MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN

Satbayev University

Institute of Architecture and civil engineering named after T. Basenov

Department of Civil engineering and building materials

Habibi Sayed Hamez

« Shopping and entertainment center with cinema in Kokshetau »

To the diploma project
EXPLANATORY NOTE

Specialty 5B072900 – Civil Engineering

Almaty 2021

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ALLOWED TO PROTECT
Head of Department
Master of technical science,
lecturer
_________N.V. Kozyukova
«___»_______2021 yr.

EXPLANATORY NOTE
to the diploma project

On the theme of « Shopping and entertainment center with cinema in Kokshetau »

5B072900 - "Civil Engeneering"

Prepared by Habibi Sayed Hamez

Scientific adviser A.P. Turganbayev
Master of technical science,
Lecturer
«_____»___2021 yr.

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I APPROVE
Head of Department
________N.V. Kozyukova
Master of technical science, lecturer
«___»_______20__ yr.

ASSIGNMENT
Complete a diploma project

Student: Habibi Sayed Hamez
Topic: « Shopping and entertainment center with cinema in Kokshetau»
Approved by the Order of the Rector of the University No. 2131-b dated November 24, 2020.
The deadline for the completed work is May 10, 2020.
Initial data for the diploma project: construction area in Kokshetau
Structural schemes of the building – frame-wall with cross-beams, structures are made of monolithic reinforced concrete, architectural solution.
List of questions to be developed:
a) Architectural and analytical part: basic initial data, space-planning solutions, heat engineering calculation of enclosing structures (outer wall), lighting calculation, calculation of the foundation option and depth of laying, justification of energy efficiency measures;
b) Calculation and design part: calculation and design of a column and crossbar;
c) Organizational and technological part: development of technological maps, construction schedule and construction plan;
d) Economic part: local estimate, object estimate, summary estimate;
List of graphic material (with exact indication of required drawings):
1 Facade, standard floor plans, parts 1-1 and 2-2 - 4 sheets.
2 KZh columns, specifications - 1 sheet.
3 Technical maps of formworks, calendar plan, construction site plan - 4 sheets.
11 slides of work presentation are provided.
Recommended main literature: SP RK 2.04-01-2017 "Construction climatology";

2, SN RK 2.04-04-2013 "Construction heat engineering", SN RK 2.03-30-2017 "Construction in seismic zones".

SCHEDULE
preparation of thesis (project)

Part	30%	60%	90%	100%	Note
Architectural and analytical	11.01.2021г.-14.02.2021г.				
Calculation and design		15.02.2021г.-23.03.2021г.			
Organizational and technological			24.03.2021г.-01.05.2021г.		
Economic				01.05.2021г.-09.05.2021г.	
Pre-defense	10.05.2021г.-14.05.2021г.				
Anti-plagiarism, norm control	17.05.2021г.-31.05.2021г				
Quality control	26.05.2021г.-31.05.2021г.				
Defense	01.06.2021г.-11.06.2021г.				

Signatures
consultants and the normative controller for the completed diploma work (project) with an indication of the parts of work (project) related to them

Name parts	Consultants, I.O.F. (academic degree, rank)	the date signing	Signature
Architectural and analytical	Turganbayev A.P., Master of technical science, lecturer		
Calculation and design	Turganbayev A.P., Master of technical science, lecturer		
Organizational and technological	Agataev A.M., civil engineer, lecturer		
Economic	Turganbayev A.P Master of technical science, lecturer		
Norm controller	Bek A.A., Master of technical science, assistant		
Quality control	Kozyukova N.V., Master of technical science, lecturer		

Scientific adviser _______________ Turganbayev A.P.

The task was accepted
for execution student _______________ Habibi Sayed Hamez

Date "__" ________ 2021 yr.

АҢДАТПА

Бұл тезистің тақырыбы - сауда орталығы және Көкшетау қаласындағы ойын-сауық. Диссертацияға келесі бөлімдер кіреді: 1. Сәулет-құрылыс - кеңістікті жоспарлау, сәулеттік-конструкторлық аналитикалық шешімдер мен қоршау құрылымдарының жылу техникалық есептеулерін қамтиды, 2. Дизайн-конструктивті - ғимараттың темірбетон монолитті қаңқасын есептеу ETBAS бағдарламасы 18. 3. Немесе Лира Сапир құрылыс өндірісінің технологиясы мен ұйымдастырылуы - негізгі жұмыстарды жүргізуге арналған машиналар-механизмдер таңдалды, кесте құрылды және еңбек шығындарының есептеулері есептелінді. 4. Құрылыс үнемдеуі - есептеу «ESTIMATION AVS» бағдарламасындағы құрылыс жұмыстарының құнын немесе қазақстандық нормаларға сәйкес қолмен.

АННОТАЦИЯ

Тема дипломной работы - Торговый центр и развлечения в городе Кокшетау. Дипломная работа состоит из следующих частей: Архитектурно-строительная - содержит объемно-планировочные, аналитические архитектурно-проектные решения и теплотехнические расчеты ограждающих конструкций. Конструктивно-конструкторские - расчет железобетонного монолитного каркаса здания в разрезе. программа ETBAS 18. Или Лира Сапир технология и организация строительного производства - выбраны основные Машины-механизмы для выполнения наземных работ, составлен график и произведен расчет затрат на оплату труда . Экономика строительства - расчет стоимости строительных работ в программе «ESTIMATION AVS» или вручную по казахстанским нормам.

ANNOTATION

The topic of this thesis is Shopping mall and entertainment in Kokshetau City. Thesis includes the following parts: 1. Architectural and construction - contains of space-planning, analytic architectural and design solutions and heat engineering calculations of enclosing structures, 2. Design-constructive - the calculation of the reinforced concrete monolithic frame of the building in the program ETBAS 18. 3. Or Lira Sapir the technology and organization of construction production — the main Machinery-mechanisms for performing above-ground works were selected, a schedule was drawn up and labor cost calculations were calculated 4. Economy of construction - the calculation of the cost of construction work in the «ESTIMATION AVS» program or manually according to the Kazakhstan norms.

CONTENT

INTRODUCTION

Civil and urban industry development of the Republic of Kazakhstan is looking create the plans of construction until 2020 is not with that all facilities which are most needs in every society, because the population of the country is going up and there are a lots of production companies inside of the city which can increase the pollution of the Kokshetau city and there is no shopping mall for the people. Scientifically based, reasonable It is planned to bring it to a reasonable and high-quality level.

The project on the theme: “Shopping mall with entertainment in Kokshetau City " was developed by the opinion of Satbayev university student Habibi Sayed Hamez.

Which include beautiful, sustainable, comfortable, Economical and safe building for the people of Kokshetau City. According to the above things we will make it.

The main goal of architecture has always been to create a favorable natural environment for human life, the nature and convenience of which is determined by the level of cultural and technical development of society, the achievements of science and technology. Every building or structure has its own purpose, i.e., for whom and for what purpose it is constructed. Public buildings are associations, enterprises, organizations, etc. And the human society needs those all to be design and construct.

This building is not just a shopping mall in this building we have cinema, gym, library, … also guest houses and offices which will bring a lot of facilities for Kokshetau people.

The purpose of computational and graphical work is to strengthen and deepen the study of the theoretical course, familiarize future specialists with the basics of engineering geology, soil mechanics, the provisions of modern methods of calculation, the acting norms for the design of foundations and foundations of buildings and structures for specific engineering -Geological conditions of the construction site.

1 Architectural part

1.1 Architectural planning solution

The topic of the proposition was chosen as a social object, which is needed for a given region. Shopping mall… is planned for short and long stay of people, and suitable shopping serving their, because this building should be well-appointed with all types landscaping to ensure quality service to people. The project "Shopping mall" in the city of Kokshetau located near to the Kopa lake Kazakhstan region. For the given project that I made it, we have the following condition and facilities.

1 For conditional BS mark plus 1.2 accepted the level of the clean floor of the first floor, which relates to the definite mark of topography plus 222.15 plus120 which is approximately 342cm above the sea level on the general plan.

2 Working drawings of the construction are developed in accordance with the architectural standards of the Republic of Kazakhstan.

3 Technical Facilities systems that need to be examined are: Structural and addition elements. Lighting requirements inside and outside, Heating, ventilation and air conditioning requirements, Water and sewage needs for the building.

The space-planning decision of the building is determined by such conditions like high insolation, noise absorption of enclosing and bearing structures and the need to protect many underground engineering networks.

In Shopping mall construction project, I have divided into many blocks which defined for each floor, that contain the various cabinets characteristic for a certain type of block. Such as shops in first and second floor, cinema in first floor which have two salon, library in first floor, ski ground in first floor, supermarket in first floor, fast food in first floor, game net and gym is designed in second floor ,electric station and parking in ground floor, security control room in first floor, rest space in every floor, bath room for man and woman in every floor (WC), and after second floor up to floor 13 we have guest houses and offices, in our space plan we have stair case and elevator areas.

The space-planning decision around the building is.

Fire safety of buildings and structures, Smoking area, Accessibility of buildings and structures for people with limited mobility, Walkthrough on site plan, Entertainment, waterfall, roads for cars around the building, Polls.

The projected object with a height of 41 meters where one floor are underground about minus 3 meters and has built in 8500m^2 area and has a total area of 73500m^2. The center is supposed shopping mall objects, the area around the center is as green as possible and includes a Park intended for walking through, recreation areas, a zone for accumulating visitors and smoking spaces. The center is proposed to be located on Kokshetau in the square of tow streets. The area of natural landscaping is the most landscaped area. In order to create normalized sanitary and hygienic conditions and reduce the impact of harmful atmospheric precipitation, the project provides for the planting of deciduous trees, shrubs and artificial shading and lighting in the territory of the future center.

2 Constructive solution

2.1 Climate Characteristic of Kokshetau

In Kokshetau, the summers are long, comfortable, and partly cloudy and the winters are long, frigid, dry, windy, and overcast. Over the course of the year, the temperature typically varies from minus 19 degree Celsius to 26 degree Celsius and is rarely below minus 29 degree Celsius or above 32 degree Celsius.

Climate characteristics of the construction according to the Kokshetau city Climatic characteristics of the construction area:

-Outside air temperature:

-The average temperature in the coldest five days minus 39.52 degree Celsius (reliability 0.94)

- Average temperature on the coldest days minus 44.8 degree Celsius (reliability 0.92)

- Wind speed pressure minus 0.38 kPa (district I)

- Weight of snow layer minus 0.8 kPa (I area)

- Seismic properties of the construction site minus 5 points

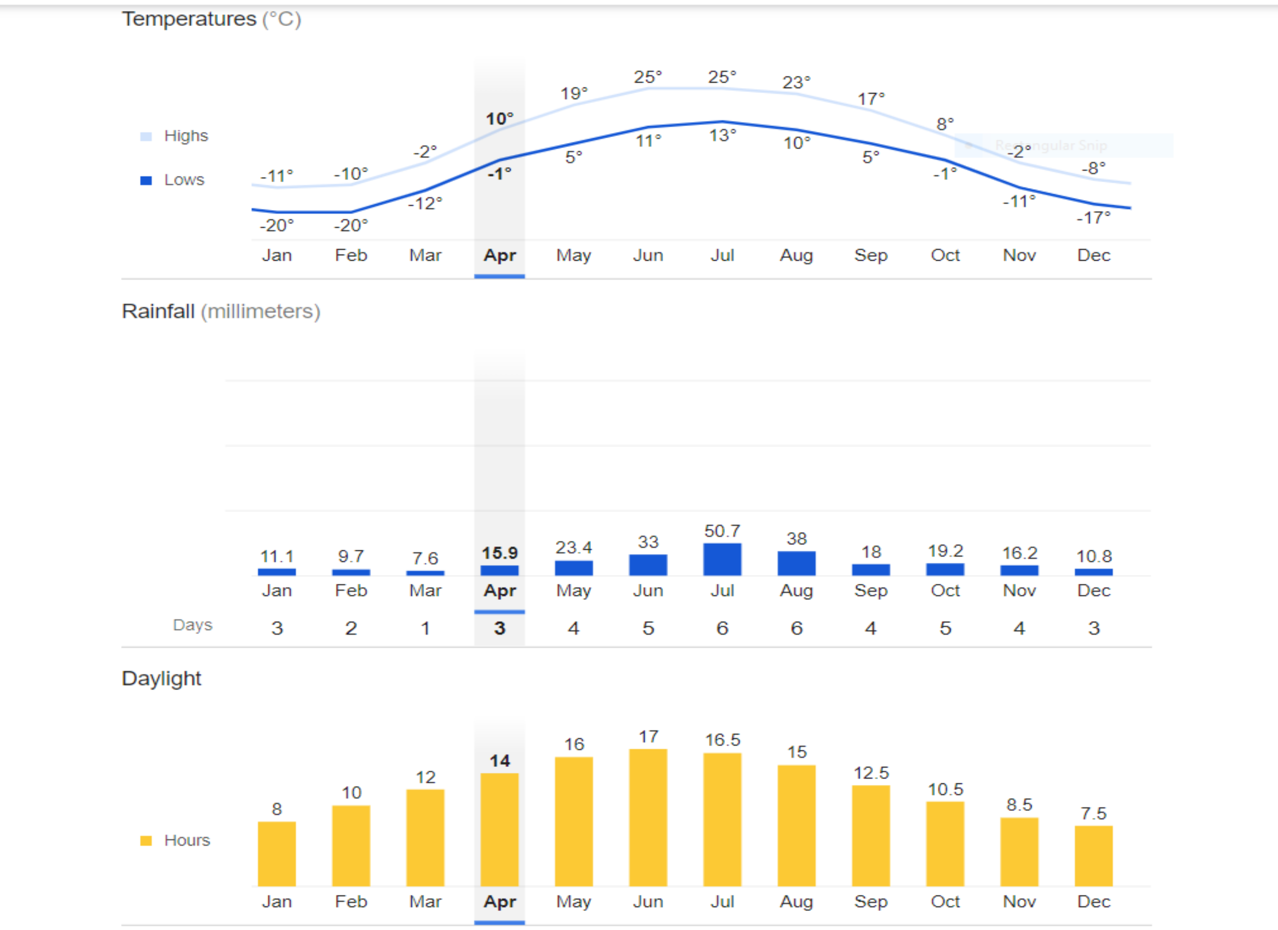


Figure 1- Climate graphs of Kokshetau city

2.2 Fine materials of the project

The device insulation of external walls.

- Curtain wall systems are usually designed using an extruded aluminum frame and are most commonly combined with materials such as glass, stone veneer, or metal panels. Louvers or vents can be added to allow light and air to pass through.

They only support their own weight and the loads imposed on them (such as wind loads, seismic loads, and so on) which they transfer back to the primary structure of the building.

-Reinforcement and fastening of external walls in every 1,5 m by the height of 2 m.

-Reinforcement and fastening of partitions Fiberglass mesh for plaster Gypsum plaster 15mm "GRENDER" Alinex Primer "Alinex" Plaster putty "GLATT" 3,5mm Putty finishing "Finish" 2mm Water dispersion paint.

-Window number 21 by 1400 x 1200mm in first floor.

-Automatic gate 3 by- 6000 x 3000

-Foundation under PV1.2 h = 100mm 200x1500 P = 1900 kg, K_{din} = 1.2.

-Cross breaker = 1.2 height

-Air inlets 2300mm, 5mm Screed from cement-sand mortar

-M200 Reinforced with mesh 5Vr1 100x100,

-55mm x40 mm extruded polystyrene M350 Floor

-Slab Concrete preparation thickness= 100mm, RC slab thickness = 200mm

-Columns made of monolithic reinforced concrete, square in plan. Section of Rectangular columns 30x40cm for left It is made of concrete of class C 30/37. For circular sections we have diameter 900, diameter 600 cm with the same class of concrete and Reinforcement class A400 and higher.

The floor slab is designed from monolithic Reinforced concrete class C30/37, 200mm thick.

-Cover plate made of monolithic reinforced concrete class C30/37, 200mm thick.

3 Anti seismic activity

The main feature of the seismic retention of wonderful frame buildings is determined by the fact that these structures have a one ground floors with height of -3 meters made from load bearing wall and other 12 floors is about +39 meter with create frame which combined from monolithic beams columns and foundation that anti-seismic seams should not always harm them combined horizontal movement during earthquakes and also we know from the seismic zone of our construction which is located in region I with a band of seismic 5 which don’t need to calculate it for the entire project.

Table 1- Seismic hazard points and accelerations specified list

Place of seismic	Seismic hazard			
	In ball on the map		In accelerations (in shares g) on the map	
	ЖСА-2475	ЖСА-22475	ЖСА-1475 (***a***gR(475))	ЖСА-12475 (***a***gR(2475))
Kokshetau	5	6	0.018	0.035

4 Structural part of the project

4.1 List of Loads which are accrue in construction

Dead load, own weight of floor, weight from wall, soil pressure, Supper dead load, temporary load, live load, wind and snow load. so, for the own weight of the structure and Constant loads we have

1 In combination of loads, constant loads from bearing and non-bearing Structures should be considered as a whole, as one impact.

2 Loads from added or moved carriers or non-bearing.

3 Structures should be considered for the most unfavorable design. combinations.

4 The design should consider permanent loads from new pavements. Of communications laid after the end of the work.

6 P In the basic design situation, the water level should be considered. But mostly we take one when the height of floor is more than 10 floors if it was less than 10 floors, we take 0.9 so for our project we should to take 1 according to the EN1990, 4.1.2.

4.2 Dead loads

Dead load of construction is the own weight of materials and elements. We can find it from specific materials density and their thickness.

Table 2- Materials own weight according to the EN1990, 4.1.2

Own weight of floors	Layer thickness, m density, kg/m^3	Characteristic load, kg/m2
For foundation floor		
Flooring	0.08	80
	850	
Expanded polystyrene	0.05	70
	1400	
Roofing materials 2 layers (insulation)	0.15	60
	200	
Reinforced cement-sand screeds	0.05	90
	1800	
Total for Basement		300=3.0KN/m^2
Own weight of roof floor		

Continues of table

Own weight of floors	Layer thickness, m density, kg/m^3	Characteristic load, kg/m^2
Roof cladding	0.0012	9.42
	7850	
Vapor barrier		0.015
Insulation foam concrete	0.088	17.6
	200	
Reinforced cement-sand screeds (PCC)	0.3	720
	2400	
Bituminous waterproofing bottom layer	0.001	0.1
	100	
Bituminous waterproofing top layer	0.001	0.1
	100	
Total for a flat roof		747.2=7.472 KN/m^2

Table 3- Calculation of wall loads

Wall construction	Layer thickness, m density, kg / m^3	Characteristic load, kg / m
External self-supporting walls:		
Aluminum	0.006	16.3
	2710	
Double glass	0.025	62.5
	2710	
	1800	
Total for parapet:		78.8=0.78KN/m
Partitions (height 3)		
Drywall	0.125	33
	600	
Sound insulation Isover	0.075	4.62
	14	
Drywall	0.0125	33
	600	
Total for partitions:		0.7 KN/m

4.3 Temporary Load

To find out temporary loads we should check the SN-RK EN 1991-1:2000/2011 table there we will take according to the given region Kokshetau and we will also see the category of our building which are divided into four (A, B, C&D) so here I chosen category C1for my guest houses First for slab equal to 2kN/m^2or 0.2t/m^2, for stairs 2kN/m^2or 0.2t/m^2 and for Non-operational roof 4kN/m^2. B for my offices I take the same factors and category D2 for my shopping center for slab 4 stair 4 and 6 for roof.

4.4 live load

For the live load of our construction, we have a category C1 public library, where the loads are considered by the following.

Table 4 - Live loads on floors, balconies and stairs of buildings

Usage categories	qk, kN / m^2	Qk, kN
C1	2,0–3,0	3,0–4,0
B	2,0–3,0	1,5-4,5
D2	4,0-5,0	3,5-7,0

4.5 Calculation of Snow Load

Snow loads on the building should be determined from the following formula. For coefficient of snow load i have the III region Kokshetau city.

$$S = \mu_i \; C_e \cdot C_t \; S_k \quad (1)$$

where S_K- calculation value of the extreme snow load on the ground for specific area=0.8kpa

Ce is the environmental coefficient or exposure factor if protected =1
Ct is the temperature coefficient if heated = 1
μ_i is coefficient of snow load form for general buildings=100

$$S = 100 \cdot 1 \cdot 1 \cdot 0.8 = 80 \text{ kg/m}^2$$

4.6 Calculation of Wind load

The wind load acts on the building from the windward (active pressure) and the windward side (suction). Calculated intensity value of wind load. And we have 12 floors which have different position, where one floor is underground which are do not affected by wind load and others floors are above the ground by the height of 39m. Span between two columns is 6 for 22 span we have 132m, the load will affect 15.5 percent from the East and by the other side we have 6·20=120, where the load will affect from south east. The dimensions of the building are 132x120x41m.

