement of 1st floor pillars	0,15 t	63,90 h/t	10 h	3	1	300000 Ft/t	45.000 F
Formwork for 1st floor pillars	7 m²	1,00 h/m²	7 h	3	1	3500 Ft/db	10.500 F
Concreting of first floor pillars	10 m ³	4,50 h/m³	45 h	3	2	54000 Ft/m ³	540.000
Formwork for 1st floor pillars removal	7 m²	0,33 h/m²	2 h	3	1		
Horizontal load-							
bearing structures 1rt					7		8.880.080 F
floor							
RC beams	4 m³	6,78 h/m³	24 h	3	2	9000 Ft/m ²	106.500 F
Formwork for RC slab Placement of	51 m²	0,84 h/m²	43 h	4	2	10000 Ft/m²	6.000.000 F
reinforcement of RC slab	1,03 t	63,90 h/t	66 h	4	3	300000 Ft/t	308.580 F
Concreting of RC slab	51 m²	0,9 h/m³	46 h	4	2	50000 Ft/m ³	2.571.500 F
Roof					5		1.555.200
Instalation of anti- vapour barrier	162 m²	0,12 h/m²	19 h	3	1	2000 Ft/m²	324.000
Thermal insulation	162 m²	0,46 h/m²	1 h	3	1	2800 Ft/m ²	453.600 F
Concrete slope from thermal insulation	162 m²	0,58 h/m²	1 h	3	1	2800 Ft/m²	453.600 F
Waterproofing	162 m²	0,28 h/m²	45 h	3	2	2000 Ft/m ²	324.000 F
Drainage sheet	162 m²	0,08 h/m²	13 h	3	1	2900 Ft/m ²	469.800
Gutter installation	10 m	0,20 h/m	2 h	1	1	8500 Ft/m²	85.000
Downpipe installation	7 m	0,20 h/m	1 h	1	1	9500 Ft/m ²	66.500
Drainage gully Roof tiling (various	27 m	0,86 h/m	23 h	3	1	14000 Ft/m²	378.000
according to the type - concrete tile to	162 m²	1,20 h/m²	194 h	3	9	9000 Ft/m²	1.458.000
complicated							
beavertail covering)							
Facade	261?	0.21 h /m2		2	32	AE Et lug?	50.577.216
Scaffolding Wall painting	261 m² 24 m²	0,21 h/m² 0,17 h/m²	55 h 4 h	2	4	45 Ft/m² 3600 Ft/m²	46.980 I 85.536 I
Gaable, Windowssill,	Z4 m-	0,17 n/m-	4 11	Z	1	5600 Ft/m-	65.5501
sheet metal covering	77 m	0,47 h/m	36 h	2	3	10700 Ft/m²	2.471.700
walls	158 m²	1,30 h/m²	205 h	2	13	205000 Ft/m ²	32.390.000
Thermal insulation	103 m²	0,45 h/m²	46 h	3	2	11000 Ft/m²	1.133.000
Exterior cladding	103 m²	1,20 h/m²	124 h	3	6	50000 Ft/m ²	5.150.000 F
External doors and windows	9 db	1,0 h/db	9 h	2	1	100000 Ft/db	900.000
Shadow system	105 m²	2,4 h/db	24 h	2	2	80000 Ft/m ²	8.400.000
Interior finishing				-			
works construction of			394 h		28		5.147.120 F
construction of	36 m²	1,60 h/m²	23 h	2	2	5000 Ft/m ²	180.000

construction of	
47 m ² 0,61 h/m ² 29 h 2 2 8500 Ft/m ²	399.500 Ft
partition walls	C20 000 FL
Internal plastering 248 m ² 0,10 h/m ² 25 h 2 2 2500 Ft/m ² Wall painting 248 m ² 0.22 h/m ² 55 h 2 4 1800 Ft/m ²	620.000 Ft
	446.400 Ft
Ceiling painting 95 m² 0,15 h/m² 14 h 2 1 1800 Ft/m²	171.000 Ft
Making water- repellent painting 25 m² 0,11 h/m² 3 h 3 1 2000 Ft/m²	50.000 Ft
Placing wall tiles 41 m ² 1,53 h/m ² 63 h 3 3 6000 Ft/m ²	248.220 Ft
Flooring 112 m² 0,30 h/m² 34 h 2 2 7000 Ft/m²	784.000 Ft
Footer 67 m 0,30 h/m 20 h 4 1 8000 Ft/m ²	536.000 Ft
	1.136.000 Ft
	24.000 Ft
Decoration and tapestry 12 db 2,40 h/m ² 29 h 2 2 6000 Ft/m ²	72.000 Ft
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installation 3 db 3,8 h/db 11 h 3 1	
Heating system	
Installation 8 db 1,8 h/db 14 h 3 1 80000 Ft/db	640.000 Ft
Placement of	
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equipments	
Photovoltaic papels	
Installation 104 db 1,0 h/db 104 h 6 3 70000 Ft/db	7.280.000 Ft
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Electrical installation 6	
Placement of 8 db 4 450000 Ft/db	3.600.000 Ft
sanitary ware	3.600.000 Ft
Cleaning and final 243 h 10	30.435.000 Ft
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concrete + gravel 2029 m ² 0,12 h/m ² 243 h 4 8 15000 Ft/m ²	30.435.000 Ft
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• FORMAURIE FOR R.C. SLAB 2 days • COKRETINS OF R.C. SLAB 2 days • INSTALLATION OF ANTI VAPOLIR BARBER 1 day • INSTALLATION OF ANTI VAPOLIR BARBER 1 day • ORANAGE SHEFT 1 day • ORANAGE SHEFT 1 day • ORANAGE GULY 1 day • ORANGE GULY 1 day • ORAGE GUNY SNTIM				_
• PLACEMENT OF REFORCEMENT OF AC. SLAB 3 days • CONCERTING OF AC. SLAB 2 days • CONCERTING OF AC. SLAB 3 days • CONCERTING OF AC. SLAB 3 days • CONCERTING OF CAS UNABRAINDLATION 1 day • INTERNAL INSULATION 1 day • INTERNAL INSULATION 1 day • INTERNAL INSULATION 1 day • UNATERPROFONO 2 days • UNATERNOFONO 1 day • DRAINAGE OFAUT 1 day • SCAFOLING 1 day	1			
• CONCRETING OF R.C. SLABB2 days• CONCRETE SLOPE FOR THERALL INSULATION1 day• CONCRETE SLOPE FOR THERALL INSULATION1 day• UNETREROCIPINO2 days• INSTALL ATON OF ANTI VAROUR BARBIER1 day• INSTALL ATON OF ANTI VAROUR BARBIER1 day• INSTALL ATON OF ANTI VAROUR BARBIER1 day• ORANAGE SHEFT1 day• ORANAGE GULV1 day• DOUNDIPS1 day• NITELAL CLADING INSTALLATION1 day• NITELAL CLADING INSTALLATION1 day• NITELAL CLADING INSTALLATION2 days• NITELAL CLADING INSTALLATION2 days• DOUNDIPS2 days• OCONTINUCTION OF PACITION VALLS2 days• OCONTINUCTION OF PACITION VALLS2 days• OCONTINUCTION OF PACITION VALLS2 days• OLONTINUTION OF PACITION VALLS2 days• OLONTINUTION OF PACITION2 days• OLONTINUTION OF PACITION2 days• OLONTINUTION OF SAUTINGUES2 days </td <td></td> <td></td> <td></td> <td>_</td>				_
• ROF 5 days • CONCERS COF REMEMBANK 1 day • INERNAL INSULATION 1 day • INERNAL INSULATION 1 day • INERNAL INSULATION 1 day • INTERN INSULATION 1 day • INTERN INSULATION 1 day • DRAINES (RULY 1 day • BORNINGE (RULY 1 day • ROR INLINO 9 days • SCAFOLINON 9 days • SCAFOLINON INSTALLATION 2 days • INTERNAL INSULATION INSTALLATION 2 days • INTERNAL INSULATION INVALLS 3 days • ONSTRUCTION OF CARTAN WALLS 1 days • SCAFOLINON INSTALLATION OF CORTAN WALLS 2 days • ONSTRUCTION OF ADMITION WALLS 2 days • ONSTRUCTION OF ADMITION WALLS 2 days • ONSTRUCTION OF CORTAN WALLS 2 days • ON				
• CORKETE SLOPE FOR THEMAAL INSULATION 1 day • THERMAL PRIVALTON 1 day • WALEPROOFNIG 2 days • INSTALLATION OF ANTI VAPOURB ARRER 1 day • INSTALLATION OF ANTI VAPOURB ARRER 1 day • DRANAGE SHEET 1 day • DRANAGE SHEET 1 day • DRANAGE SHEET 1 day • DRANAGE GULY 1 day • DOOR TILLING 9 days • DOOR TILLING 9 days • DOOR TILLING 9 days • SCACADE 22 days • SCACADING COLLING 9 days • STERMAL CLADDINI INSTALLATION 6 days • MALL ARAITING 1 day • MALLATING 1 days • INSTALLATION OF CURTAN VALLATION 6 days • INSTALLATION OF CURTAN VALLATION 6 days • INSTALLATION OF CURTAN VALLATION 2 days • INSTALLATION OF CURTAN VALLATION 2 days • INSTALLATION OF CURTAN VALLATION 2 days • CONSTRUCTION OF FACITION CHAR STALLATION 2 days • CONSTRUCTION OF FACITION CHAR STALING 2 days				_
• IntERNAL INSULATION 1 day • INTERNAL INSULATION OF ANTI VACURE ARRIER 1 day • INTERNAL TALLATION OF ANTI VACURE ARRIER 1 day • ORAINAGE VACURE NATALLATION 1 day • ROARINGE VACURE NATALLATION 1 day • ROARINGE VACURE NATALLATION 2 days • ROARINGE VACURE NATALLATION 2 days • SCAFOLINAGE 3 days • SCAFOLINAGE NATALLATION 2 days • SCAFOLINAGE NATALLATION OF CURTAIN VALLS 2 days • ORDINUCTION OF PLATING NUMALS 2 days • ORDINUCTION OF PLATING NUMALS 2 days • ORDINUCTION OF PLATING NUMALS 2 days • NATRING FINISHING NUMAGES 2 days				_
• WALEPROOFNOG 2 days • INSTALLATION O FAITT VAPOUR BARRIER 1 day • INSTALLATION O FAITT VAPOUR BARRIER 1 day • DRANAGE GHET 1 day • ORANAGE GHET 1 day • ORANAGE GULY 1 day • DRANAGE GULY 1 day • DRANAGE GULY 1 day • DOWNPB 1 day • STACLACOUND INSTALLATION 2 days • WALL PAITINB 1 day • INSTALLATION OF CUTKIN VALLS 1 days • INSTALLATION OF CUTKIN VALLS 2 days • ORSTRUCTION OF FALTING VALLS 2 days • CONSTRUCTION OF FALTING VALLS 2 days • ORSTRUCTION OF FALTING VALLS 2 days • ORSTRUCTION OF FALTING VALLS 2 days • ORSTRUCTION OF FALTING VALLS 2 days • PLACING OF VALLTINS 2				_