The wind load is taken from Eurocode EN 1991.1-1 2002/2011 is V region, in Kokshetau city.

The wind is most often from the north for 1.7 months, from June 18 to August 8, with a peak percentage of 40 precent on July 20. The wind is most often from the west for 10 months, from August 8 to June 18, with a peak percentage of 48 precent on January 1.

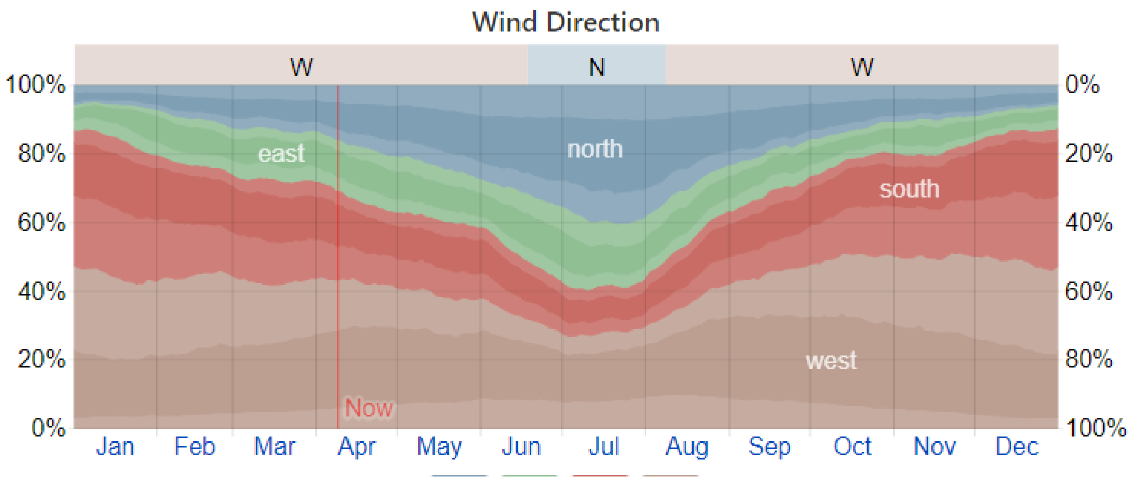


Figure 2- wind pressure in sides

The wind load acts on the building from the windward (active pressure) and the windward side (suction). Calculated intensity value wind load. And we have 9 floors in one tower (11·3)+(2·4)=41 And span between to column is 6 The dimensions of the building are 120x130x41m, V wind region, terrain type IV.

1. External pressure on the windward side (zone D): Separation of the building in height into zones corresponding to the base height for external pressure *ze* according to method at b = 120 m >h = 41 m:

For the windward side, two zones in the first zone from 0 to 120 m include floors 1-4 floors; second from 5-9 plus roof.

Table 5- Wind pressure in levels

	1th floor
D	$142.76 \cdot 2.6 = 371.176$ kg/m
A	$-262.47 \cdot 2.6 = -682.422$ kg/m
B	$-174.98 \cdot 2.6 = -454.948$ kg/m
C	$-109.36 \cdot 2.6 = -284.336$ kg/m
E	$-109.36 \cdot 2.6 = -284.336$ kg/m
	Typical floor 2-4
D	$142.76 \cdot 4.2 = 371.176$ kg/m
A	$-262.47 \cdot 4.2 = -682.422$ kg/m
B	$-174.98 \cdot 4.2 = -454.948$ kg/m
C	$-109.36 \cdot 4.2 = -284.336$ kg/m
E	$-109.36 \cdot 4.2 = -284.336$ kg/m
	Typical floor 5-9
D	$122.49 \cdot 4.2 = 514.458$ kg/m
A	$-262.47 \cdot 4.2 = -682.422$ kg/m
B	$-174.98 \cdot 4.2 = -454.948$ kg/m
C	$-109.36 \cdot 4.2 = -284.336$ kg/m
E	$-109.36 \cdot 4.2 = -284.336$ kg/m
	Roof
D	$122.49 \cdot 2.1 = 514.458$ kg/m
A	$-262.47 \cdot 2.1 = -682.422$ kg/m
B	$-174.98 \cdot 2.1 = -454.948$ kg/m
C	$-109.36 \cdot 2.1 = -284.336$ kg/m
E	$-109.36 \cdot 2.1 = -284.336$ kg/m

Wind pressure w_e, according to the following formula:

$$we = (ze) \cdot cpe \quad (2)$$

Where qp (ze) - peak value of the velocity wind pressure qp $(ze) = ce$ (z) $\cdot$ qb;
cpe - aerodynamic coefficient of external pressure according to $h/d = 1 \rightarrow cpe =$ plus 0.8.

Basic velocity wind pressure for wind region

$$\text{IV } qb = 1.0 \text{ kPa} \quad (3)$$

Table 6-Wind pressure *we* is equal to:

ze = 15 м	*ce* (15) = 1.725	*we* = 1.75 · 1000 · 0.8 = 1400 Pa = 142.76 kg/m^2
ze = 29м	*ce* (29) = 2.145	*we* = 2.145 · 1000 · 0.8 = 1 716 Pa = 174.98 kg/m^2

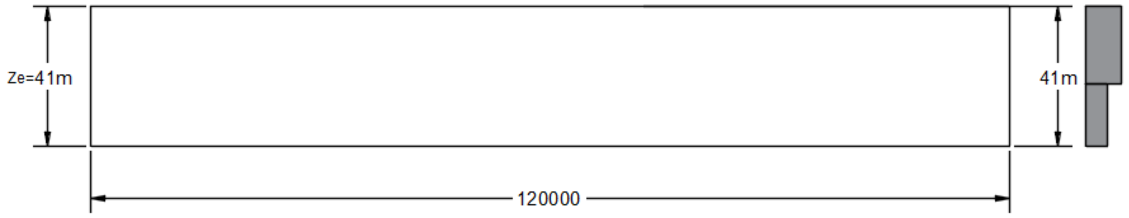


Figure 3- Wind pressures in zones

Table 7-Wind pressure *we* is equal to:

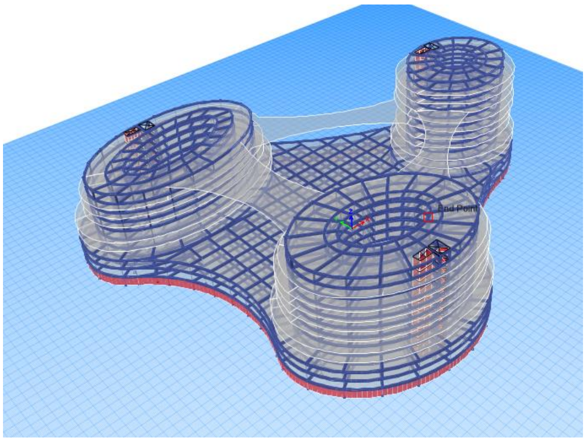
A	*cpe* = −1.2	*ce* (29) = 2.145	*we* = 2.145 · 1000 · (−1.2) = −2 574 Pa = −262.47 kg/m^2
B	*cpe* = −0.8	*ce* (29) = 2.145	*we* = 2.145 · 1000 · (−0.8) = −1 716 Pa = −174.98 kg/m^2
C	*cpe* = −0.5	*ce* (29) = 2.145	*we* = 2.145 · 1000 · (−0.5) = −1 072.5 Pa = −109.36 kg/m^2
D	*cpe* = −0.5	*ce* (29) = 2.145	*we* = 2.145 · 1000 · (−0.5) = −1 072.5 Pa = −109.36 kg/m^2

roof level - 1500mm. or the windward side, two zone inthe first zone from 0 to 22 m include floors 1-4 floors; in the second from 5-9 plus roof.

Wind loads are applied at the floor level: Well, the level of the 1st floor: we take into account half the floor (2000mm) plus the foundation above ground level (3000mm). Estimated strip on the 1st floor 5000mm. Typical floors design strip - 3000mm. At the

5 Analyzing of the structural parts of the building by Etabs

The shopping mall which is located in Kokshetau city I had designed and analyzed by the Etabs program and in calculation part I had the column and beam which all the results and information you can find in appendix A.



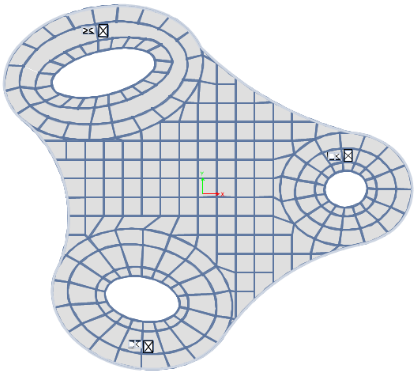


Figure 3- Floor plan and 3D view of the building

6 Manual Calculation

6.1 Manual Calculation of Circular Columns

For the calculation of column, we need to find the force from DCL table which we have on Etab: Then the main system is sequentially loaded with constant and temporary loads, which cause corresponding reactions and bending moments in the racks.

According to my calculation in ETABS Software the moment is equal to M=910KNm and the shear force N=-540.69KN

Determination of Longitudinal forces From Design Loads

First, we need to find the length of column:

$$lc = h_f - h_{sl} = 3000 - 450 = 2550mm$$

Area of Column:

$$d = 0.9m$$

$$A = \pi \left(\frac{d}{2}\right)^2 = 3.14 \left(\frac{0.9}{2}\right)^2 = 0.635m^2$$

Load area of the middle column with a grid of columns $6 \cdot 6 = 36m^2$.

Constant load: -from overlapping according to the formula from 4:

$$N_1 = \gamma_n \cdot g \cdot A_{гр} \quad (4)$$

where g – floor Design load,

$A_{гр}$–middle column cargo area

$$N_1 = 0.95 \cdot 7.472 \cdot 36 = 255.5 \text{ kN}$$

- From the crossbar according to the formula from 5:

$$N_2 = \gamma_n \cdot \gamma_f \cdot h_р \cdot b_р \cdot L_р \cdot \rho \quad (5)$$

$$N_2 = 0.95 \cdot 1.1 \cdot 0.45 \cdot 0.55 \cdot 6 \cdot 30 = 46.55\text{кN},$$

Column dead weight according to the formula from 5:

$$N_3 = \gamma_n \cdot \gamma_f \cdot A_C \cdot H_{эт} \cdot \rho \quad (6)$$

where A_c – Column Area,

$H_{эт}$– Floor height

$$N_3 = 0.95 \cdot 1.1 \cdot 0.635 \cdot 3 \cdot 30 = 59.7 \text{ kN}$$

-from the coating is determined by the formula from 7:

$$N_4 = \gamma_n \cdot \gamma_f \cdot g_{покр} \cdot A_{гр} \quad (7)$$

Where $g_{покр}$–temporary load from the coating.

$$N_4 = 0.95 \cdot 1.1 \cdot 3.036 \cdot 36 = 114.2 \text{ kN},$$

The total constant load is:

N_{last} = (255.5 + 46.55)·2 + 59.7·3 + 114.2 =604.1+179.1+114.2=897.4 kN .

Live load: -from the overlap is determined by the formula from 8:

$$N_5 = \gamma_n \cdot \gamma_f \cdot \vartheta \cdot \text{А}_{\text{гр}} \cdot n_{\text{перекр}} \quad (8)$$

where ϑ – temporary design load

$$N_5 = 0.95 \cdot 1.2 \cdot 3.036 \cdot 36 \cdot 3 = 373.79 \text{ kN}$$

-from snow is determined by the formula from 9:

$$N_6 = \gamma_n \cdot \gamma_f \cdot p \cdot \text{А}_{\text{гр}} \quad (9)$$

where p – snow load

$$N_6 = 0.95 \cdot 1.4 \cdot 0.8 \cdot 36 = 38.304 \text{ kN}$$

Longitudinal force acting on the column:

$$\text{N} = N_{Ed} = N_{\text{пост}} + N_{\text{врем}} = -1309.49 \text{ kN} .$$

Shear Force according to ETABS software:

Selection of section and calculation of the sectional area of reinforcement

Effective length of column:

$$l_0 = 0.9 \cdot l = 0.9 \cdot 2550 = 2295\text{mm}$$

Calculate the eccentricity of column [10]

$$\text{e0} = \frac{lc}{400} \quad (10)$$

$$e_0 = \frac{2295}{400} = 5.73\text{mm}$$

$$M_{Ed} = e_0 \cdot N \quad (11)$$

$$M_{Ed} = 0.0057 \cdot 1309.49 = 7.464\text{kNm}$$

Calculate the slenderness value:

$$\lambda = \frac{4 \cdot l_0}{d} \quad (12)$$

$$\lambda = \frac{4 \cdot 2295}{900} = 10.2$$

Design shear force caused by the load on column:

$$V_{Ed} = \frac{N_{Ed}}{(Acf_{cd})} \quad (13)$$

$$V_{Ed} = \frac{-1309490}{6350 \cdot 20} = -10.31$$

$$V_{Ed} = \frac{-540690}{6350 \cdot 20} = -4.257$$

$$a_{Eds} = \frac{M_{Ed}}{(Ac \cdot h \cdot f_{cd})} \quad (14)$$

$$a_{Eds} = /\frac{910000000}{635000 \cdot 900 \cdot 20}() = 0.079$$

$$\omega_{tot} = 0.5$$

The total area of the longitudinal reinforcement in the section.

$$A_{s,tot} = \frac{\omega_{tot} \cdot \text{Ac}}{\frac{f_{yd}}{f_{cd}}} \quad (15)$$

$$A_{s,tot} = /\frac{0.5 \times 635000}{25} = 12500\ mm^2$$

$A_{s1} = A_{s2}$ = 6350 mm^2, accept 10 diameter 40 S800 (A_s = 12600 mm^2).

The step is taken based on the conditions:

- No more than 500 mm;
- No more than the minimum side of the section;
- No more $20d_{min}$.

The step is taken equal to 400 mm.

1 Checking the percentage of column reinforcement:

$$\mu = \frac{As}{Ac} \cdot 100 \text{ percent} = \mu = \frac{12600}{635000} \cdot 100 \text{ percent} = 1.98 \text{ percent}$$

2 Assign the diameter of the cross bars:

$d_{sw} \geq 0.25 d_s = 0.25 \cdot 40 = 10$ mm (according to the design rules, the smallest the diameter of the transverse reinforcement bars in the frames must be at least 6mm, so we take d_{sw} = 10mm (A-I).

The calculation for the limiting states of the first group consists in

3 Checking for load-bearing capacity and stability: Checking the bearing capacity of a column is reduced to checking the condition:

$$N \leq \varphi(RbAc + RscAs,tot) \quad (16)$$

Determine the value of the buckling factor φ (according to Table 6.1. SP52-101-2003):

$\frac{l}{h} = \frac{2550}{900} = 2.8 \Rightarrow \varphi = 0.82$

$$1309.49 \leq 0{,}82 \cdot (20 \cdot 10^6 \cdot 0{,}635 + 695 \cdot 10^6 \cdot 12600 \cdot 10^{-6})$$

$$1309.49 \text{ KN} \leq 49808 \text{KN}$$

4 Column stability check is performed according to the condition:

$$\sigma = \frac{N}{\varphi \cdot A} \leq Rb \cdot \gamma c \quad (17)$$

$$\sigma = \frac{1309.49}{0.88 \cdot 0.635} \leq 20 \cdot 1.5 = 7.38 MPa \leq 30 MPa$$

Condition is met.

6.2 Manual Calculation of Beam

Supporting moment in the diagram.

M_{12}=-47.6 kN·m, M_{21}= -40.2 kN·m, M_{23}= -35.1 kN·m

Maximum torque:

M_{max}=24.02 kN·m

Medium torque:

M_{23} = M_{32} = 19.31 kN, M_{34} =18.73 kN

Maximum longitudinal force:

Q= 69.43кN

Calculation of the strength of crossbars on the longitudinal axis Concrete class C30/37, the design resistance of concrete to axial compression f_{ck}=20MPa, individual safety factor for concrete γ_c = 1,5; in advance concrete for the compression of prestressed structures and reinforced concrete design resistance $f_{cd} = \frac{acc \cdot fck}{\gamma c} = \frac{0.85 \cdot 20}{1.5}$=14.16 MPa; Longitudinal reinforcement class S500 (f_{yk}= 500 MPa, $f_{yd} = \frac{fyk}{\gamma c}$ = 435 MPa); horizontal reinforcement class S240 (f_{yk}=240MPa, $f_{yd} = \frac{fyk}{\gamma c}$ = 167 mPa);

The design torque of the crossbar on the edge of the support:

$M_{Ed,max}$ =47.6 kN.m; ,

We determine the following coefficient:

$$a_{Ed} = / \frac{MEd.max}{fcd \cdot b\prime f \cdot d2} = \frac{50.4 \cdot 103}{14160 \cdot 103 \cdot 0.30 \cdot 0.412} = 0.03$$

Where d = h-c1 = 45-4 = 41 cm,

$M_{Ed, max}$ = M_{Eds}. ST RK 02-01-1.1-2011 B.

According to the table for concrete a_{Ed} = 0.03 and σ_{sd} = f_{yd} = 435MPa, ω=0.13, ξ=0.189.

Required area of elongated reinforcement:

$$A_{s1} = \frac{1}{fyd} (\omega \cdot b \cdot fcd \cdot N_{ED}) \quad (18)$$

We accept: 2 reinforcement of diameter 20 S500 from the assortment (A_{S1} = 6.28 cm^2). Rigeldy reinforcement. Maximum intermediate torque:

M=24.02kHm

$$a_{Ed} = \frac{MEd.max}{fcd \cdot b\prime f \cdot d2} = \frac{24.02 \cdot 103}{14160 \cdot 103 \cdot 0.30 \cdot 0.412} = 0.33$$

concrete according to the schedule for a_{Ed} = 0.33 and σ_{sd} = f_{yd} = 435 MPa - ω = 0.0412, ξ = 0.07

Required area of elongated reinforcement:

$$A_{s1}=\frac{1}{fyd}(\omega \cdot b \cdot d \cdot fcd + N_{Ed}) = \frac{1}{435}(0.13 \cdot 30 \cdot 41 \cdot 14.16)=5.20cm^2$$

We accept: 2Ø20 S500 from the assortment (A_{S1} = 6.28 cm2). Rigeldy reinforcement.

Maximum intermediate torque:

M = 24.02 kH · m

$$a_{Ed}=\frac{MEd.max}{fcd \cdot b\prime f \cdot d2}=\frac{24.02 \cdot 103}{14160 \cdot 103 \cdot 0.30 \cdot 0.412}=0.33$$

Concrete according to the schedule for a_{Ed} = 0.33 and $\sigma_{sd} = f_{yd}$ = 435 MPa - ω = 0.0412, ξ = 0.079

Required area of elongated reinforcement:

$$A_{s1}=\frac{1}{fyd}(\omega \cdot b \cdot d \cdot fcd + N_{Ed}) = \frac{1}{435}(0.041 \cdot 30 \cdot 41 \cdot 14.16)=1.641cm^2$$

We accept: 2 reinforcment with diameter of 14 S500 from the assortment (A_{S1} = 2.26 cm^2). Rigeldy reinforcement Determining the area and pitch of horizontal reinforcement According to the calculation, the length of the area where the horizontal reinforcement is installed: determined by the diagram of the transverse forces. First of all, concrete determine the transverse force that receives

$$VRd,c = \left[\left(\frac{0.18}{\gamma c}\right) \cdot k \cdot (100\rho1 \cdot fck)^{\frac{1}{3}}\right] \cdot bw \cdot d,; \geq Vrd,c,min = \left[0.035 \cdot k^{\frac{3}{2}} \cdot fck^{\frac{1}{2}}\right] \cdot bw \cdot d, kN \quad (19)$$

where VRd, c=70.11kN accepted for horizontally reinforced concrete transverse force;

γc- safety factor of concrete;

ρ1- longitudinal reinforcement coefficient;

fck- characteristic resistance of concrete to axial compression;

d- height of the section;

$k=1+\sqrt{200/d} \leq 2, =1+\sqrt{300/441}=1.822$

$\rho1=\frac{As1}{bw \cdot d}=\frac{520}{300 \cdot 410}=0.0042$

d=h-c1=450-40=410mm

The calculation area is:

$$a_w=\frac{VEd,max - VRd,c,min}{q+g}=\frac{69.43 - 52.73}{79.24}=0.210 \text{ m}$$

$$Vrd,c,min = \left[0.035 \cdot 1.82^{\frac{3}{2}} \cdot 25^{\frac{1}{2}}\right] \cdot 300 \cdot 410 = 52.736, kN$$

Assign the first design section at a distance of d_z = 410 mm from the support. the value of the transverse force in this section: V_{Ed} = 69.43 kN. the angle of inclination of the light is $\theta = 40^o$

The horizontal reinforcement of the calculation zone is the length of this zone within the following conditions:

$$V_{Ed}=V_{Rd,sy}; \quad V_{Ed} \leq V_{Rd,max} \quad (20)$$

Where $V_{Rd,\ sy}$ is the calculated transverse force with the cross section of the transverse reinforcement accepted.