• INSTALLATION OF ANTI VAPOUR BARRIER 1 day • DRAILAGE SHET 1 day • DRAILAGE SQLIVY 1 day • BOOF ILLINO 9 days • ACACE 32 days • SCACEIDING 4 days • STERMAL INSULATION INSTALLATION 2 days • DISTERMAL FUNDINE INSTALLATION 2 days • SCACEIDING 1 day • SCACEIDING INSTALLATION 2 days • SCACEIDING INSTALLATION 2 days • SCACEIDING INSTALLATION 2 days • SCACEIDING INSTALLATION OF CURAIN WALLS 1 day • SCACEIDING INSTALLATION OF CURAIN WALLS 2 days • SCACEIDING INSTALLATION OF CURAIN WALLS 2 days • OLDINICITION OF ALDINE STELLING 2 days • OLDINICITION OF SUMPRIDE CELING 2 days • OLDINICITION OF SUMPRIDE CELING 2 days • NULLS ANTING 1 day • NULLS ANTING 2 days • NULLS ANTING 2 days • NULLATION OF SUMPRIDE CELING 2 days • NULLATION OF SUMPRIDE CELING 2 days • NULLATING <td><u>4</u></td> <td></td> <td></td> <td></td>	<u>4</u>			
• DRANAGE SHET 1 day • DRANAGE GULY 1 day • DRANAGE GULY 1 day • DRANAGE GULY 1 day • DRONAGE GULY 9 days • DRONAGE GULY 9 days • CACADE 2 days • SCACADINAG TALAITON 2 days • THERMAL LADDINI NITALLATION 6 days • MULL PAITING 1 day • NITALAITON OF CURTAN WALS 1 day • NITALAITON OF CURTAN WALS 1 days • NITALAITON OF CURTAN WALS 2 days • CONSTRUCTION OF FACITING HADOR 2 days • CONSTRUCTION OF FACITING HADOR 2 days • CONSTRUCTION OF FACITING HADOR 2 days • PLACING OF WALL TLS 2 days • RADOR HADOR SON TIME LOOR 2 days • RADISTRING 2 days • CONSTRUCTION OF FACITING HADOR 2 days • PLACING OF WALL TLS 3 days • RADOR SON TIMING 3 days •	<u> </u>			
• UTR NATULATION 1 day • DRAIMAG (DULY) 1 day • DRAIMAG (DULY) 1 day • DRAIMAG (DULY) 1 day • ROOF INLINO 9 days • ROOF INLINO 9 days • SCAFCIDING 4 days • SCAFCIDING 4 days • SCAFCIDING 6 days • DISTRINGL CONDENINSTALLATION 2 days • WALL PAINTING 1 day • SCAFCIDING INSTALLATION 6 days	<u> </u>			
• DRANAGE GULY 1 day • DOWNPPS 1 day • DOWNPS 1 day • DOWNPS 9 day • CACADE 22 days • SCACDINS 2 days • SCACDINS 2 days • STACADE 2 days • STERALA ILADDINI INTALLATION 2 days • MILL PAINTING 1 day • MERMAL RUSILIDONI INTALLATION 6 days • MILL PAINTING 1 day • MALL PAINTING 1 day • INTELLATION OF CURTAN WALLS 1 days • INTELLATION OF CURTAN WALLS 2 days • CONSTRUCTION OF FARITINGN CONSIN 2 days • PLACING OF WALL TLS 2 days • WALL PAINTING 1 day • MILLATION OF SLATINGN 2 days • MILTA	<u>k</u>			
• DOWARRE SPECIAL DIA OF SUPPRIATION 1 day • RACK ILLARION 2 days • SCAPCIDING 4 days • TREMAL INSULATION INSTALLATION 2 days • DISTREMAL CONDINING STALLATION 2 days • DISTREMAL CONDINING STALLATION 2 days • DISTREMAL CONDINING STALLATION 2 days • DISTREMAL CONSING STALLATION 2 days • GAREL WINDOLL SHETT EAST CONSING 3 days • STATULATION OF CURTININAULS 1 days • STATULATION OF CURTININAULS 1 days • STATULATION OF CURTININAULS 2 days • NUTRICE RINEWED SWORDS 2 days • CONSTRUCTION OF ADATION VALLS 2 days • CONSTRUCTION OF ADATION VALLS 2 days • CONSTRUCTION OF FLOATION FEOCOME 2 days • NUTRICE RINEWED SWORDS 2 days • UNATION OF SUPPRIATION VALLS 2 days • UNATION OF SUPPRIATION 1 day • UNATI	b			
• ROCO FILLING 9.4ps • RACADE 32.4ps • SCAPUDING 4.4ps • INTERNAL CLADDING INSTALLATION 4.4ps • INTERNAL CLADDING INSTALLATION 6.4ps • INTERNAL CLADDING INSTALLATION 6.4ps • INTERNAL CLADDING INSTALLATION 6.4ps • MALL PAINTING 1.4ps • ABALE, WINDOSLI, SHET METAL COVERING 3.4ps • INSTALLATION OF CURTAIN WALLS 1.4ps • INSTALLATION OF FAINTING 2.4ps • INTERNAL CLADDING FAINTING 2.4ps • ONSTRUCTION OF FAINTING WALLS 2.4ps • CONSTRUCTION OF FAINTING 2.4ps • CONSTRUCTION OF FAINTING FAINTING 2.4ps • RACERG GY WALL TLES 2.4ps • RACERG GY WALL TLES 2.4ps • RACENG GY WALL TLES 2.4ps • RACENG GY WALL TLES 2.4ps • WALL PAINTING 3.4ps • WALL PAINTING 3.4ps • REACHG GY WALL TLES 3.4ps • REACHG GY WALL TLES 3.4ps • WALL PAINTING 3.4ps • REACHG MORS SAU WI	<u>ų</u>			