Taking the step of the horizontal reinforcement, its cross section We determine the area by the last formula, the number of horizontal reinforcement The given method assumes the following condition, ie the leakage of the voltage is equal to the limit: f_{sw} = f_{ywd} assume the pitch of the horizontal reinforcement s = 100 mm

$$Asw=\frac{VEd\cdot s}{dz\cdot fsw\cdot cot\theta}=\frac{69.43\cdot 10^3\cdot 200}{410\cdot 167\cdot cot40}=169.81mm^2=1.698cm^2$$

From the assortment 2reinforcment with diameter of 12 S240 ($Asw=2.26cm^2$) crossbar reinforcement Iron wrought iron.

Only if the following conditions are met:

$$\frac{Asw\cdot Fsw}{bw\cdot s} \leq 0.5\cdot v\cdot fcd \qquad (21)$$

$$V_{Ed}\leq V_{Rd},max=\frac{V\cdot fcd\cdot bw\cdot dz}{cot\theta+tan\theta}$$

$$V_{Ed}=<V_{Rd,max}=69.43kN \leq 70.11kN$$

The condition is met.

Where v is the tensile strength of concrete, The coefficient to be taken into account for heavy concrete is as follows:

Since all the conditions are met, the horizontal reinforcement is 2reinforcment with diameter of 14 S240 (Asw = 2.26 cm2), we take the step s = 100 mm.

7 Building and Technological part

Building technology: Building or construction technology are the tools and techniques for the creation of buildings, dwellings or places for people to escape the natural elements. The design and overall development is usually referred to as architecture.

Although most buildings are on land, there are numerous examples of building of other technological objects, for example the building or construction of boats, aircraft etc. Building technology is slightly different to engineering. The main difference is that engineering is really about the whole process of designing a project from a long term economic perspective.

7.1 Concrete Formwork Removal Time, Specifications and Calculations

The removal of concrete formwork also called as strike-off or stripping of formwork should be carried out only after the time when concrete has gained sufficient strength, at least twice the stress to which the concrete may be subjected to when the formworks are removed. It is also necessary to ensure the stability of the remaining formwork during formwork removal.

7.2 Concrete Formwork Removal Time

The rate of hardening of concrete or the concrete strength depends on temperature and affects the formwork removal time. For example, time required for removal of concrete in winter will be more than time required during summer.

Special attention is required for formwork removal of flexural members such as beams and slabs. As these members are subjected to self-load as well as live load even during construction, they may deflect if the strength gained is not sufficient to handle to loads.

To estimate the strength of concrete before formwork removal, the tests on concrete cubes or cylinders should be carried out. The concrete cubes or cylinders should be prepared from the same mix as that of the structural members and cured under same circumstances of temperature and moisture as that of structural member.

When it is ensured that the concrete in the structural members has gained sufficient strength to withstand the design load, only then formworks should be removed. If possible, the formworks should be left for longer time as it helps in curing.

Removal of formwork from concrete section should not make the structural element to:

- Collapse under self-load or under design load;
- deflect the structural member excessively in short or the long term;
- Physically damage the structural member when formwork is removed.

The following points must be kept in mind during formwork removal whether the structure will be prone to:

- freeze thaw damage;
- cracks formation due to thermal contraction of concrete.

After formwork striking if there is a significant risk of any of the above damages, it is better to delay the removal time of formwork. If formwork have to remove for optimizing the concrete construction activities, then these structures must be insulated well to prevent such damages.

7.3 Economy in Formwork

The following points are to be kept in view to effect economy in the cost of formwork:

- The plan of the building should imply minimum number of variations in the size of rooms, floor area etc. so as to permit reuse of the formwork repeatedly;
- Design should be perfect to use slender sections only in a most economical way;
- Minimum sawing and cutting of wooden pieces should be made to enable reuse of the material a number of times. The quantity of surface finish depends on the quality of the formwork.

Formwork can be made out of timber, plywood, steel, precast concrete or fiberglass used separately or in combination. Steel forms are used in situation where large numbers of re-use of the same forms are necessary. For small works, timber formwork proves useful. Fibre glass made of precast concrete and aluminium are used in cast-in-situ construction such as slabs or members involving curved surfaces.

Types of Formwork (Shuttering) for Concrete Construction:

Timber for formwork should satisfy the following requirement:

It should be: well-seasoned, light in weight, easily workable with nails without splitting, free from loose knots.

Timber used for shuttering for exposed concrete work should have smooth and even surface on all faces which come in contact with concrete.

Table 9-Normal sizes of members for timber formwork:

Sheeting for slabs, beam, column side and beam bottom	25 mm to 40mm thick
Joints, ledges	50 x 70 mm to 50 x 150 mm
Posts	75 x 100mm to 100 x 100 mm

7.4 Calculation part

Types of System Formwork:
1 Wall Formworks;
2 Slab Formworks;
3 Monolithic Formworks;
4 Climbing Formworks.

Footing Forms – Formworks for Foundation the first step for any concrete construction starts with the construction of foundation. Foundation can be for columns or walls. So, based on type of structural member, the shape and size of footing are designed. Thus formwork size and shape depends on the type and dimension of the footing.

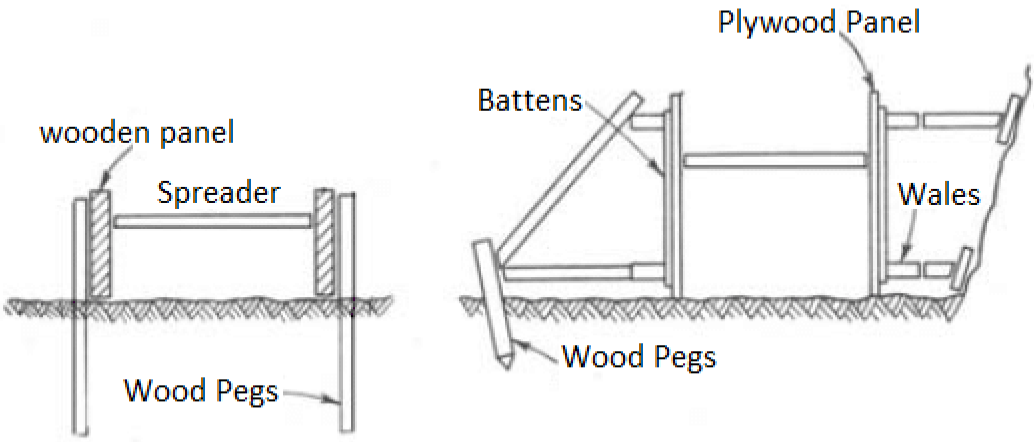


Figure 4- Formwork of footing

Size of footing= 150x150x60cm

Volume of footing =1.35m^3

For formwork we have; 1.85cm thickness and the mass of formwork is 30.62 kg

Size of formwork for footing=151.85x151.85x61.85

Area of formwork=151.85x151.85=2.3m^2

Volume of formwork=1.42m^3

For formwork of every kind of construction structure elements the above number or value of formwork is not enough because we also need small pieces of wood (timber) for connecting and stability of large pieces. We shall multiply 1.05 as coefficient to increase the value of formwork.

Area of formwork=2.3 m^2 ·1.05=2.415m^2

Weight of plywood is taken from table where the weight of 2.9768m^{2}is 30,62kg in metric system for 1.55m^2 plywood we have the following calculation

$$2.9768X=30.62\cdot 2.415$$

Amount of plywood=24.84kg

Table 10-Specification of formwork

Item	Shield type	Sizes cm		Weight kg	Number of shield m^2
Footing	Hardwood rectangular	151.85	151.85	24.84kg	$2.415m^2$

Column Forms – Formwork for Concrete Column Construction

Reinforced concrete column forms are subjected to lateral pressure because of their small cross section, large heights and relatively high rates of concrete placement. Thus It is necessary to provide tight joints and strong tie support to the formwork. As the sizes of concrete column increases, the stiffness of the formwork must be increased by either increasing thickness of sheathing or vertical stiffeners must be added to prevent sheathing deflection. For calculation of formwork of columns and footing we shall consider the following table

Table 11. Specification of monolithic reinforced concrete columns on the standard floor

Item name	Concrete grade	Size without opening		Element volume	Number of item per floor	Concrete volume	
		Πr^2	H			One element	Total
Column D900	B30/37	$3.14 \cdot 0.9^2$	3	7.63	216	7.63	1648
Column D600	B30/37	$3.14 \cdot 0.6^2$	3	3.39	120	3.39	406.8

Plywood Type	Plywood Thickness					
	6mm	9.5mm	12.5mm	15.5mm	18.5mm	28.5mm
Softwood Plywood	9.98 kg	12.93 kg	18.37 kg	21.77 kg	27.67 kg	38.33 kg
Hardwood Plywood	11.11 kg	14.29 kg	20.41 kg	24.04 kg	30.62 kg	42.64 kg
Marine Plywood	12.25 kg	15.88 kg	22.68 kg	26.76 kg	34.02 kg	47.17 kg
Baltic Birch	11.79 kg	15.2 kg	21.77 kg	25.63 kg	32.43 kg	45.13 kg
Particle Board	14.97 kg	19.5 kg	27.67 kg	32.66 kg	41.28 kg	57.61 kg
MDF	16.33 kg	21.09 kg	30.25 kg	35.61 kg	45.13 kg	62.82 kg
MDO	9.07 kg	11.79 kg	17.01 kg	19.96 kg	25.4 kg	35.15 kg
OSB	11.57 kg	14.97 kg	21.32 kg	25.17 kg	31.98 kg	44.45 kg

Figure 5-Plywood weight

Note: Approximate metric weight of 1220mm x 2440mm sheets of various types and thicknesses of plywood measured in kilograms.

Calculation

The thickness of plywood shelters are 1.85cm, type of wood structure is hardwood

Sizes=2.649·310cm

Volume=8.212m^3

Weight=6.26·8.212=6.58kg

Table 12-Specification of formwork

Item No#2	Shield type	Weight kg	Number of shield
Monolithic column	hard wood	51.4	31.3 where the weight of each shield=1.64kg

Floor Forms – Formwork for construction of RCC Slabs Formwork for reinforced concrete slabs depends on the type of slabs to be constructed. The floor slabs can be structural slabs supported on a steel or concrete structural frame, or slab-on-grade.

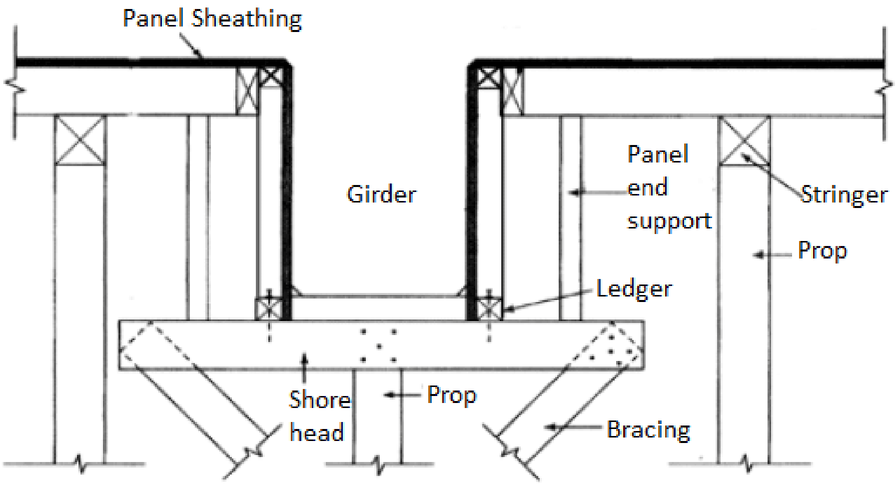


Figure 6- Formwork of slab

Calculation

Area of monolith concrete slab for first floor=8500m^2

Volume of monolithic concrete slab=8500·0.2=1700 m^3

For formwork of monolithic concrete slab we have the following calculation In the following sizes of slab we should add the sizes of dropped or heading beam where the thickness of heading beams are more than slab I will accept as a 55cm for each beam

Sizes of formwork for monolithic concrete slab=8534.1·0.385

Sizes of formwork for monolithic concrete slab with beam=8534.1·0.55m

Volume of formwork=4693.75m^3

Area of formwork=8534.1m^2

Weight of formwork=87783.57kg

Table 15-Specification of formwork

Item No2	Shield type	Sizes m	Weight kg	Number of shield
Monolithic concrete slab	hard wood	8534.1	87783.57kg	53526 shield

8 Energy Efficiency of the building

My building is 13-storey shopping mall guest house and offices with one underground floors. Scope of Services are Architectural Designs, Structural Designs, MEP Service Designs, Quantity Surveying, Construction Supervision and Project Management. Total area of construction which need Energy efficiency is 8500m^2 but in the outside we also need Energy for parking walkthrough, polls, and entertainment Area.

In This building there were applied energy efficiency techniques to save more energy and use renewable energies. The whole system: walls (outer walls), windows, doors, heating system, ventilation system, thermal radiators are used in a way which do not loss energy and heat from the building. Moreover, we mostly focused on renewable energy (Solar panels) in this building. According to the area (8500m^2) we use 18 solar panels, due to the standard we need to use 16_18 solar panels.

There are some alternative techniques which was unfortunately not applied in this building are passive houses techniques, which concentrate mostly on internal heating source like heating of shower room, kitchen and heat from human body.

We calculate the operation final energy use for space heating, ventilation, tap water heating and household and facility electricity with the dynamic energy balance program. The space heating demand is modeled for climate conditions of the city Kokshetau, assuming indoor temperatures of 20 degree Celsius minus 21 degree Celsius for the Studding areas and 18 degree Celsius for the common areas of the buildings. The primary energy needed to provide the final energy for the operation activities are calculated with the ENSYST program. We calculate the primary energy use for cases where the buildings are heated with cogeneration-based district heat or electric-based bedrock heat pump. The COP of the heat pump for heating is assumed to be 3. 0... The solar panels are assumed to replace electricity mostly.

To conclude, this 13_storey public building applied some energy efficiency techniques and methods to save energy and heats inside the building. We only used Solar panels and a general electricity of Kazakhstan. In this building which is quite efficient and heating radiators plus thermal heat pumps are installed in a way that maintain the moderate temperatures, low humidity and increased air quality inside the building. In addition, for future work we need to rely more on renewable energies such as (Wind Turbines, Biomass, geothermal etc.) and some of passive house techniques and devices for making the building more energy efficient.

9 Safety measures

In the production of reinforced concrete works, it is necessary to strictly comply with the requirements of Euro codes "Occupational Health and Safety in Construction" and observe certain rules:

The formwork used for the erection of monolithic reinforced concrete structures must be manufactured and applied in accordance with the PPR approved in accordance with the established procedure.

Formwork should be developed after the concrete has reached the specified strength with the permission of the foreman.

The preparation and processing of the reinforcement must be carried out in specially designated places for this purpose.

The given reinforcing mesh is lowered over the place of its laying not lower than by 80 cm and only then the reinforcement workers direct it to the design position.

Walking on reinforcing elements is allowed only on the gangways of a width of 30-40 cm.

When cranes are working, people are not allowed to stay in the zone of operation. Do not carry the load over workers.

It is forbidden to swing a suspended cargo and leave it without supervision, as well as to conduct installation with a wind of more than 6 points.

It is prohibited to operate the boom crane directly under the wires of operating power lines of any voltage.

The descent of workers into the pit or trench is allowed only on the stairs.

If cracks or trenches appear in the slopes of the trench, which threaten the collapse, it is necessary to fix the walls or reduce the steepness of the slope before the work begins.

Welding transformers and lighting fixtures must only be connected to an electrician on duty.

For a temporary power grid on a construction site, an insulated wire should be used and suspended on reliable supports at a height of at least 2.5 m above the workplace, 3 m above the aisles and 5 m above the thoroughfares. At an altitude of at least 2.5 m from the ground, the electrical wires must be enclosed in cords or boxes.

Welding transformer housings and welded products are grounded in accordance with euro code.

Welding transformers are only included in the network with the use of closed types.

When working with an open electric arc, electric welders are provided with a helmet-mask or a shield with protective glass filters for protecting the face and eyes, and all those working in the electric welding zone - glasses with protective glasses. The electric welder is obliged to warn the people around him about starting work.

Electric welding work is prohibited in the open air during a thunderstorm and rain. The length of the wires between the supply network and the welding transformer must not exceed 15 m. It is recommended to place the wires in a rubber hose to avoid mechanical damages.

Do not use wires with damaged braids and insulation. Before starting work, check the insulation of welding wires and the electrode holder, as well as the tightness of the connections of all contacts. The electrode holder must have a reliable insulation, ensure a quick replacement of the electrical wire without touching live parts and securely clamp it.

The voltage at the terminals of the welding transformers at the time of ignition of the arc must not exceed 70 V. Switching of the jumpers of the transformer stages is possible only when the tg is switched off.

When preparing a concrete mixture with the use of chemical additives, measures should be taken to prevent skin burns and damage to the eyes of workers.

Installation, dismantling and repair of concrete trucks, as well as removal of delayed concrete from them is allowed only after reducing the pressure to atmospheric.

Workers with electric vibrators are allowed to work only after medical conclusion. Medical re-examination is carried out regularly and on time.

Concrete workers are provided with overalls, including shoes and vibration-proof dielectric gloves.

The vibrator housings are reliably grounded, and the wires feeding the vibrators are enclosed in rubber pins.

When compacting the concrete mix, the electric vibrator must not be moved by current-carrying hoses, and at the end it must be switched off.

After every 30-35 minutes of operation, the vibrators are switched off for 5-7 minutes for cooling.

10 Development of elements of a building object

Work on the construction plan is carried out on a graphic sheet and includes the development of the following elements required for the course project:

- Design of installation sites for construction and lifting machines at the facility, indicating the trajectories of movement, paths and areas of action (working and hazardous areas);
- Design of areas and locations of open warehouses of building structures, materials and devices;
- Design of areas and locations for enlargement assembly sites, acceptance of concrete mix;
- Design of device circuits at the site of temporary and permanent roads, road trips for vehicles with an indication of their width and radius of curvature.

A fragment of the construction plan is performed on a sheet of the graphic part in a scale of 1: 200 or 1: 500.

The fragment of the construction plan does not conditionally show power supply networks, sanitary networks, temporary structures and other components of the construction plans, which are the subject of the study of the organization of construction.

Symbols of the construction plan are carried out in accordance with the requirements of Euro code.

CONCLUSION

The term Diploma Project refers to the building analyze architecture and technical processes and methods used in the constructing buildings. This has become an increasingly important aspect of the construction industry, as buildings have moved from being evolutions of standard types to becoming one-off prototypes, building performance requirements have become more demanding, and the number of products and specialist suppliers has increased.

The software package pc Etabs is a representative of a new generation of programs of the design family. Its development and further improvement is carried out taking into account its integration into the technological line of BIM technologies. The software systems of the Etabs family, already have a close information connection and can form the basis of the domestic BIM technology being created: Etabs includes a built-in preprocessor - designs, which on one hand is closely related to the architectural program, arch cad, Revit, all plan, on the other hand, has its own powerful tool shaping and construction of analytical models. Sequences of computer-aided design of structures for various purposes. Theoretical foundations of computer Safe and the principles of building computer models covered in the papers. In essence, construction is the process of moving and assembling materials and equipment into completed forms for use. However, unlike manufacturing, construction operations are never completely standardized (neither in a fixed sequence nor at a fixed location).

The basic process of construction has remained relatively unchanged since the middle Ages, however construction technology has changed significantly. The earliest dwellings were built of animal skins draped across sticks, or mud, straw, timber and stone, and were intended purely to provide shelter. Early experiments with concrete were introduced by the ancient Romans, who mixed lime and volcanic rock to build many of their most famous structures. Buildings are now constructed from a bewildering array of interrelated systems and assemblies that must work together to deliver the required standard of performance. This requires the collaborative work of client, consultants, suppliers, contractors and sub-contractors to properly prepare planning applications, building regulations submissions, and submissions for programs such as BREEAM, construction documentation, operation and maintenance manuals and so on.

Building technology encompasses; materials and their applications, physical properties, capacities and vulnerabilities; the functioning of components and systems; the principles, procedures and details of building assembly; operating strategies and so on.

In its widest sense, it can be considered to cover any skilled area related to the construction of buildings, such as:

Site investigations and surveying, Construction materials, components, systems and techniques, Building services, Operation and maintenance, Energy supply and efficiency, Structural systems, Communications, Smart technology, Sustainability, Waste water and water management, Building engineering physics, Building science

Prefabrication and offsite manufacturing, Modelling and assessment, Collaborative practices, Research, development and innovation, Construction plant

REFRENCES

1 EUROCODE 0 – EN 1990 Basis of Structural Design [1]

2 EUROCODE 1 - EN 1991 Actions on Structure [2]

3 EUROCODE 2. EN 1992 Design of Concrete structure [3]

4 EUROCODE 7. EN 1997 Geotechnical design,[4]

5 EUROCODE 8. EN 1998 Design of structures for earthquake resistance [5]

6 SN-RK EN 1991-1:2000/2011[6]

7 Republic of Kazakhstan 2.04-01-2017- Building climatology and "Construction hotness engineering [7].

8 Eurocode EN 1991.1-1 2002/2011 snow and wind loads

9 Simplified Engineering for Architects and Builders James Ambrose, Patrick Tripeny 2016[18]

10 Modern Construction Handbook by Andrew Watts Call Number: online ISBN: 9783990434543 Publication Date: 2013-07-17 [19]

11 NTP RK 02-01-1.6-2013

12 NTP RK 01-01-3.1 (4.1)-2017 Нагрузки и воздействия на здания-снег, ветер [17].

Appendixes

APPENDIX A

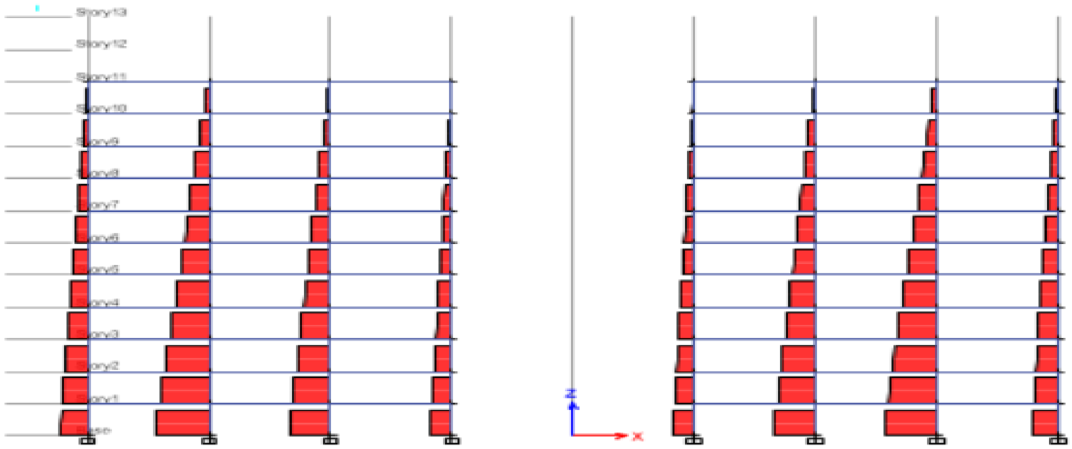


Figure A.1- Axial force in dead load case

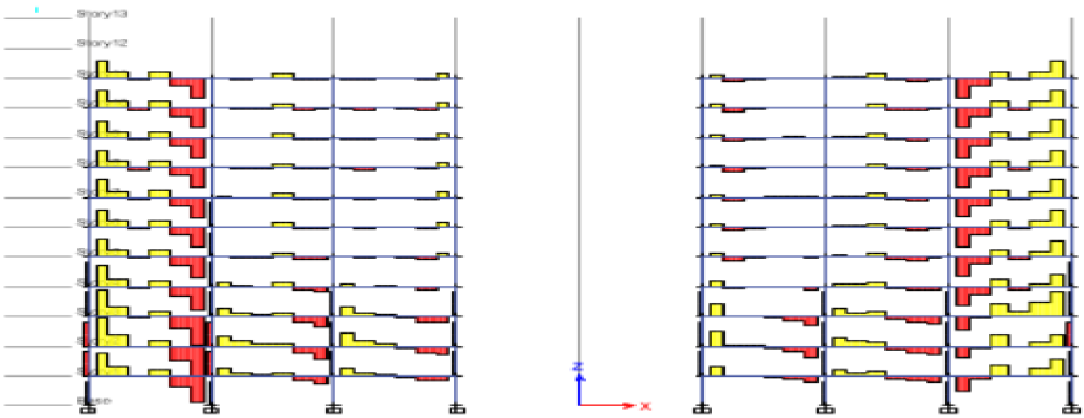


Figure A.2- Torsion in dead load case

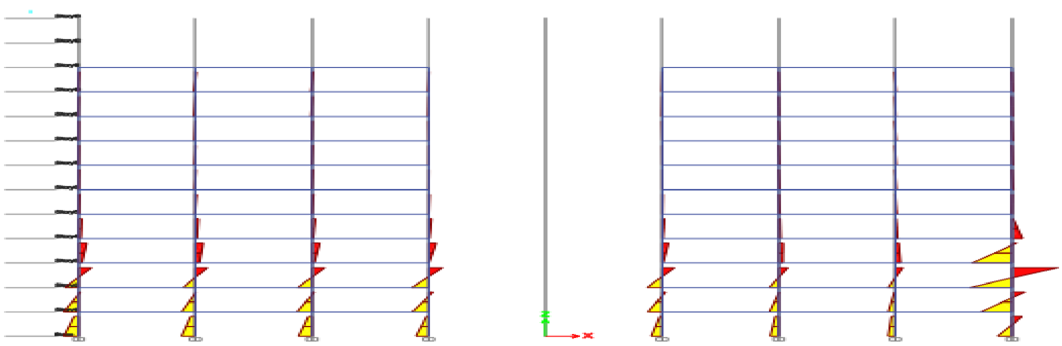


Figure A.3- moment 2-2 in dead load

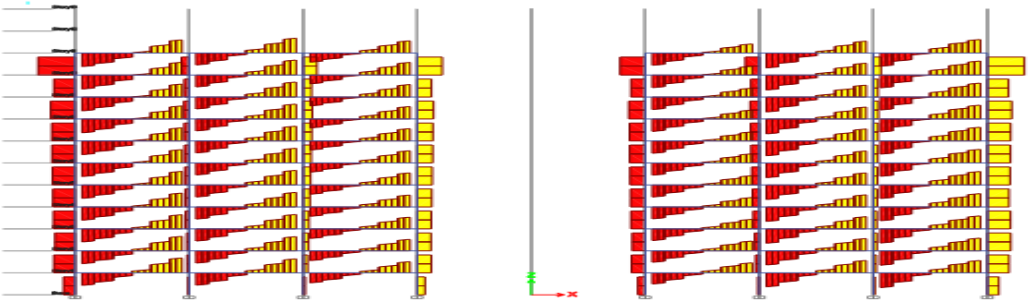


Figure A.4- Shear force 2-2 in dead load

Sell force stress and resultant forces.