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• SCARDING 4 dys • THERMA (LIADONI INTALLATION 2 dys • DITRIAL CLADDRO INSTALLATION 6 dys • MULL PARTING 1 dy • GAREL WINDOLLS, HEET MERLA COVERING 3 dys • GAREL WINDOLLS, HEET MERLA COVERING 3 dys • INSTALLATION OF CURTAIN WALLS 3 dys • INSTALLATION OF FARLITION WALLS 3 dys • OKTRONO OF PARTING WALLS 3 dys • NALLERING OF SARTING WALLS 3 dys • MALLATING OF SARTING WALLS 3 dys • MALLATING OF SARTING WALLS 3 dys • WALLPARTING 4 dys • WALLPARTING 1 dys • MALLATING OF SARTING WALLS 4 dys • OKTRON CORS AND WINDOWSAND 1 dys	·			
• HERNAL INSULATION STALLATION 2 days • DITERNAL LADON MISTRALLATION 6 day • WALL PAINTING 1 day • WALL PAINTING 3 days • WALL PAINTING 2 days • WALL ATON OF CURTAN WALLS 1 days • WALL PAINTING 2 days • WALL PAINTING 2 days • CONSTRUCTION OF FAIRTING FLOOR 2 days • ALCONS OF WALLT FLOOR 2 days • ALCONS OF SUBPENDE CELLING 2 days • MALL PAINTING 2 days <t< td=""><td></td><td></td><td></td><td></td></t<>				
• DTERNAL CLADDRIN INSTALLATION 6 days • WALE PAINTINS 1 day • WISTULATION COLVERTINU VALIS 1 days • NETROLETION COLVERTINU VALIS 2 days • DOTORIS 1 day • CONSTRUCTION OF PAINTINU VALIS 2 days • PLACING OF WALL TILIS 2 days • PLACING OF WALL TILIS 2 days • PLACING OF WALL TILIS 2 days • PLACING OF SUBFINED CELING 6 days • WALLE PAINTINS 1 days • VALLE PAINTINS 1 days • MARTE PAINTINS 1 days • MECHARTONA NO TSUBFINISTICALATION 1 days • MECHARTONA NO TSUBFINISTICALATION 1 days • MECHARTONA NO TARDESTEN 1 days • MECHAR		h		
• Wul, PANTING 1 day • WISLI, PANTING 3 days • GABE, WINGOBL, SHET MERL ALCONING 3 days • WISTRAIL DATON OF CURTANI WALLS 13 days • WISTRAIL DATON OF CURTANI WALLS 3 days • WISTRAIL DATON OF CURTANI WALLS 3 days • CONSTRUCTION OF PARTING WALLS 3 days • CONSTRUCTION OF FRANTING FLOOR 3 days • CONSTRUCTION OF FRANTING FLOOR 3 days • CONSTRUCTION FRANTING FLOOR 3 days • CONSTRUCTION FRANTING FLOOR 3 days • RACING OF MARTING FLOOR 3 days • RACING OF MARTING HLOOR 3 days • RACING OF MARTING 6 days • RACING OF MARTING 6 days • RACING OF MARTING 1 day • WALL PARTING 1 day • RACING OF MARTING 1 day • RACING OF MARTING 1 days • RACING OF MARTING MARTING 1 days		<u> </u>		
• WALL PARTING 1 day • MARL PARTING 3 daya • MARLALTION OF CURTANI WALLS 3 daya • MERVAL LODORS 3 daya • MERVAL DOORS 3 daya • MERVAL DOORS 3 daya • CONSTRUCTION OF CURTANING 3 daya • CONSTRUCTION OF PLACTING FROM 3 daya • RECORA OF WALLT TLS 3 daya • RECORA OF GRUPPINED CELLING 6 daya • MERVER MERVER FROM 4 daya • MERVER MERVER MARKAL 1 day • MERVER MERVER MARKAL 1 daya • ROORIN NATURATION 1 daya • MERVER MERVER MARKAL 1 daya • MERVER MERVER MARKAL 1 daya • MERVER MERVER MARKAL 1 daya • MERVER MARKAL 1 daya • M				
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• BADOW SYSTM 2days • INTERIOR DOORS 2days • CONSTRUCTION OF FARTITION VARIONS 2days • PLASTERING 4days • WALL PAINTING 4days • WALL PAINTING 1day • CONSTRUCTION OF SAUD WALDOWS 1day • METAL WORSS 1day • METALWORSS NAW WALDOWS 1day • METALWORSS 1day • METALWORSS NAW WALDOWS 1day • METALWORSS NAW WALDOWS 1day • METALWORSS 2days • METALWORSS 2days • DECORTION AND TAPESTRY 2days • DECENTRICTION AND TAPESTRY 2days • DECENTRICTION AND T			_	