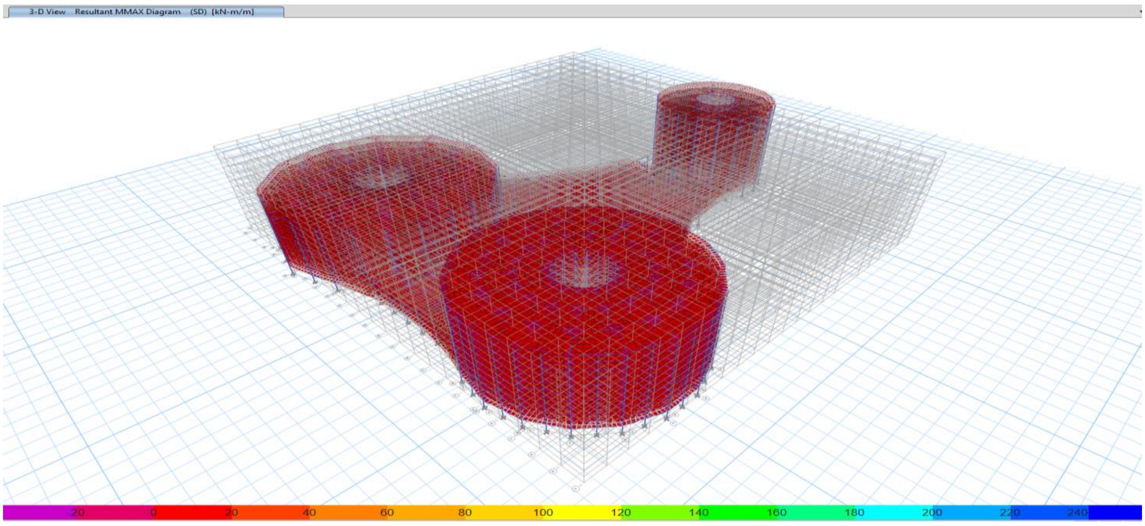


Figure A.5- M max in super dead load

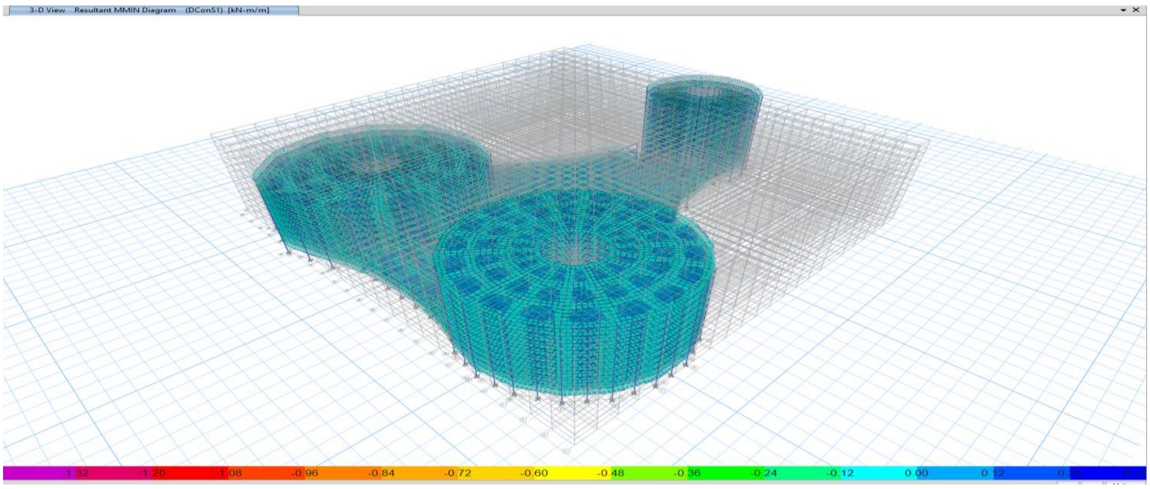


Figure A.6- M min in dead load

Continues of APPENDIX A

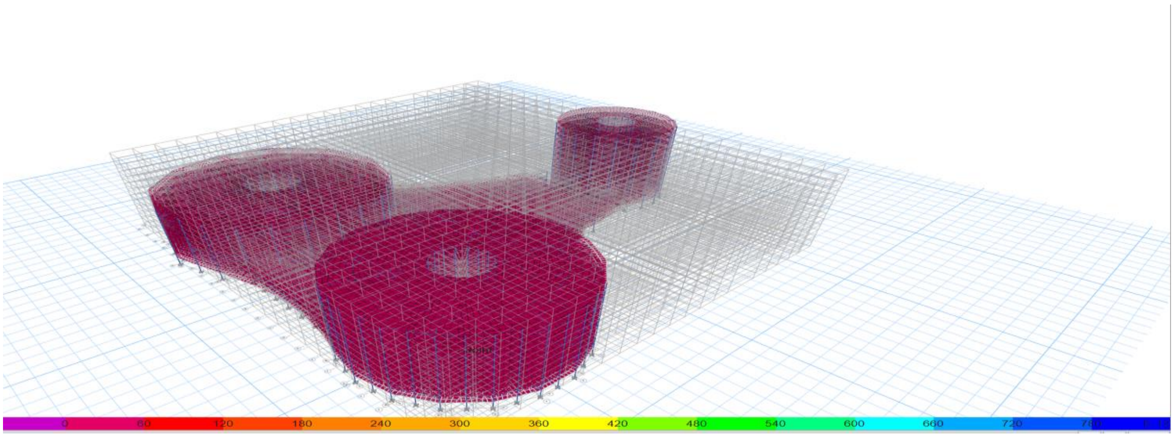


Figure A.7- F max dead

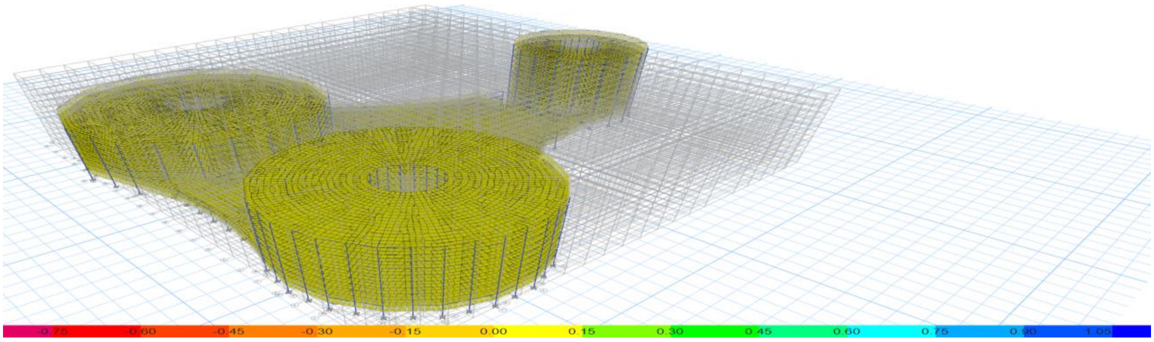


Figure A.8-F min dead load

Shell stress

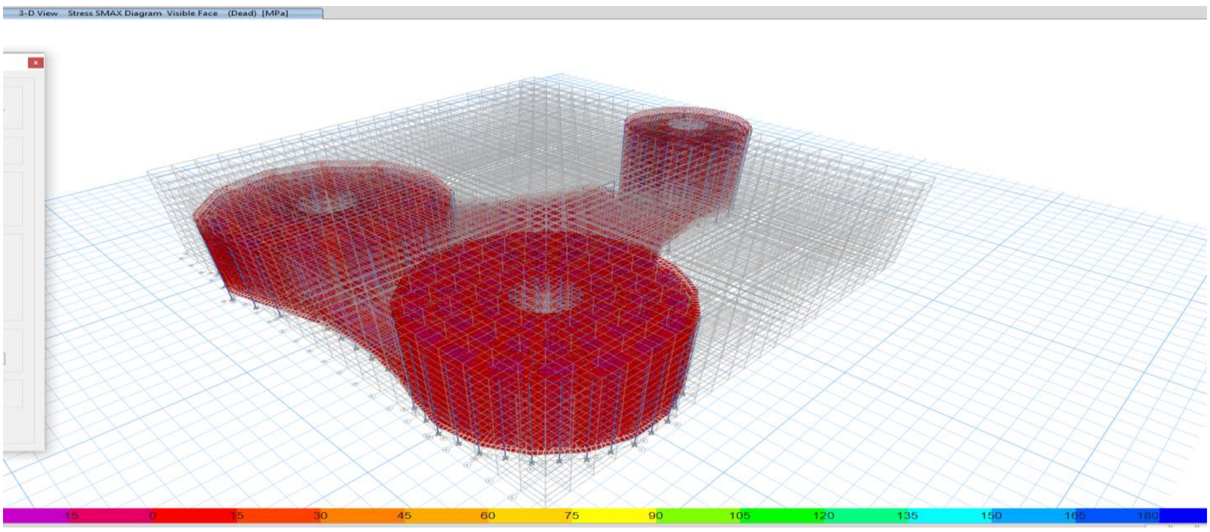


Figure A.9- Shell stress Smax in dead load

Continues of APPENDIX A

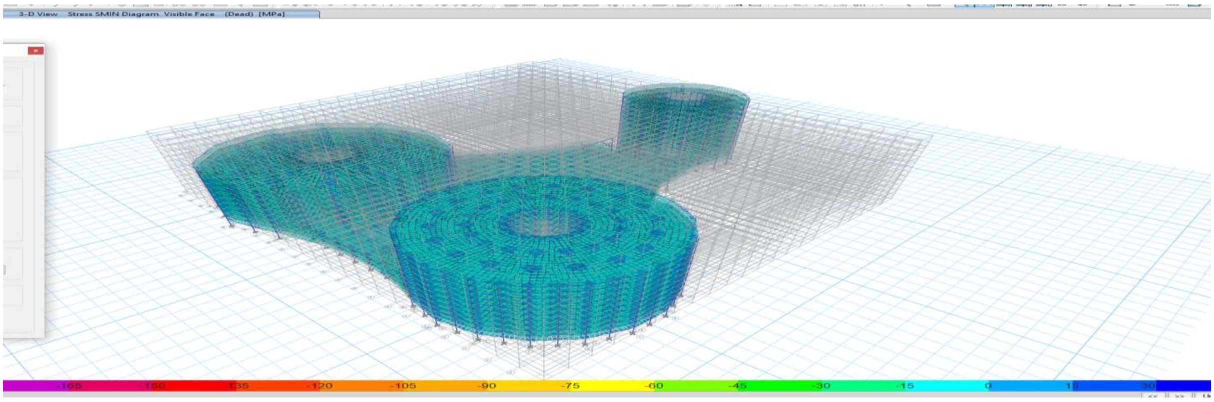


Figure A.10- Shell stress Smin dead load

Shell strain in dead load

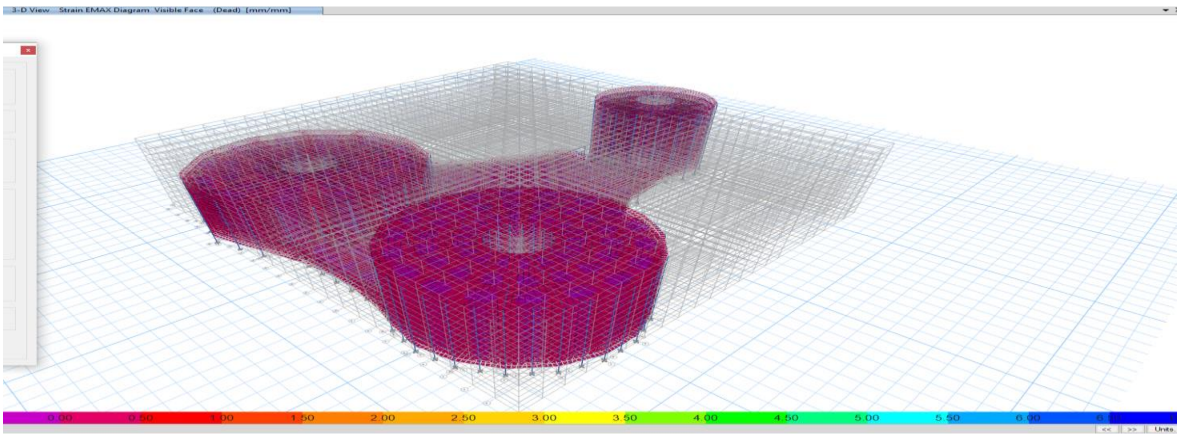


Figure A.11- Shell strain Emax

Displacement

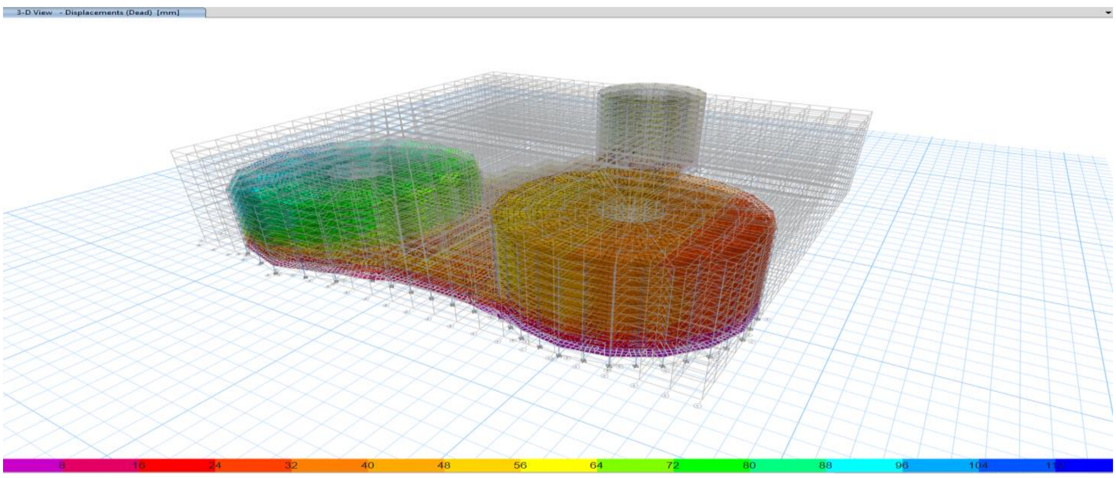


Figure A.12- Displacement in dead loads

Continues of APPENDIX A

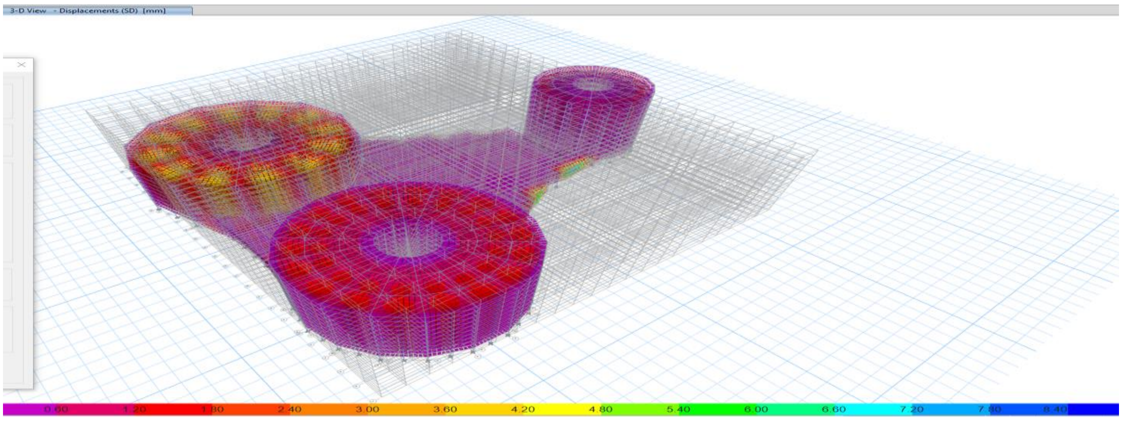


Figure A.13- Displacement of super dead load

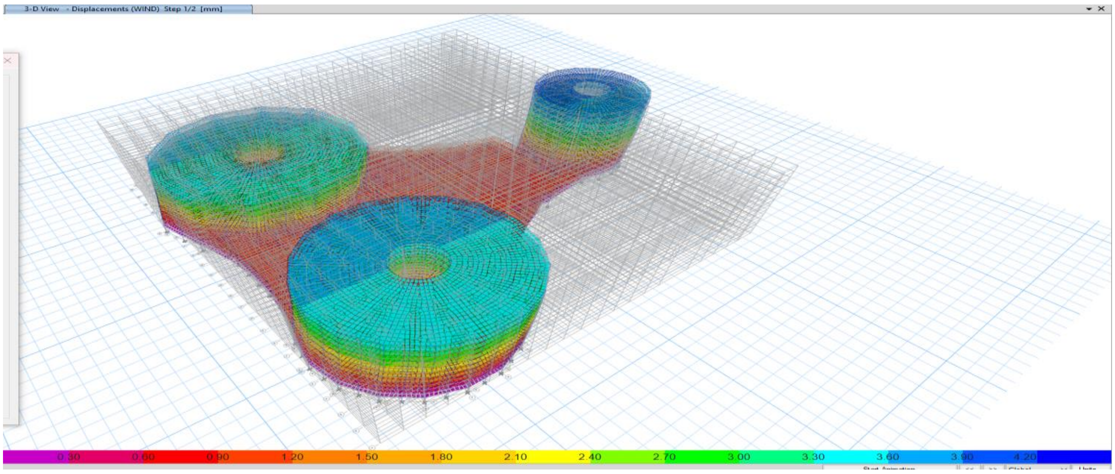


Figure A.14- Displacement in wind loads

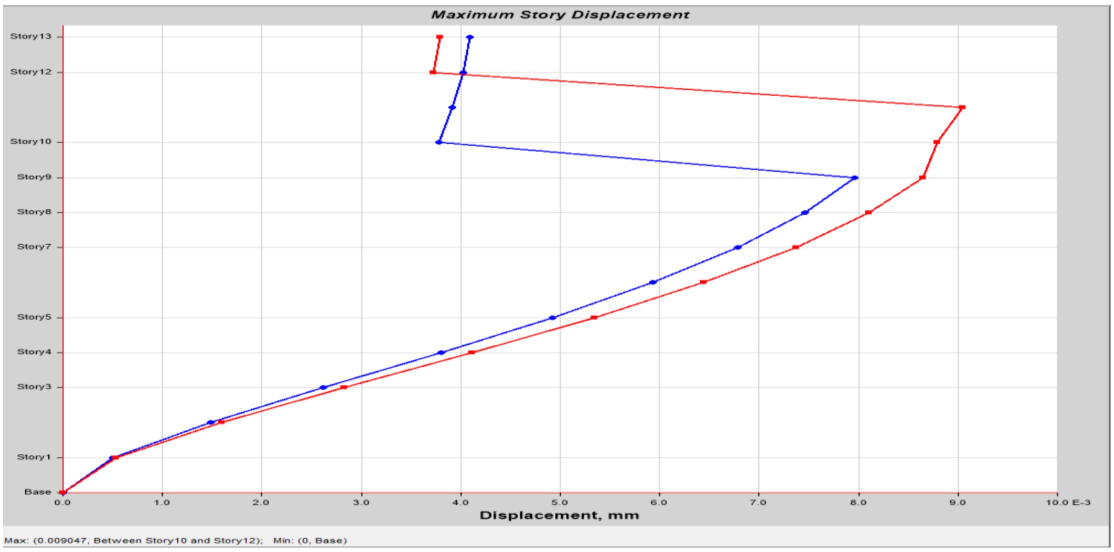


Figure A.15- Maximum story displacement

Continues of APPENDIX A

Designing of concert elements (columns)

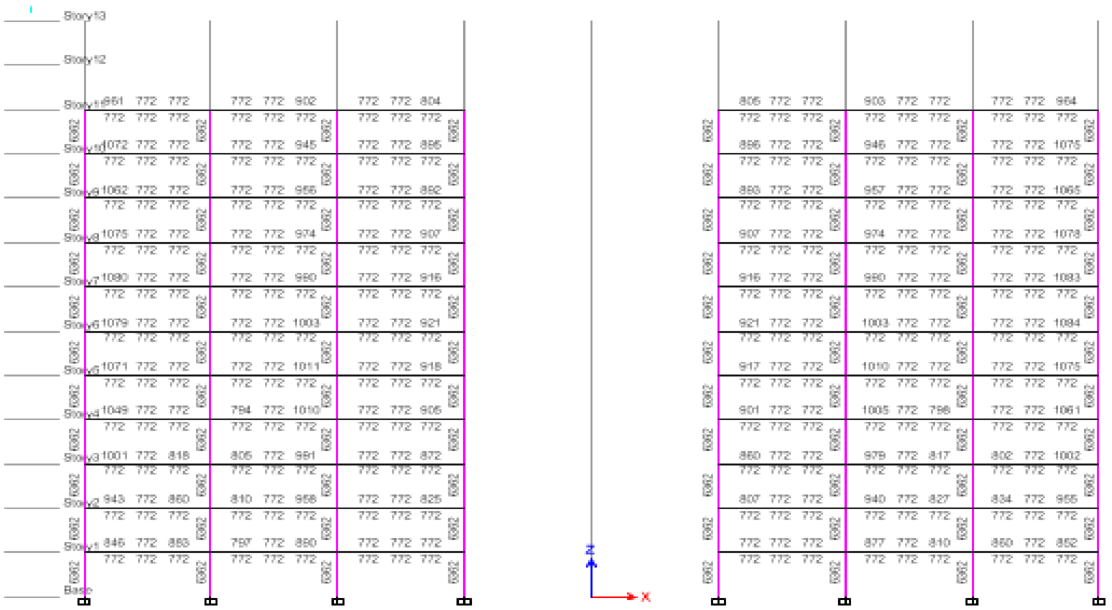


Figure A.16- Longitudinal reinforcement

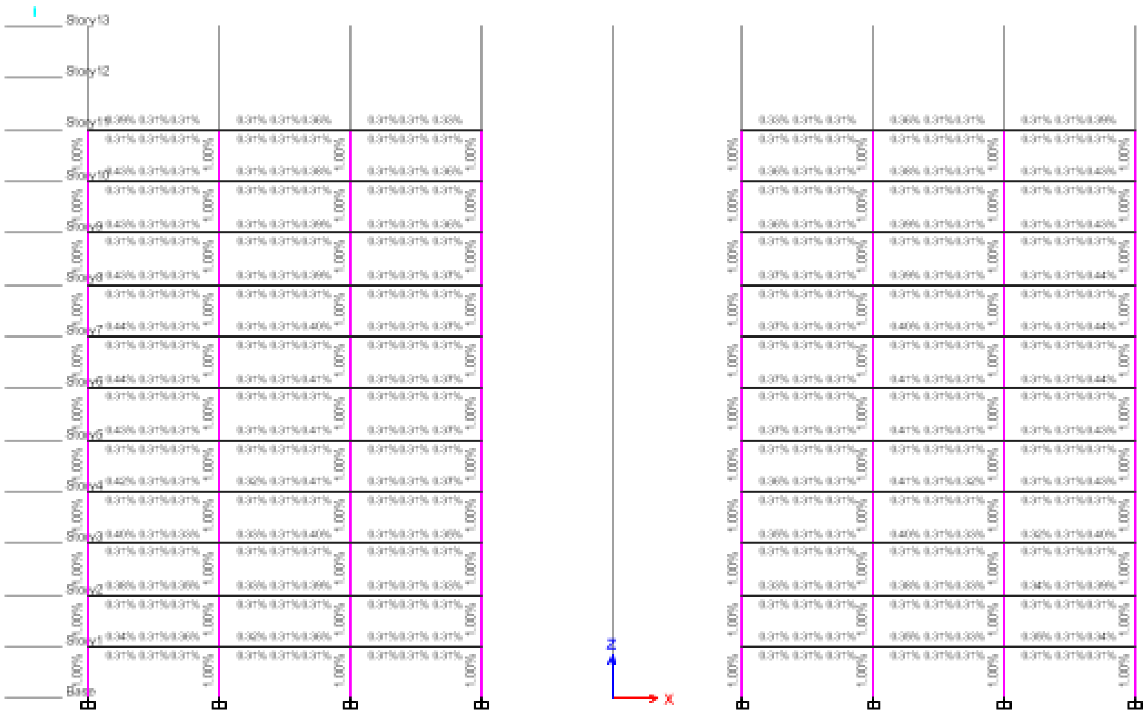


Figure A.17- Rebar percentage

Appendix B

B.1 Calculation of Safe Formwork Striking Times

Structural members are constructed based on designed load. But before a structure is complete and subjected to all loads assumed during structural design, the structural members are subjected to its self-weight and construction loads during construction process.

So, to proceed with construction activities at a quicker rate, it is essential to calculate the behavior of structure under is self-load and construction load. If this can be done and structural member is found to be safe, formwork can be stripped-off.

If these calculations are not possible, then following formula can be used for calculation of safe formwork striking times:

Characteristic strength of cube of equal of maturity to the structure required at time of formwork removal

Formwork striking times = (Dead load + construction load) grade of concrete/Total design load

This formula was given by Harrison (1995) which describes in detail the background of determination of formwork removal times.

Other method to determine the strength of concrete structure is to conduct the non-destructive tests on structural member.

Factors Affecting Concrete Formwork Striking Times

The striking time of concrete formwork depends on the strength of structural member. The strength development of concrete member depends on:

- Grade of concrete– higher the grade of concrete, the rate of development of strength is higher and thus concrete achieves the strength in shorter time;
- Grade of cement– Higher cement grade makes the concrete achieve higher strength in shorter time;
- Type of Cement– Type of cement affects the strength development of concrete. For example, rapid hardening cement have higher strength gain in shorter period than the Ordinary Portland Cement. Low heat cement takes more time to gain sufficient strength than OPC;
- Temperature– The higher temperature of concrete during placement makes it achieve higher strength in shorter times. During winter, the concrete strength gain time gets prolonged;
- A higher ambient temperature makes the concrete gain strength faster;
- Formwork helps the concrete to insulate it from surrounding, so longer the formwork remain with concrete, the less is the loss of heat of hydration and rate of strength gain is high;
- Size of the concrete member also affects the gain of concrete strength. Larger concrete section members gain strength in shorter time than smaller sections;
- Accelerated curing is also a method to increase the strength gain rate with the application of heat.

Generally following values of concrete strength is considered for removal of formwork for various types of concrete structural members.

Table B.1-Strength of concrete vs. Structural Member Type & Span for Formwork Removal

Concrete Strength	Structural Member Type and Span
2.5 N/mm^2	Lateral parts of the formwork for all structural members can be removed
70 percent of design strength	Interior parts of formwork of slabs and beams with a span of up to 6m can be removed
85 percent of design strength	Interior parts of formwork of slabs and beams with a span of more than 6m can be removed

Important note: It is important to note that the time for formwork removal shown above in Table -2 is only when Ordinary Portland Cement is used. In normal construction process Portland Pozzolana cement is used. So, the time shown in Table-2 should be modified.

For cements other than Ordinary Portland cement, the time required for formwork removal should be as: Portland Pozzolana Cement – stripping time will be 10/7 of the time stated above, Low heat cement – stripping time will be 10/7 of the time stated above, Rapid Hardening Cement – stripping time of 3/7 of the time stated above will be sufficient in all cases except for vertical sides of slabs, beams and columns which should be retained at least for 24 hours.

B.2 Concrete Formwork Removal Specification

During stripping of formwork, following points must be remembered:

- Formwork should not be removed until the concrete has developed sufficiently strength to support all loads placed upon it. The time required before formwork removal depends on the structural function of the member and the rate of strength gain of the concrete. The grade of concrete, type of cement, water/cement ratio, temperature during curing etc. influence the rate of strength gain of concrete;
- The formwork parts and connections should be arranged in a way that makes formwork removal easy and simple, prevents damage to concrete and formwork panels so that it can be reused without extensive repair;

- The formwork removal procedure should be supervised by the engineer to ensure that quality of hardened concrete in structural member, i.e. it should be free from or has minimum casting defects such as honeycombing, size and shape defects etc. These defects in concrete influence the strength and stability of structure. Thus immediate repair works can be done or the members can be rejected;
- The separation of forms should not be done by forcing crowbars against the concrete. It may damage the hardened concrete. This should be achieved by using wooden wedges;
- Beam and joist bottoms should remain in place until final removal of all shoring under them are done;
- Joist forms should be designed and removed so that the shores may be removed temporarily to permit removal of joist forms but must be replaced at once. The shores and joists will be dismantled beginning from the middle of the member's span, continuing symmetrically up the supports;
- The approval from the engineer should be obtained for the sequence and pattern of formwork removal;

B.3 Types of Formwork (Shuttering) for Concrete Construction and its Properties

Formwork (shuttering) in concrete construction is used as a mould for a structure in which fresh concrete is poured only to harden subsequently. Types of concrete formwork construction depends on formwork material and type of structural element.

Formworks can also be named based on the type of structural member construction such as slab formwork for use in slab, beam formwork, column formwork for use in beams and columns respectively etc.

The construction of formwork takes time and involves expenditure up to 20 to 25 percent of the cost of the structure or even more. Design of these temporary structures are made to economic expenditure. The operation of removing the formwork is known as stripping. Stripped formwork can be reused. Reusable forms are known as panel forms and non-usable are called stationary forms.

Timber is the most common material used for formwork. The disadvantage with timber formwork is that it will warp, swell and shrink. Application of water impermeable cost to the surface of wood mitigates these defects.

A good formwork should satisfy the following requirements: It should be strong enough to withstand all types of dead and live loads, It should be rigidly constructed and efficiently propped and braced both horizontally and vertically, so as to retain its shape, The joints in the formwork should be tight against leakage of cement grout, Construction of formwork should permit removal of various parts in desired sequences without damage to the concrete, The material of the formwork should be cheap, easily available and should be suitable for reuse, The formwork should be set accurately to the desired line and levels should have plane surface, It should be as light as possible, The material of the formwork should not warp or get distorted when exposed to the elements, It should rest on firm base.

B.4 Plywood Formwork

Resin bonded plywood sheets are attached to timber frames to make up panels of required sizes. The cost of plywood formwork compares favorably with that of timber shuttering and it may even prove cheaper in certain cases in view of the following considerations: It is possible to have smooth finish in which case on cost in surface finishing is there, By use of large size panels it is possible to effect saving in the labor cost of fixing and dismantling, Number of reuses are more as compared with timber shuttering. For estimation purpose, number of reuses can be taken as 20 to 25.

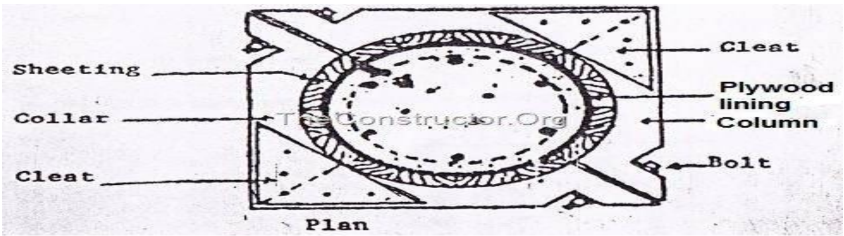


Figure B.1-Details of timber formwork for circular RCC column

Continuation of Application B

Shopping and entertainment center with a cinema in Kokshetau

(Local estimate calculation)

Estimated cost	116728.069	thousand tenge
Standard labor intensity	93025.91	person-h
Estimated wages	28359.350	thousand tenge

Compiled in 2001

N p / p	Code and item number of the standard	Name of works and costs, unit of measure	Number	Unit cost, tenge: Total	Unit cost, tenge: Expl. machines	Total cost, tenge: Total	Total cost, tenge: Expl. machines	Overheads	Labor costs, man-hours, construction workers	
				Salary of construction workers	incl. Salary of drivers	Salary of construction workers	incl. Salary of drivers	tenge	workers serving machines	
								%	for one.	Total
one	**2**	**3**	**four**	**five**	**6**	**7**	**eight**	**nine**	**10**	**eleven**
		SECTION 1. Earthworks								
one	**E11-01-03-072-02**	**Layout of areas from soils of the 1st group in a mechanized way**	**4,320.00**	**12.57**	**7.38**	**54,302.40**	**31,881.60**	**2,295.48**	**-**	**-**
		m2		**-**	**0.74**	**-**	**3.188.16**	**72.00**	**0.41**	**1,771.20**
2	**E11-01-01-001-04**	**Excavation of soil of the 4th group into the dump with single-bucket dragline excavators, with a bucket with a capacity of 6.3-6.5 m3, electric walking when working on hydropower construction**	**5,848.00**	**386.90**	**204.18**	**2,262,591.20**	**1,194,044.64**	**58,105.73**	**1.36**	**7,953.28**
		m3		**6.90**	**6.90**	**40,351.20**	**40,351.20**	**72.00**	**0.94**	**5,497.12**
3	**E11-010104-0603**	**Backfilling of trenches and pits with bulldozers with a capacity of 79 (108) kW (hp), when moving soils of the 1st group up to 5 m**	**2,323.65**	**56.43**	**56.43**	**131,123.57**	**131,123.57**	**6,993.26**	**-**	**-**
		m3		**-**	**4.18**	**-**	**9,712.86**	**72.00**	**0.66**	**1,533.61**
		TOTAL SECTION 1 DIRECT COSTS	**Tenge**			**2,448,017.17**	**1,357,049.81**			**7,953.28**
			Tenge			**40,351.20**	**53,252.22**			**8,801.93**
	The cost of general construction works -		Tenge			**2,448,017.17**				
	Materials -		Tenge							
	Total salary -		Tenge			**93,603.42**				
	The cost of materials and structures -		Tenge							
		Overhead costs -	Tenge					**67,394.46**		
		Normative labor intensity in N.R. -	person-h							**837.76**

		Estimated wages in N.R. -	Tenge			**10,109.17**				
		Irregular and unforeseen costs -	Tenge			**150,924.70**				
	TOTAL, The cost of general construction works -		Tenge			**2,666,336.33**				
		Standard labor intensity -	person-h							**16,755.21**
		Estimated salary -	Tenge			**103,712.59**				
		TOTAL SECTION 1	Tenge			**2,666,336.33**				
		Standard labor intensity -	person-h							**16,755.21**
		Estimated salary -	Tenge			**103,712.59**				

SECTION 2. Foundations foundations

four	**E11-060101-0101**	**Concrete preparation device, concrete class B7.5**	**75.32**	**7,006.11**	**1,346.00**	**527,716.32**	**101,383.82**	**47,826.77**	**1.43**	**107.71**
		m3		**685.20**	**12.56**	**51,610.84**	**946.05**	**91.00**	**0.19**	**14.31**
five	**E11-060101-0113**	**Installation of flat reinforced concrete foundation slabs, class B30 concrete**	**4,320.00**	**4,480.31**	**3,408.30**	**19,354,939.20**	**14,723,856.00**	**974,819.66**	**4.17**	**18,014.40**
		m3		**220.66**	**27.31**	**953,251.20**	**117,979.20**	**91.00**	**0.17**	**734.40**
6	**E11-080101-0307**	**Side coating bituminous waterproofing in 2 layers on the leveled surface of rubble masonry brick, concrete walls, foundations**	**19,885.10**	**365.30**	**27.01**	**7,264,027.03**	**537,096.55**	**398,527.23**	**0.19**	**3,778.17**
		m2		**21.20**	**0.35**	**421,564.12**	**6,959.79**	**93.00**	**0.00**	**26.29**
7	**S121-050301-3202**	**Reinforcing blanks, not assembled into frames and meshes: steel of periodic profile of class A-III, d 12 mm**	**21.28**	**67,412.88**	**-**	**1,434,276.50**	**-**	**-**	**-**	**-**
		t		**-**	**-**	**-**	**-**	**-**	**-**	**-**
eight	**S121-050301-3001**	**Reinforcement blanks not assembled into frames and meshes: smooth steel of class A-I, d 6 mm**	**3.14**	**65,745.09**	**-**	**206,336.36**	**-**	**-**	**-**	**-**
		t		**-**	**-**	**-**	**-**	**-**	**-**	**-**
		TOTAL SECTION 2 DIRECT COSTS	**Tenge**			**28,787,295.42**	**15,362,336.37**			**21,900.28**
			Tenge			**1,426,426.16**	**125,885.03**			**775.00**
	The cost of general construction works -		Tenge			**27,146,682.55**				
	Materials -		Tenge			**1,640,612.87**				
	Total salary -		Tenge			**1,552,311.19**				
		Overhead costs -	Tenge					**1,421,173.66**		
		Normative labor intensity in N.R. -	person-h							**1,133.76**
		Estimated wages in N.R. -	Tenge			**213,176.05**				
		Irregular and unforeseen costs -	Tenge			**1,812,508.14**				
	TOTAL, The cost of general construction works -		Tenge			**32,020,977.22**				
		Standard labor intensity -	person-h							**22,675.28**
		Estimated salary -	Tenge			**1,765,487.24**				
		TOTAL SECTION 2	Tenge			**32,020,977.22**				
		Standard labor intensity -	person-h							**22,675.28**
		Estimated salary -	Tenge			**1,765,487.24**				

SECTION 3. Columns columns

nine	**E11-060501-0201**	**Arrangement of columns of civil buildings in metal formwork, concrete class B30**	**494.13**	**23,012.14**	**13,416.07**	**11,370,989.09**	**6,629,282.67**	**4,008,883.61**	**13.55**	**6,695.46**
		m3		**7,436.23**	**1,479.17**	**3,674,464.33**	**730,902.27**	**91.00**	**5.07**	**2,505.24**
10	**S121-050301-3203**	**Reinforcement blanks not assembled into frames and meshes: steel of periodic profile of class A-III, d 25-28 mm**	**14.40**	**56,070.27**	**-**	**807,411.84**	**-**	**-**	**-**	**-**
		t		**-**	**-**	**-**	**-**	**-**	**-**	**-**
eleven	**S121-050301-3202**	**Reinforcing blanks, not assembled into frames and meshes: steel of a periodic profile of class A-III, d 16-18 mm**	**3.14**	**67,412.88**	**-**	**211,570.62**	**-**	**-**	**-**	**-**
		t		**-**	**-**	**-**	**-**	**-**	**-**	**-**
12	**S121-**	**Reinforcement blanks not**	**1.57**	**65,745.09**	**-**	**103,167.85**	**-**	**-**	**-**	**-**

	050301-3001	**assembled into frames and meshes: smooth steel of class A-I, d 8 mm**								
		t		-	-	-	-	-	-	-
		TOTAL SECTION 3 DIRECT COSTS	**Tenge**			**12,493,139.40**	**6,629,282.67**			**6,695.46**
			Tenge			**3,674,464.33**	**730,902.27**			**2,505.24**
The cost of general construction works -			Tenge			**11,370,989.09**				
Materials -			Tenge			**1,122,150.30**				
Total salary -			Tenge			**4,405,366.60**				
		Overhead costs -	Tenge					**4,008,883.61**		
		Normative labor intensity in N.R. -	person-h							**460.04**
		Estimated wages in N.R. -	Tenge			**601,332.54**				
		Irregular and unforeseen costs -	Tenge			**990,121.38**				
TOTAL, The cost of general construction works -			Tenge			**17,492,144.39**				
		Standard labor intensity -	person-h							**9,200.70**
		Estimated salary -	Tenge			**5,006,699.14**				
		TOTAL SECTION 3	Tenge			**17,492,144.39**				
		Standard labor intensity -	person-h							**9,200.70**
		Estimated salary -	Tenge			**5,006,699.14**				

SECTION 4. Wall Walls

13	**E11-080201-0103**	**Laying of simple exterior brick walls with a floor height of up to 10 m**	**3,440.00**	**4,875.72**	**812.62**	**16,772,476.80**	**2,795,412.80**	**6,484,558.10**	**4.90**	**16,856.00**
		m3		**1,820.44**	**206.49**	**6,262,303.71**	**710,339.40**	**93.00**	**0.41**	**1,410.40**
fourteen	**E11-080201-0107**	**Laying of internal brick walls with a floor height of up to 5 m**	**1,419.00**	**3,745.55**	**259.44**	**5,314,936.72**	**368,145.36**	**2,312,331.15**	**4.25**	**6,030.75**
		m3		**1,556.64**	**195.56**	**2,208,872.16**	**277,505.42**	**93.00**	**0.39**	**553.41**
fifteen	**E11-080401-0301**	**Laying of partitions made of bricks reinforced with a thickness of 1/4 brick at a floor height of up to 5 m**	**12,642.20**	**1,248.11**	**181.80**	**15,778,856.24**	**2,298,351.96**	**7,856,426.92**	**1.39**	**17,572.66**
		m2		**637.92**	**30.30**	**8,064,712.22**	**383,058.66**	**93.00**	**0.03**	**379.27**
		TOTAL SECTION 4 DIRECT COSTS	**Tenge**			**37,866,269.77**	**5,461,910.12**			**40,459.41**
			Tenge			**16,535,888.10**	**1,370,903.48**			**2,343.08**
The cost of general construction works -			Tenge			**37,866,269.77**				
Materials -			Tenge							
Total salary -			Tenge			**17,906,791.58**				
		Overhead costs -	Tenge					**16,653,316.17**		
		Normative labor intensity in N.R. -	person-h							**2,140.12**
		Estimated wages in N.R. -	Tenge			**2,497,997.42**				
		Irregular and unforeseen costs -	Tenge			**3,271,175.16**				
TOTAL, The cost of general construction works -			Tenge			**57,790,761.09**				
		Standard labor intensity -	person-h							**42,802.48**
		Estimated salary -	Tenge			**20,404,789.00**				
		TOTAL SECTION 4	Tenge			**57,790,761.09**				
		Standard labor intensity -	person-h							**42,802.48**
		Estimated salary -	Tenge			**20,404,789.00**				

SECTION 5. Overlay Overlay

sixteen	**E11-060801-0105**	**Arrangement of ribbed floors at a height of more than 6 m from the support area, concrete class B30**	**103.20**	**23,999.10**	**1,534.00**	**2,476,707.12**	**158,308.80**	**628,197.09**	**11.05**	**1,140.36**
		m3		**6,568.91**	**120.30**	**677,911.51**	**12,414.96**	**91.00**	**0.36**	**37.15**
17	**S121-050301-3202**	**Reinforcement blanks not assembled into frames and meshes: steel of periodic profile of class A-III, d 16 mm**	**32.44**	**67,412.88**	-	**2,186,873.93**	-	-	-	-
		t		-	-	-	-	-	-	-
eighteen	**S121-050301-3001**	**Reinforcement blanks not assembled into frames and**	**2.00**	**65,745.09**	-	**131,304.78**	-	-	-	-

		meshes: smooth steel of class A-I, d 6 mm								
		t		-	-	-	-	-	-	-
		TOTAL SECTION 5 DIRECT COSTS	**Tenge**			**4,794,885.83**	**158,308.80**			**1,140.36**
			Tenge			**677,911.51**	**12,414.96**			**37.15**
	The cost of general construction works -		Tenge			**2,476,707.12**				
	Materials -		Tenge			**2,318,178.71**				
	Total salary -		Tenge			**690,326.47**				
		Overhead costs -	Tenge					**628,197.09**		
		Normative labor intensity in N.R. -	person-h							**58.88**
		Estimated wages in N.R. -	Tenge			**94,229.56**				
		Irregular and unforeseen costs -	Tenge			**325,384.98**				
	TOTAL, The cost of general construction works -		Tenge			**5,748,467.90**				
		Standard labor intensity -	person-h							**1,177.51**
		Estimated salary -	Tenge			**784,556.04**				
		TOTAL SECTION 5	Tenge			**5,748,467.90**				
		Standard labor intensity -	person-h							**1,177.51**
		Estimated salary -	Tenge			**784,556.04**				

SECTION 6. Roof Roof

nineteen	**E11-120101-0701**	**Roofing made of corrugated asbestos-cement sheets, ordinary profile on a wooden lathing with its device**	**864.00**	**749.54**	**47.91**	**647,602.56**	**41,394.24**	**208,068.65**	**0.42**	**362.88**
		m2		**252.80**	**8.96**	**218,419.20**	**7,742.37**	**92.00**	**0.02**	**17.28**
twenty	**E11-120101-0102**	**Installation of pitched roofs from three layers of roofing roll materials on bitumen mastic with a protective layer of gravel on bitumen mastic**	**144.00**	**464.44**	**41.39**	**66,879.36**	**5,960.05**	**29,696.79**	**0.23**	**33.12**
		m2		**216.93**	**7.23**	**31,237.92**	**1,041.20**	**92.00**	**0.01**	**1.44**
		TOTAL SECTION 6 DIRECT COSTS	**Tenge**			**714,481.92**	**47.354.29**			**396.00**
			Tenge			**249,657.12**	**8,783.57**			**18.72**
	The cost of general construction works -		Tenge			**714,481.92**				
	Materials -		Tenge							
	Total salary -		Tenge			**258,440.69**				
		Overhead costs -	Tenge					**237,765.43**		
		Normative labor intensity in N.R. -	person-h							**20.74**
		Estimated wages in N.R. -	Tenge			**35,664.82**				
		Irregular and unforeseen costs -	Tenge			**57,134.84**				
	TOTAL, The cost of general construction works -		Tenge			**1,009,382.19**				
		Standard labor intensity -	person-h							**414.72**
		Estimated salary -	Tenge			**294,105.50**				
		TOTAL SECTION 6	Tenge			**1,009,382.19**				
		Standard labor intensity -	person-h							**414.72**
		Estimated salary -	Tenge			**294,105.50**				
		TOTAL DIRECT COSTS BY ESTIMATE:	**Tenge**			**87,104,089.50**	**29,016,242.05**			**78,544.79**
			Tenge			**18,930,234.09**	**2,302,141.53**			**14,481.12**
	The cost of general construction works -		Tenge			**82,023,147.62**				
	Materials -		Tenge			**5,080,941.88**				
	Total salary -		Tenge			**24,906,839.95**				
		Overhead costs -	Tenge					**23,016,730.42**		
		Normative labor intensity in N.R. -	person-h							**4,651.30**
		Estimated wages in N.R. -	Tenge			**3,452,509.56**				
		Irregular and unforeseen costs -	Tenge			**6,607,249.20**				
	TOTAL, The cost of general construction works -		Tenge			**116,728,069.12**				
		Standard labor intensity -	person-h							**93,025.91**
		Estimated salary -	Tenge			**28,359,349.51**				
		TOTAL BY AN ESTIMATE:	Tenge			**116,728,069.12**				

	Standard labor intensity -	person-h							**93,025.91**
	Estimated salary -	Tenge			**28,359,349.51**				
	Recalculation of totals into prices as of 04/26/2021								
	Total direct costs				**87,104,089.50**				
	Overheads				**23,016,730.42**				
	Irregular and unforeseen costs				**6,607,249.20**				
	TOTAL in prices as of 01.01.2001				**116,728,069.12**				
	Total with the cost of seniority				**117,895,349.81**				
	Total with the cost of additional leave				**118,362,262.08**				
	Total in current prices as of 03.24.				**404,798,936.32**				
	Total with taxes, fees and obligations. payments				**412,894,915.05**				
	Value Added Tax (VAT)	**12%**			**49,547,389.81**				
	Total with value added tax (VAT)				**462,442,304.86**				

Made up

Continuation of Application C

Object estimate

Shopping and entertainment center with a cinema in Kokshetau		
Estimated cost	116728.069	thousand tenge
Standard labor intensity	93025	thousand people hour
Estimated salary	28359.34	thousand tenge

Compiled in 2001

P / p No.	No. of estimates and calculations	Name of works and costs	Estimated cost, thousand tenge				Normative labor intensity, thousand people hour	Estimated salary, thousand tenge	Indicators of a unit cost, thousand tenge
			construction and installation works	equipment, furniture and inventory	other costs	Total			
one	2	3	four	five	6	7	eight	nine	10
	one	Installation work	116728.069			116728.069	93025	28359.34	
		Total	1098.193			116728.069	93025	28359.34	

Continuation of Application C

RESOURCE ESTIMATE

on the video surveillance system

Object name - Shopping and entertainment center with a cinema in Kokshetau

Compiled in 2001 Tenge

P / p No.	ABC resource code and attribute	Resource cipher	Name of resources, equipment, structures, products and parts	unit of measurement	Number of units	Estimated unit price	Sale price per unit	Transport costs per unit	Cost (Total)
						justification	justification	Total	
one	2	3	four	five	6	7	eight	nine	10
			LABOR RESOURCES						
one	one		Labor costs of construction workers	man-h	362.88	249657.12	-	-	249657.12
						-	-	-	
2	3		Labor costs of machinists	man-h	17.28	714481.92	-	-	12346247.5776
						-	-	-	
			TOTAL	**Tenge**				-	**249657.12**
			CONSTRUCTION MACHINES AND MECHANISMS						
						OPERATION OF MACHINES		**Salary of the Engineers**	
3			Construction machines and mechanisms	machine-h		47354.29	-	8783	
						-	-		56137.29
			TOTAL	**Tenge**					
			BUILDING MATERIALS AND CONSTRUCTIONS						
four	6300 M	S143001-1	Concrete	m3	0.3	-	-	-	-
						-	-	-	
five		SPRICE	Video recorder NVR MS-N8032 Hikvision	PC	one	63564	-	-	63564
						-	-	-	
6		SPRICE	Camera stand AVL 350	PC	five	8429.18	-	-	42145.9
						-	-	-	
7		SPRICE	PVC pipe d 16 mm	m	90	17.34	-	-	1560.6
						-	-	-	
eight		SPRICE	Corrugated PVC pipe d 16 mm	m	900	41.56	-	-	37404
							-	-	
nine		SPRICE	UTP cable, 100 Ohm, cat6, PVC UTP 2x4x0.53	m	600	41.56	-	-	24936
						-	-	-	
10		SPRICE	Nagel-dowel 60x40	PC	1620	1.49	-	-	2413.8
						-	-	-	
eleven		SPRICE	Cable duct 60x40 RUVINYL	m	twenty	103.15	-	-	2063
							-	-	
12		SPRICE	Cable duct 20x16 RUVINYL	m	560	50.23	-	-	28128.8
						-	-	-	
13		SPRICE	Rj-45 connector	PC	36	4.48	-	-	161.28
						-	-	-	
fourteen		SPRICE	Patch cord UTP 5e category, (0,5m) RJ45-	PC	2	50.53	-	-	101.06

			RJ-45 IT Telecom						
						-	-	-	
fifteen		SPRICE	Power cable VVG 3x1.5	m	twenty	47.24	-	-	944.8
						-	-	-	
sixteen		SPRICE	Power cable ШВВП 2x0.75	m	80	52.62	-	-	4209.6
						-	-	-	
17		SPRICE	DGS-1510-28P / A1A D-Link switch	PC	one	37034.64	-	-	37034.64
						-	-	-	
eighteen		SPRICE	Hard drive, 6000 Gb HDWE160EZSTA Toshiba	PC	one	20830.27	-	-	20830.27
						-	-	-	
nineteen		SPRICE	Power supply panel (8 sockets-220V)	PC	one	2538.38	-	-	2538.38
						-	-	-	
twenty		SPRICE	Fan module 19 "	PC	one	2882.21	-	-	2882.21
						-	-	-	
21		SPRICE	ITK Network cabinet 19 "N 6U 600x800 mm glass front door black	PC	one	10817.27	-	-	10817.27
						-	-	-	
22		SPRICE	Uninterruptible Power Supply UPS SVC RTO-1.5K-LCD)	PC	one	14850.57	-	-	14850.57
						-	-	-	
23		SPRICE	Accumulator battery 7A / h	PC	eleven	932.83	-	-	10261.13
						-	-	-	
24		SPRICE	Redundant power supply 12V-3A-17Ah Quant 50	PC	eleven	1835.77	-	-	20193.47
						-	-	-	
25		SPRICE	Outdoor, waterproof (IP-67) video camera day / night DS-2CD2T35FWD-I5 Hikvision	PC	12	13634.3	-	-	163611.6
						-	-	-	
26		SPRICE	Day / Night IP Dome Camera DS-2CD2312-I Hikvision	PC	eleven	11202.96	-	-	123232.56
						-	-	-	
27		SPRICE	Monitor 24 for video surveillance systems 243V5LSB5 / -01	PC	eleven	13451.32	-	-	147964.52
						-	-	-	
			TOTAL	**Tenge**				-	**761849.46**

Made up Kalidollina OASIS

Continuation of Application C

Estimated calculation of the cost of construction in the amount of 19s 7k **473,062.06** thousand tenge

including refundable amounts: 15s7k **658.70** thousand tenge

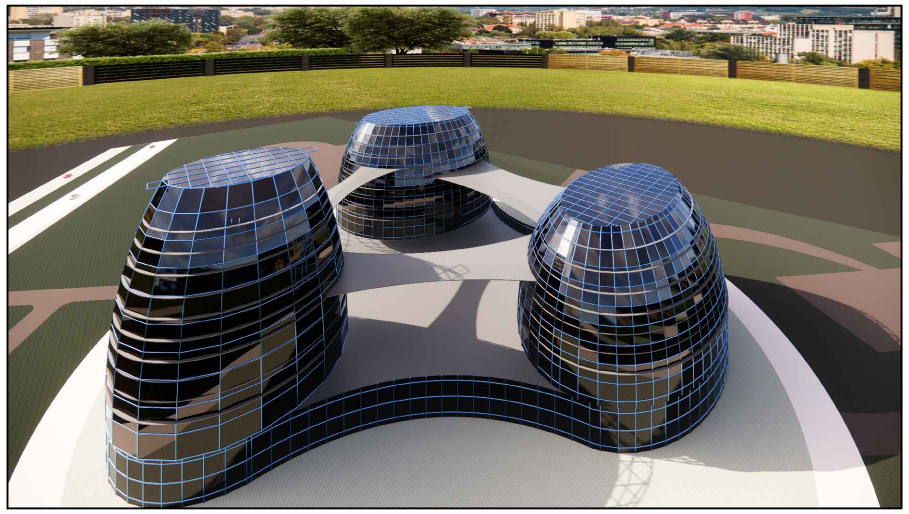
value added tax 18s7k **50,685.22** thousand tenge