• DTRIAL DOORS 1 day • DTRIDAR INFORMS WORKS 2 days • CONSTRUCTION OF PARTINON WALLS 2 days • CONSTRUCTION OF PLANTING FLOORS 2 days • CONSTRUCTION OF PLANTING FLOORS 2 days • CONSTRUCTION OF PLANTING FLOORS 2 days • RACERS OF WALL TILS 3 days • WATER REPELIAT FANTING 4 days • WATER REPELIAT FANTING 1 day • WATER REPELIAT FANTING 1 day • ROTER INSTRUCTION AND TARESTRY 1 day • RECENTION AND TARESTRY 2 days • RECENTION AND TARESTRY 2 days <td></td> <td></td> <td>b,</td> <td></td>			b ,	
• CORSTRUCTION OF PARTING WALLS 2 days • CORSTRUCTION OF FLANTING FLANTING 2 days • CORSTRUCTION OF FLANTING FLANTING 2 days • RACORDO OF FLANTING FLANTING 2 days • NATURA FERDER MARTING 4 days • WIXEL PARTING 4 days • WIXEL PARTING 4 days • WIXEL PARTING 1 day • ORTRING FLANTING 1 day • ORTRING FLANTING 1 day • ORTRING FLANTING 1 day • DECORATION AND TARESTRUCTION 2 days			ė,	
• CORSTRUCTION OF PARTING WALLS 2 days • CORSTRUCTION OF FLANTING FLANTING 2 days • CORSTRUCTION OF FLANTING FLANTING 2 days • RACORDO OF FLANTING FLANTING 2 days • NATURA FERDER MARTING 4 days • WIXEL PARTING 4 days • WIXEL PARTING 4 days • WIXEL PARTING 1 day • ORTRING FLANTING 1 day • ORTRING FLANTING 1 day • ORTRING FLANTING 1 day • DECORATION AND TARESTRUCTION 2 days				
• CONSTRUCTION OF FLOATING FLOOR 2 days • PLASTERINO 2 days • FLOORING 2 days • FLOORING 2 days • PLOCONSTOR VALL TLES 3 days • INSTRUCTION OF SUSPENDE CELLINO 6 days • WALE PARTIND 6 days • WALE PARTIND 6 days • CELLINO FOR SUSPENDE CELLINO 6 days • WALE PARTIND 6 days • CELLINO FARTINE CELLINO 6 days • CELLINO FARTINE CELLINO 1 day • FOORT RINTSLILATION 1 day • DECORATION AND TAPESTRY 2 days • ELETTICAL WORS 2 days • ELETTICAL WORS 2 days • ELETTICAL WORS 2 days • DECORATION AND TAPESTRY 2 days • ELETTICAL WORS 2 days • ELETTICAL WORS 6 days			<u>h</u>	
P AASTENNG 2 days F RACORNG FWALLTLES 3 days INSTALLATION OS SPERINDE DELUNG 6 days V WALL PAINTING 6 days V WALLT PAINTING 6 days V WALLT PAINTING 6 days V WALLT PAINTING 6 days C ELUNG PATNING 6 days P ORTER INSTALATION 6 days D ECOGNATION AND TAPESTRY 2 days MECHARCAL WORKS 2 days ELETTICAL WINSTALATION 6 days ELETTICAL WINSTALATION 6 days DOMESTIG FORMARE NATALATION 6 days			<u> </u>	
• R.CORRIG 2 days • RACING OF VAILTIES 3 days • INSTALLATION OF SUPERIDED CELING 6 days • WALLE JANTINS 4 days • WALLE JANTINS 6 days • WALLE JANTINS 1 days • CELLING FARTINS 1 days • FOOTER INSTALLATION 1 days • MECHARION AND ADDESTRY 2 days • ELETINCAL WORKS 2 days			Ľ.	
• PLACING OF WALL TLES 3 days • INSTALLATION OF SUBENING DELEUNS 6 days • WATLE APATING 1 day • WALTE APATING NOT			7	
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• WALE JANITING 4 days • WATER BERGLET DARTING 1 day • CILLING PATTING 1 day • DOTER INSTALLATION 1 day • INTEROL DOGS AND VINDOVIS 1 day • INTEROL DOGS AND VINDOVIS 1 day • INTEROL DOGS AND VINDOVIS 1 day • INTEROL NORANO TAPESTRY 2 days • ELETINCL WIRRING 2 days • ELETINCLA WIRRING 6 days • DOMESTIC HOVATER INSTALLATION 1 day				
• WATE REPERLIT PAINTING 1 day • CELLING PAITING 1 day • CELLING PAITING 1 day • FOOTER INSTALLATION 1 day • INTERIO DOORS AND WINDOWS 1 day • INTERIO MORS 1 day • DECORATION AND TAPESTRY 2 days • ELETRICAL WIRNIG 2 days • ELETRICAL WIRNIG 2 days • ELETRICAL WIRNIG 6 days • DOMESTIC HOVIERE INSTALLATION 1 day				
• CELLING PATING 1 day • FORTER INSTALLATION 1 day • INTERIOR DORS AND VINIOUNS 1 day • MECHA WORS 1 day • MECHA WORS 1 day • MECHA WORS 2 days • MECHA WORKS 2 days • MECHA WORKS 2 days • ELETINCAL WINNA MAN TARESTRY 2 days • ELETINCAL WINNA MAN TARESTRY 6 days • ELETINCAL WINNA MAN TARLATION 6 days				
• PODER INSTALLATION 1 day • INTERIOR DOORS AND WINDOWS 1 day • METAL WORS 1 day • MECHAW CORK JONGS 2 days • RECHAW CORK JONGS 2 days • ELECTRICAL WIRMIG 4 days • ELECTRICAL WIRMIG 6 days • ELECTRICAL WIRMIG 6 days • DOMESTIC HOT WATER INSTALLATION 1 day			Th.	