ESTIMATE CALCULATION OF THE COST OF CONSTRUCTION

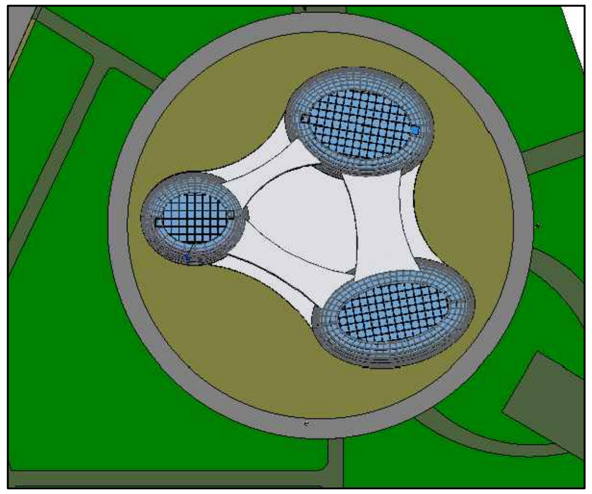
Compiled in 2001

P / p No.	No. of estimates and calculations	Name of chapters, objects, works and costs	Estimated cost, thousand tenge			Total, thousand tenge
			construction and installation works	equipment, furniture and inventory	other costs	
one	2	3	four	five	6	7
one	one	Civil works	116,728.07	-	-	116,728.07
2		**Total = 1 line**	116,728.07	-	-	**116,728.07**
3		Temporary buildings and structures 1.1% * 2 line 7 column	1,284.01	-	-	1,284.01
four		Return of materials from temporary buildings and structures 15% * 3s7k	192.60	-	-	192.60
five		**Total = 3 lines**	1,284.01	-	-	**1,284.01**
6		**Total 2s + 5s**	118,012.08	-	-	**118,012.08**
7		Additional costs during the performance of work in the winter 1.2% * 6s7k	1,416.14	-	-	1,416.14
eight		Seniority costs 1% * 6s7k			1,180.12	1,180.12
nine		Costs for additional vacations 0.4% * 6s7k			472.05	472.05
10		**Total 7s + 8s + 9s**	**1,416.14**		**1,652.17**	**3,068.31**
eleven		**Total 6s + 10s**	119,428.22		1,652.17	121,080.39
12		Including refundable amounts = 4s	192.60		-	192.60
13		**Total according to the estimated calculation in base prices 2001 = 11s**	119,428.22		1,652.17	121,080.39
fourteen		Total estimated at current prices in 2020. 13s * 3.42	408,444.52		5,650.42	414,094.94
fifteen		Including refundable amounts in current prices 12s7k * 3.42	658.70			658.70
sixteen		Taxes, fees, mandatory payments, 2% * 14s7k			8,281.90	8,281.90
17		Estimated cost at the current price level 14s + 16s	408,444.52		13,932.32	422,376.84
eighteen		VAT (12%) * 17s7k			50,685.22	50,685.22
nineteen		Construction cost 17s + 18s	408,444.52		64,617.54	473,062.06

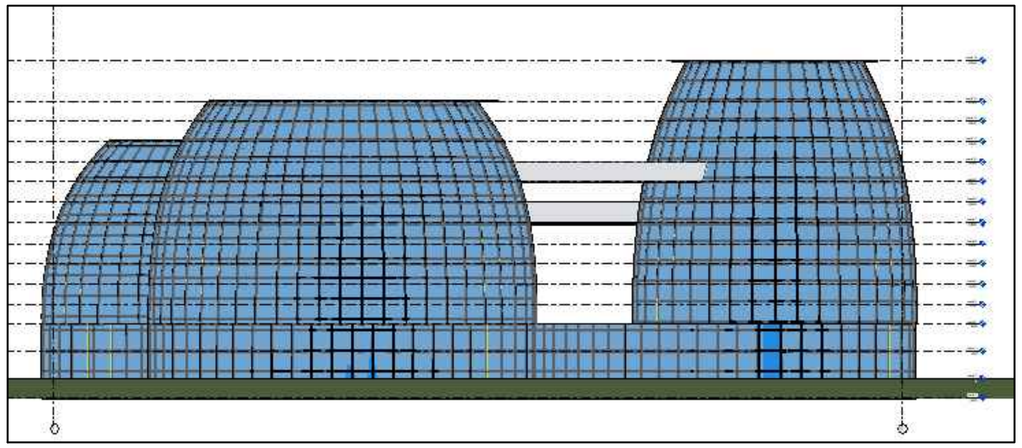
3d view



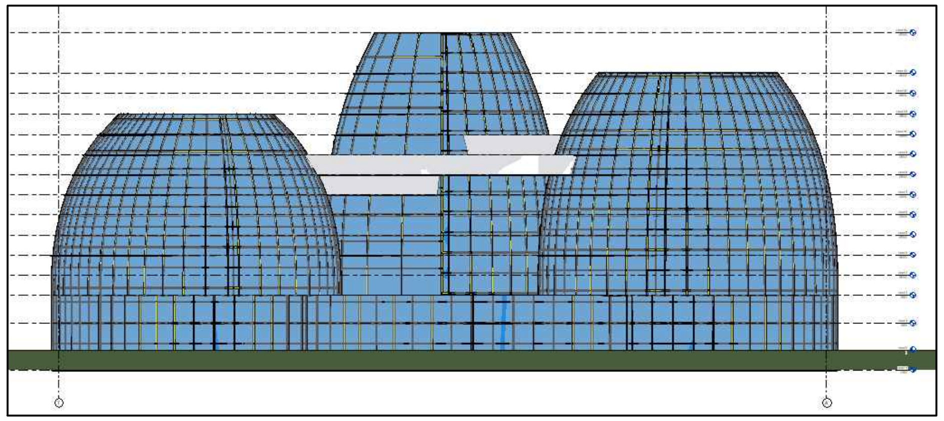
site plan



facade 1-1

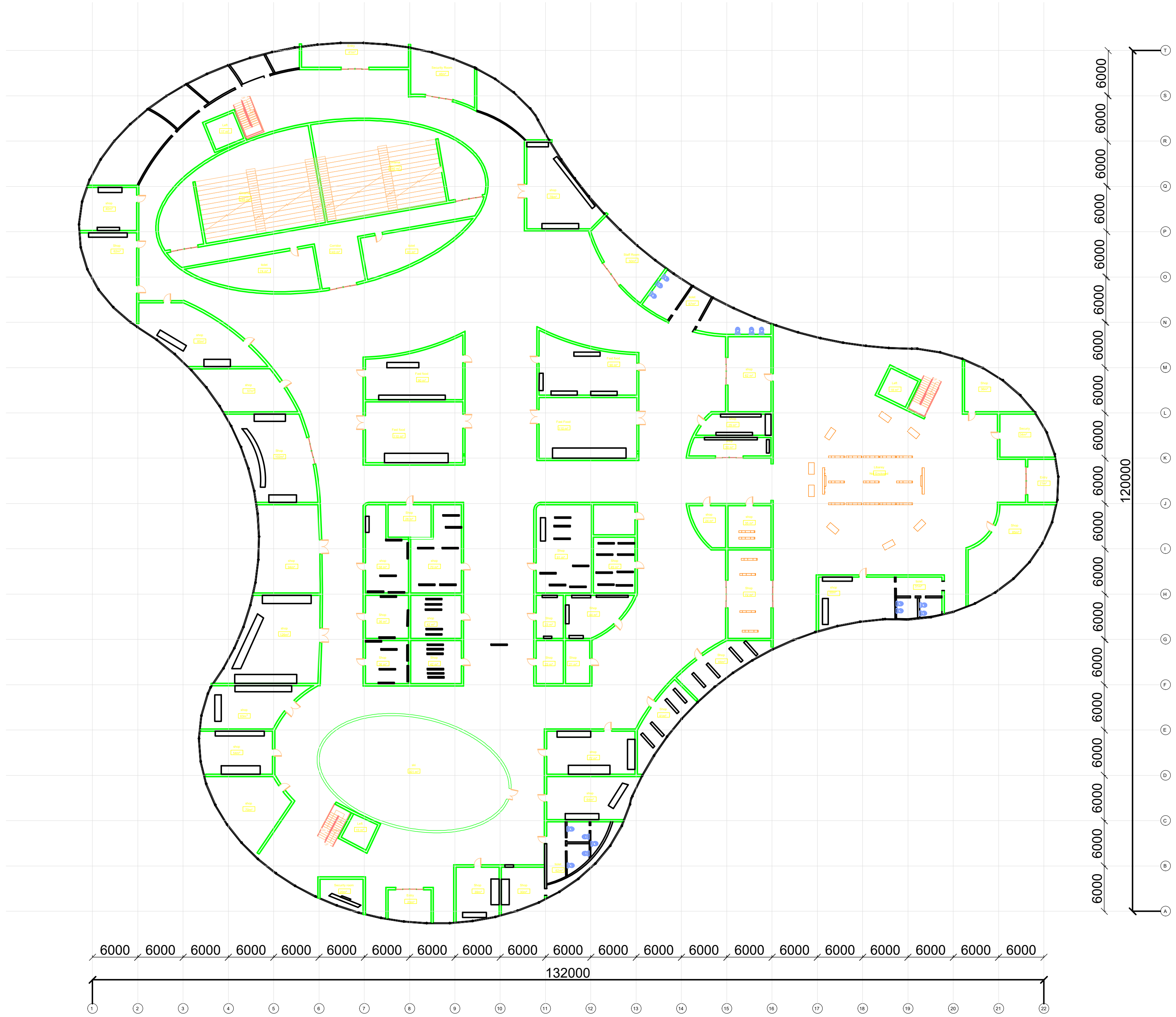


facade 2-2



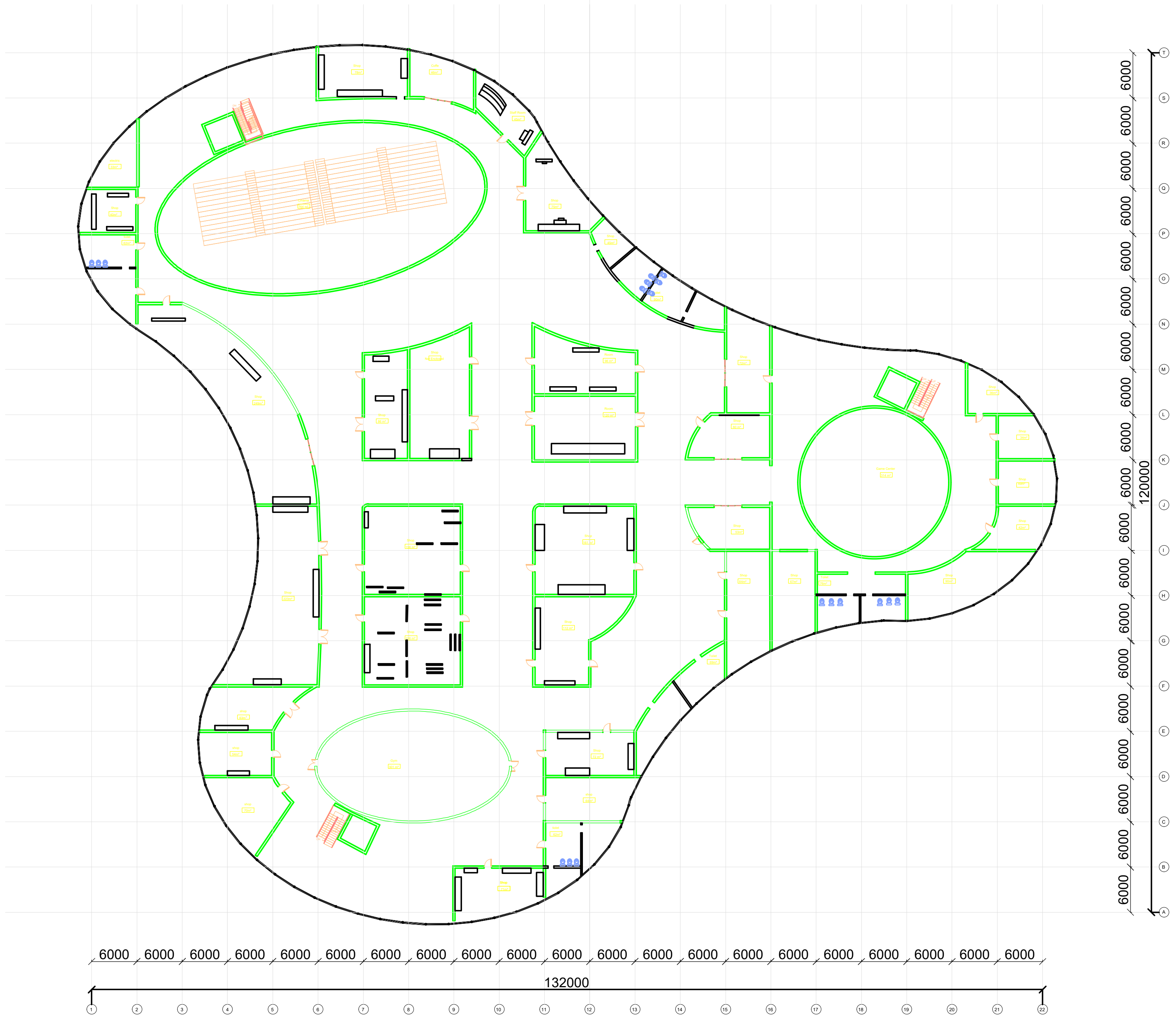
					KazNITU-5B072900-Civil Engeneering-Stb-24.03.2021-DP			
					Architectural part of shopping center with cinema			
Chan	Num.par.List	№doc	Sign	Date				
Head of Dep		Kozyukova .N.V			Architecture design part	stage	list	scale
Consultant		Kozyukova .N.V				DP	1	1/100
Supervisor		Turganbayev A.P						
Controller		Bek A.A			Facade 3D View	Construction and building materials departmen		
Created		Habibi S.H						

First floor Plan



					KazNITU-5B072900-Civil Engeneering-Stb-24.03.2021-DP
					Architectural part of shopping center with cinema
Chan	Num.par.List	№doc	Sign	Date	
Head of Dep		Kozyukova .N.V			Architecture design part
Consultant		Kozyukova .N.V			stage: DP; sheett: 3; scale: 1/100
Supervisor		Turganbayev A.P			
Controller		Bek.A.A			floor scheme
Created		Habibi S.H			Construction and building materials departmen

Second floor plan



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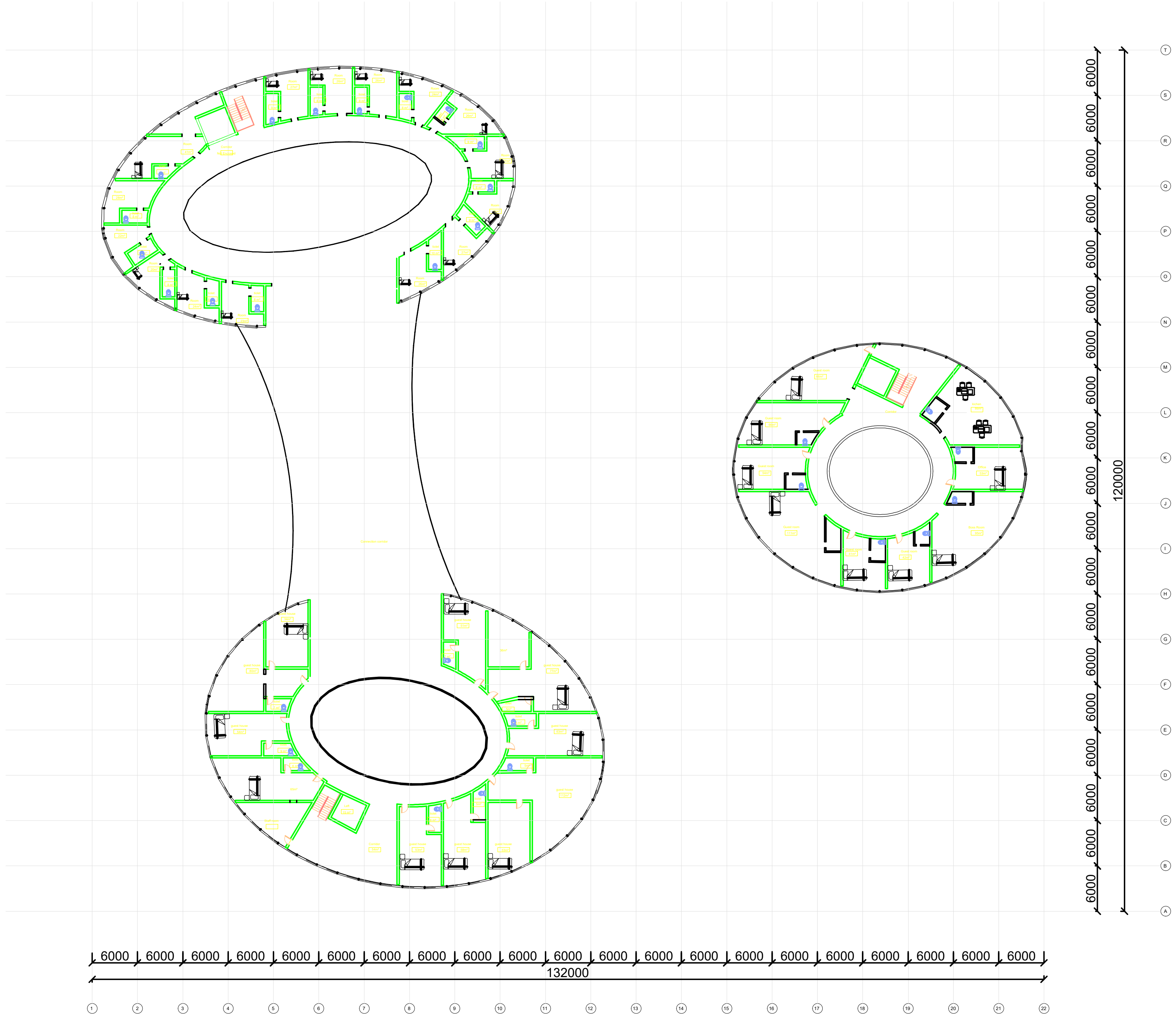
Chan	Num.par.List	№doc	Sign	Date	*Architectural part of shopping center with cinema*			
Head of Dep		Kozyukova .N.V			Architecture design part	stage	sheet	scale
Consultant		Kozyukova .N.V				DP	4	1/100
Supervisor		Turganbayev A.P						
Controller		Bek.A.A			floor scheme	Construction and building materials departmen		
Created		Habibi S.H						