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• MERLA WORKS 1 day • DECORATION AND PASTRY 2 days • MECHANICAL WORKS 2 days • ELECTRICAL WIRNIG 4 days • ELECTRICAL WIRNIG 6 days • DOMESTIC HOT WATER INSTALLATION 6 days			1	
MECHANICAL WORKS 22 drys BLETINCAL WIRNS			<u>+</u> 4	
BLETRICAL WIRNIG Constrained ELECTRICAL INSTALLATION days DOMESTIC HOT WATER INSTALLATION 1dy				
• ELECTRICAL INSTALLATION 6 days • DOMESTIC HOT WATER INSTALLATION 1 day				
DOMESTIC HOT WATER INSTALLATION 1 day			i	7
				0,
HEATING SYSTEMS INSTALLATION 1 day				<u>l</u>
PLACEMENT OF MECHANICAL EQUIPMENTS 3 days				Ĺ.
PLACEMENT OF SANYTARY WARE 4 days				İ.
CLEANING AND FINAL WORKS 10 days				
WASTE DISPOSAL 2 days				
AVEMENT + SAND + CONCRETE + GRAVEL 8 days				

13. References

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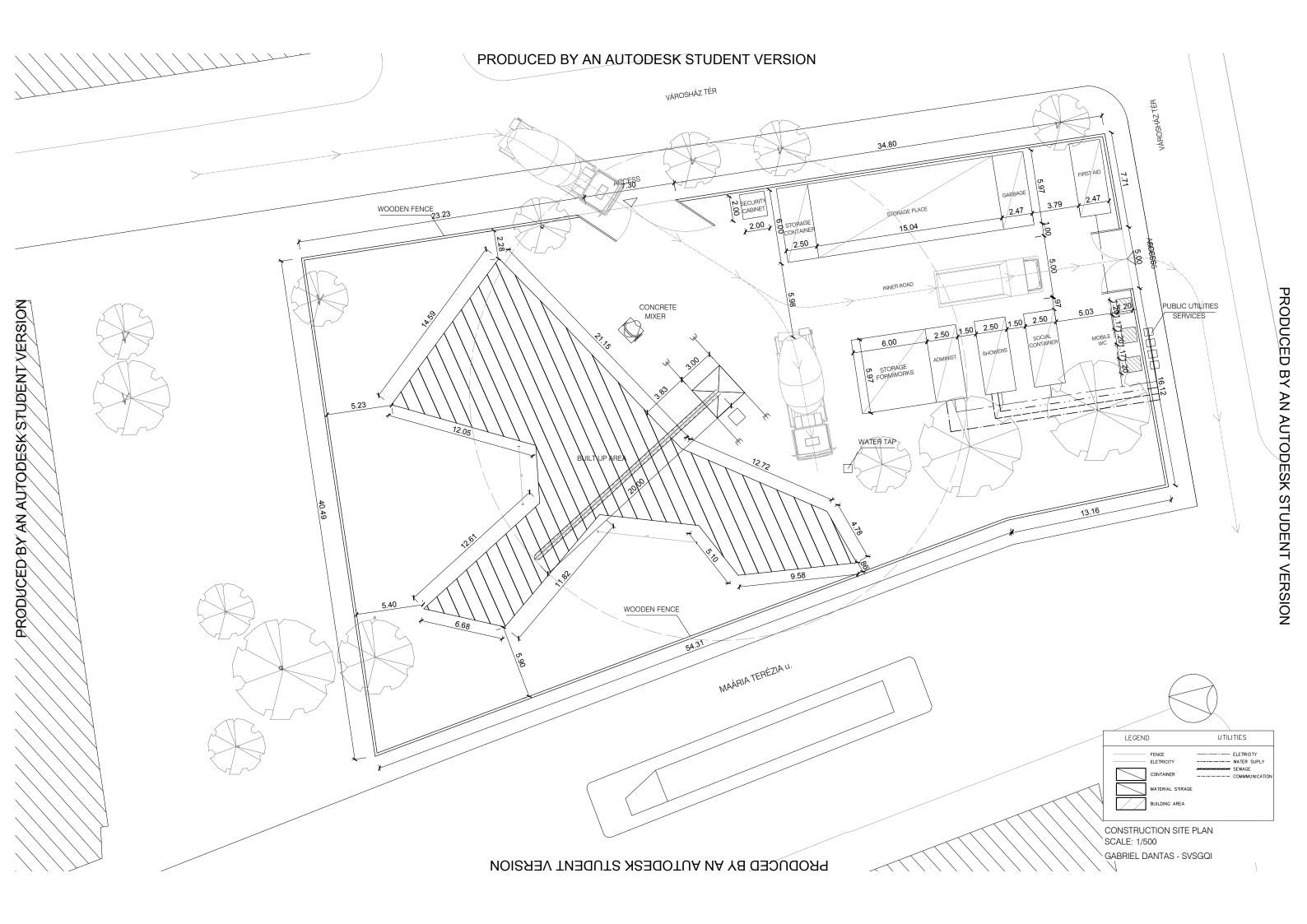
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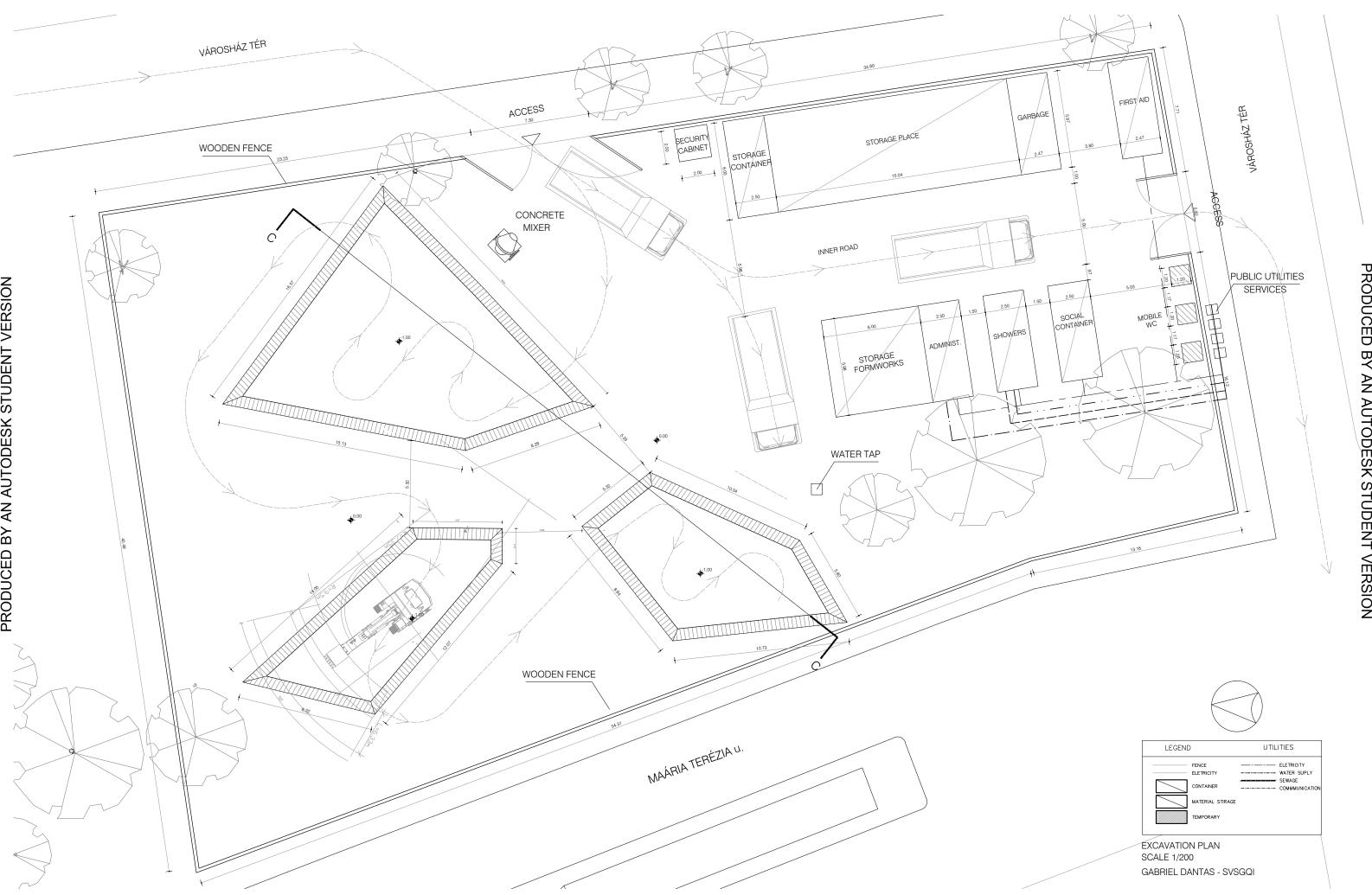
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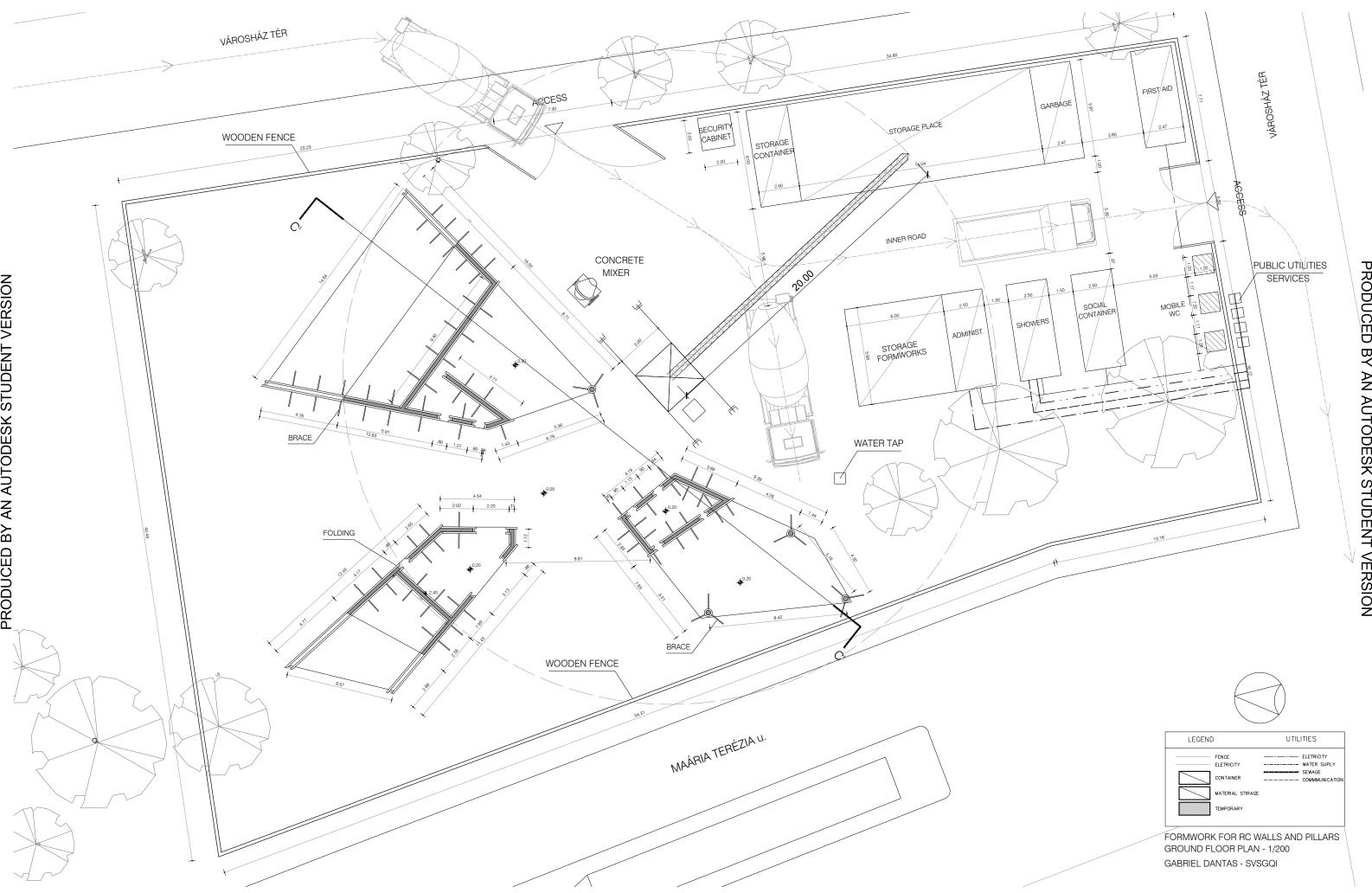
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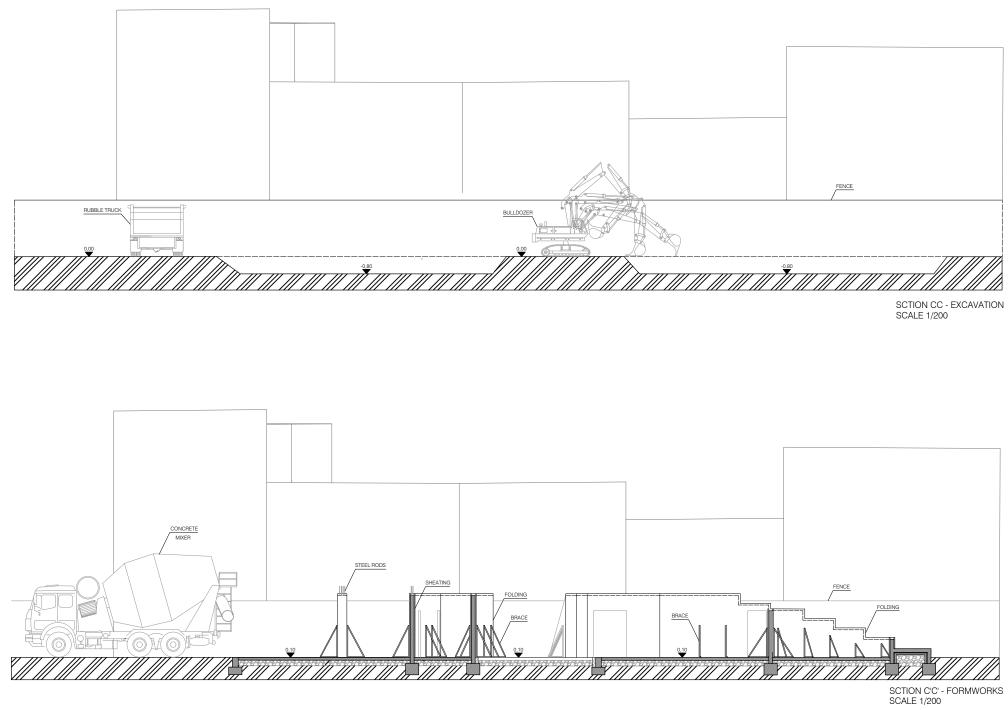
ΡΑΟΡυζΕΡ ΒΥ ΑΝ Αυτορέδκ στυρέντ νέβοιον

LEGEND		UTIL	ITIES
	FENCE ELETRICITY CONTAINER MATERIAL STIRAGE TEMPORARY		ELETRICITY WATER SUPLY SEWAGE COMMMUNICATION

PRODUCED BY AN AUTODESK STUDENT VERSION



ΡΑΟΡυζΕΡ ΒΥ ΑΝ Αυτορέδκ στυρέντ νέβοιον



LEGEND		UTIL	ITIES
	FENCE ELETRICITY CONTAINER MATERIAL STIRAGE TEMPORARY		ELETRICITY WATER SUPLY SEWAGE COMMMUNICATION

SECTIONS C-C AND C'-C' SCALE 1/200 GABRIEL DANTAS - SVSGQI