8 Floor plan



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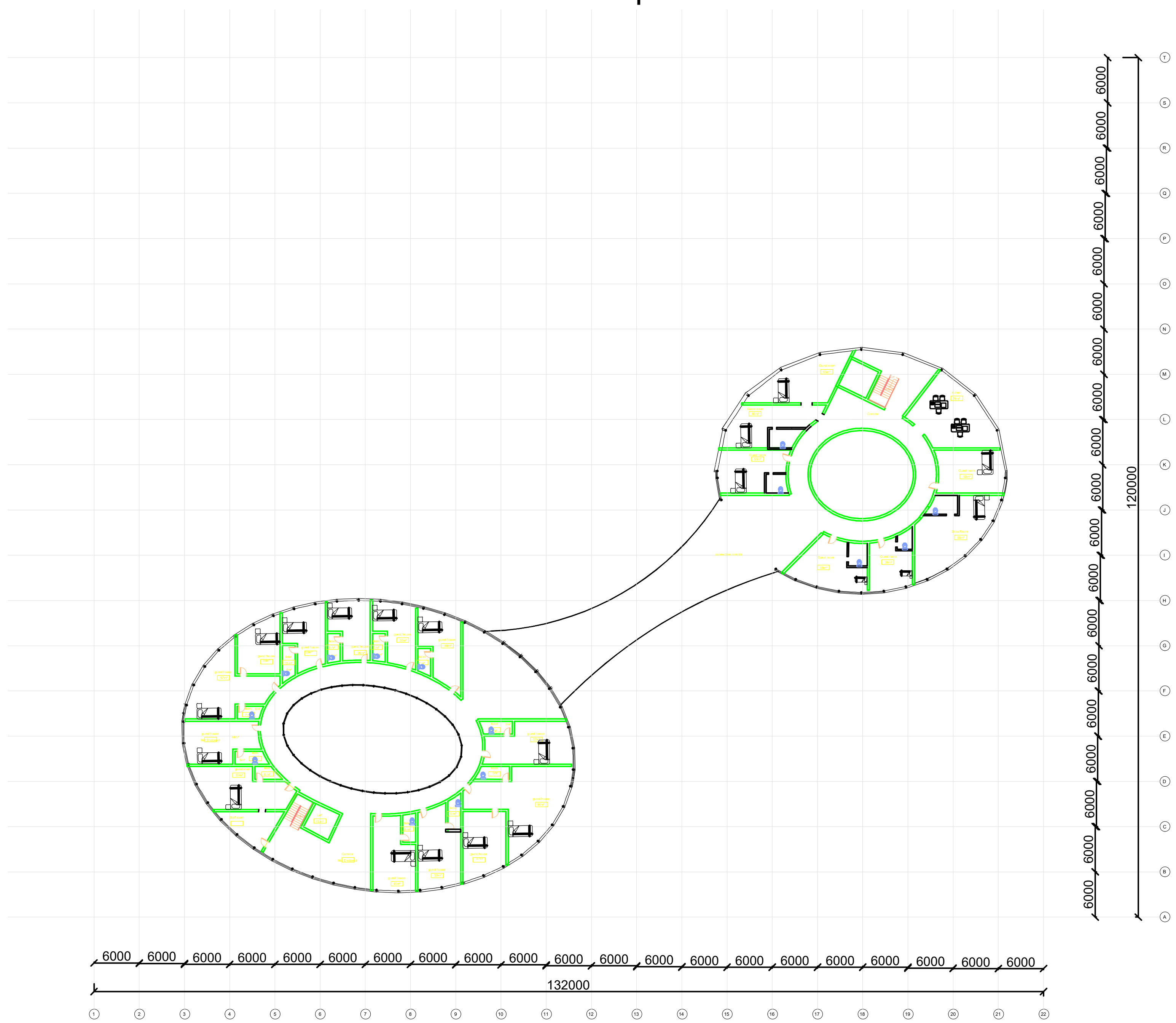
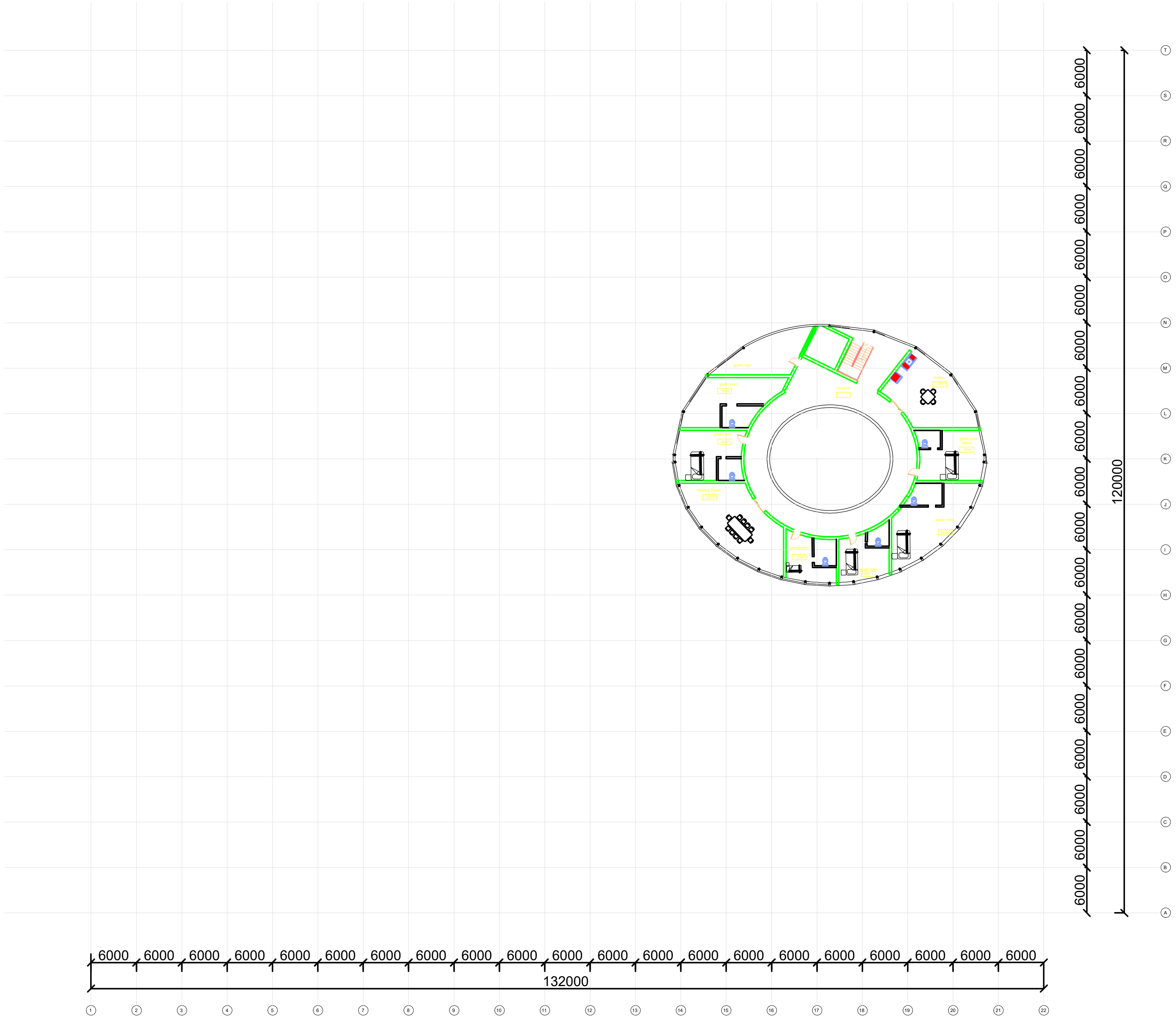
					Architectural part of shopping center with cinema			
Chan	Num.par.List	№doc	Sign	Date				
Head of Dep		Kozyukova .N.V			Architecture design part	stage	sheet	scale
Consultant		Kozyukova .N.V				DP	5	1/100
Supervisor		Turganbayev A.P						
Controller		Bek.A.A			floor scheme	Construction and building materials departmen		
Created		Habibi S.H						

10 Floor plan



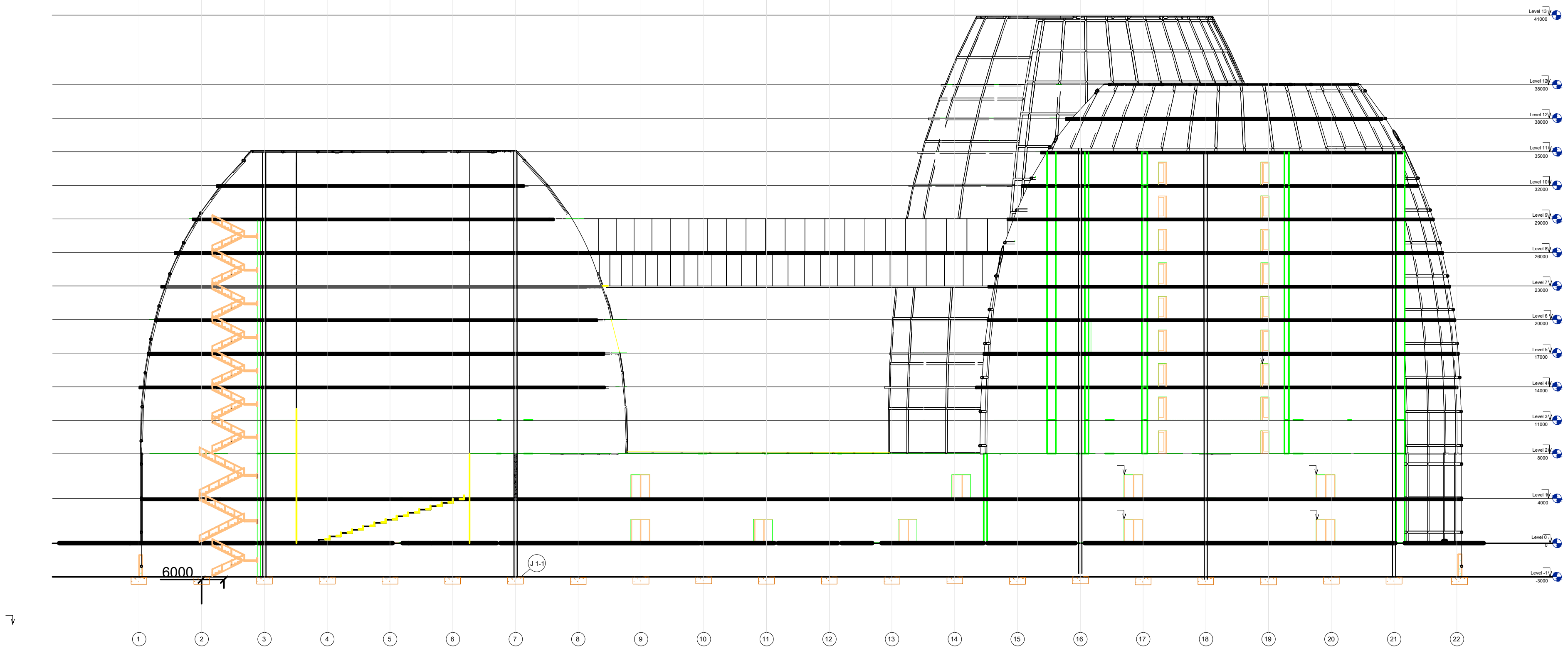
					KazNITU-5B072900-Civil Engeneering-Stb-24.03.2021-DP
Chan	Num.par.List	№doc	Sign	Date	*Architectural part of shopping center with cinema*
Head of Dep		Kozyukova .N.V			Architecture design part
Consultant		Kozyukova .N.V			stage: DP; sheet: 6; scale: 1/100
Supervisor		Turganbayev A.P			
Controller		Bek.A.A			floor scheme
Created		Habibi S.H			Construction and building materials departmen

12 floor plan

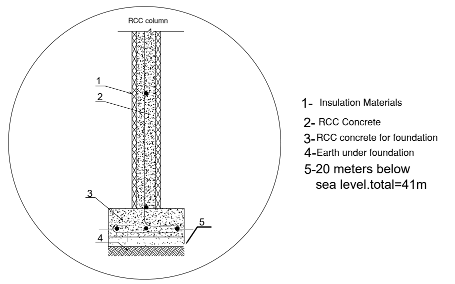


					KazNITU-5B072900-Civil Engeneering-Stb-24.03.2021-DP			
Chan	Num.par.List	№doc	Sign	Date	*Architectural part of shopping center with cinema*			
Head of Dep		Kozyukova .N.V			Architecture design part	stage	sheet	scale
Consultant		Kozyukova .N.V				DP	9	1/100
Supervisor		Turganbayev A.P						
Controller		Bek.A.A			floor scheme	Construction and building materials departmen		
Created		Habibi S.H						

section 1-1

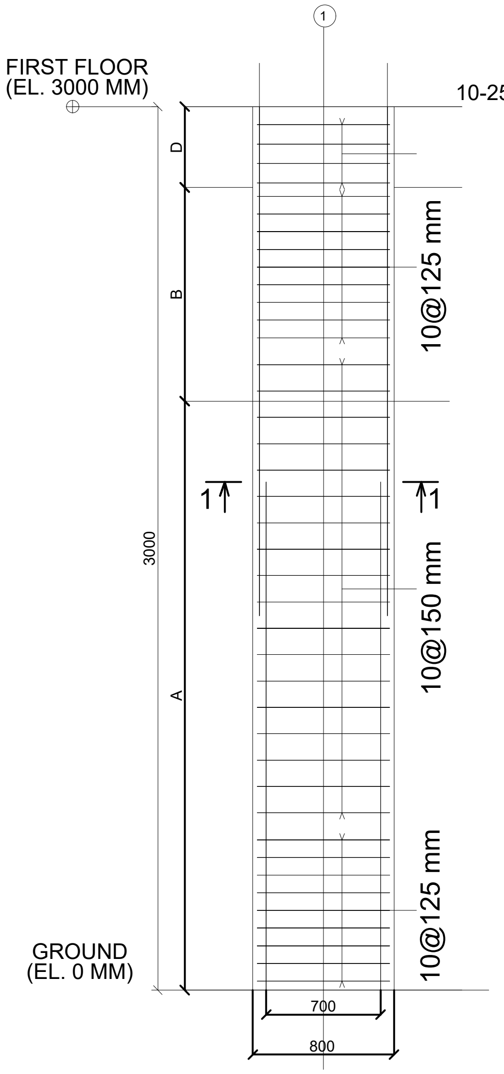


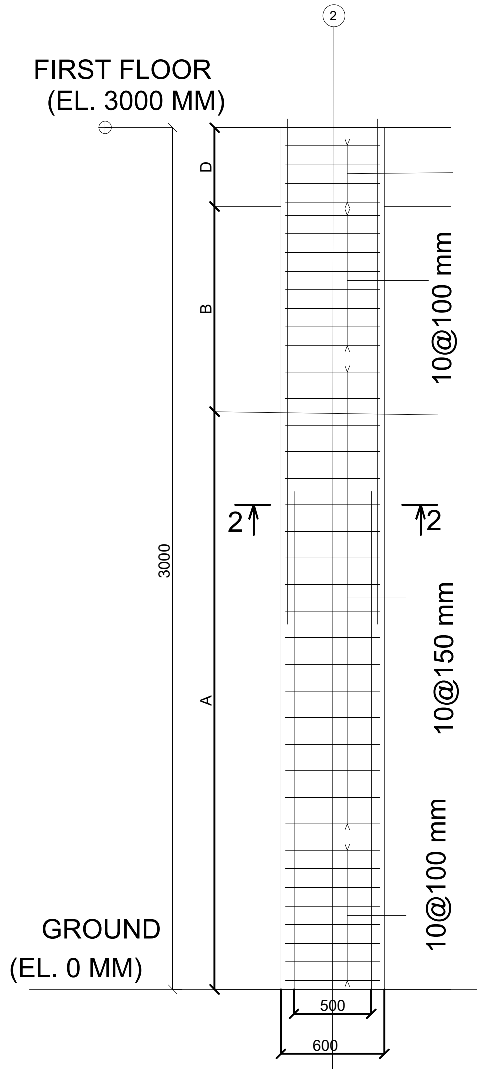
Junction 1-1 column&foundation



					KazNITU-5B072900-Civil Engeneering-Stb-24.03.2021-DP			
					Architectural part of shopping center with cinema			
Chan	Num.par.List	№doc	Sign	Date				
Head of Dep		Kozyukova .N.V			Architecture design part	stage	sheet	scale
Consultant		Kozyukova .N.V				DP	10	1/100
Supervisor		Turganbayev A.P						
Controller		Bek.A.A			Section scheme	Construction and building materials departmen		
Created		Habibi S.H						

CC62:Elevation-1





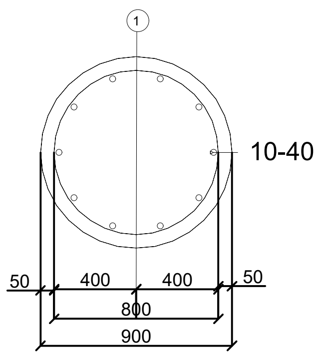
Rebar Quantitives

SR. NO.	BAR SIZE	LENGTH (M)	WEIGHT (KG)
1	10	657.5	405
2	32	312.0	1989

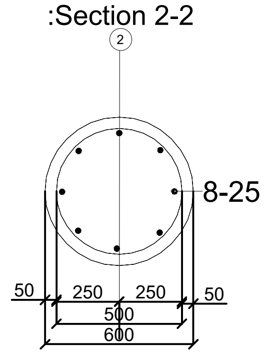
Specification of Reinforcement From manual Calculation

Mark	NO	Standards	Diameter, class reinforcement	length mm	Number	Mass 1 Kg.	Mass Total,Kg
C62-1	1	EN 10134-3	10Ø40 S800	3000	10	14.13	141.3
	2	EN 10134-3	10Ø40 S800	3000	10	14.13	141.3
	3	EN 10134-3	Ø10Bp-I	150	33	0,1	3.3
C59-2	4	EN 10134-4	8Ø25 S400	3000	8	5.49	43.93
	5	EN 10134-4	8Ø25 S400	3000	8	5.49	43.93
	6	EN 10134-4	Ø10Bp-I	150	33	0.1	3.3

Section 1-1



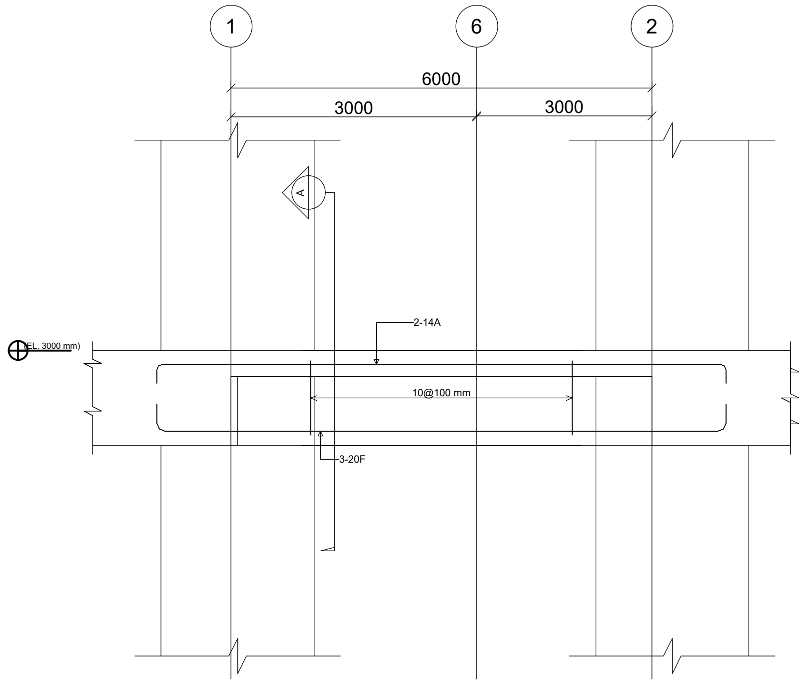
:Section 2-2



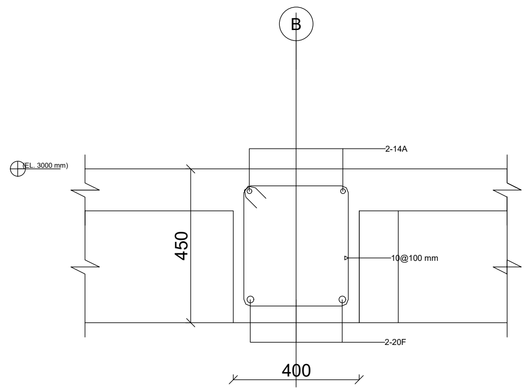
CONCRETE COLUMNS
CONCRETE STRENGTH = 27.58 N/MM2
REINFORCEMENT STRENGTH, LONGITUDINAL = 344.74 N/MM2
REINFORCEMENT STRENGTH, TRANSVERSE = 275.79 N/MM2
CLEAR COVER = 40 MM
CLEAR COVER = 50 MM

Chan	Num.par.List	Nºdoc	Sign	Date	*KazNITU-5B072900-Civil Engeneering-Stb-24.03.2021-DP*
					Architectural part of shopping center with cinema
Head of Dep		Kozyukova .N.V			*Architecture design part* — stage: DP; Sheete: 1; scale: 1/100
Consultant		Kozyukova .N.V			
Supervisor		Turganbayev A.P			
Controller		Bek.A.A			*Column scheme* — *Construction and building materials departmen*
Created		Habibi S.H			

CB1 Elevation



CB1 Section



Specification of Reinforcement From manual Calculation

Mark	NO	Standards	Diameter, class reinforcement	length mm	Number	Mass 1 Kg.	Mass Total,Kg
CB1	1	EN 10134-3	10Ø40 S800	3000	10	14.13	141.3
	2	EN 10134-3	10Ø40 S800	3000	10	14.13	141.3
	3	EN 10134-3	Ø10Bp-I	150	33	0,1	3.3
C59-2	4	EN 10134-4	8Ø25 S400	3000	8	5.49	43.93
	5	EN 10134-4	8Ø25 S400	3000	8	5.49	43.93
	6	EN 10134-4	Ø10Bp-I	150	33	0.1	3.3

REBAR QUANTITIES: 1CB1

SR. NO.	BAR SIZE	LENGTH (M)	WEIGHT (KG)
1	10	22.6	14
2	14	7.0	8
3	20	10.7	26

NOTES:
1. SEE BEAM SCHEDULE FOR STIRRUP TYPE AND SPACING.
2. ZONE A LENGTH SHALL BE TWICE THE BEAM DEPTH, d.
3. THE FIRST STIRRUP IN ZONE A SHALL BE LOCATED 50mm MAXIMUM FROM THE FACE OF THE SUPPORT.
4. LAP SPLICES SHALL NOT BE LOCATED WITHIN THE BEAM/COLUMN JOINT, NOR WITHIN A DISTANCE OF 2H.
5. LAP SPLICE LENGTH SHALL NOT BE LESS THAN 300mm.

Chan	Num.par.List	№doc	Sign	Date
Head of Dep	Kozyukova .N.V			
Consultant	Kozyukova .N.V			
Supervisor	Turganbayev A.P			
Controller	Bek.A.A			
Created	Habibi S.H			

KazNITU-5B072900-Civil Engeneering-Stb-24.03.2021-DP

Architectural part of shopping center with cinema

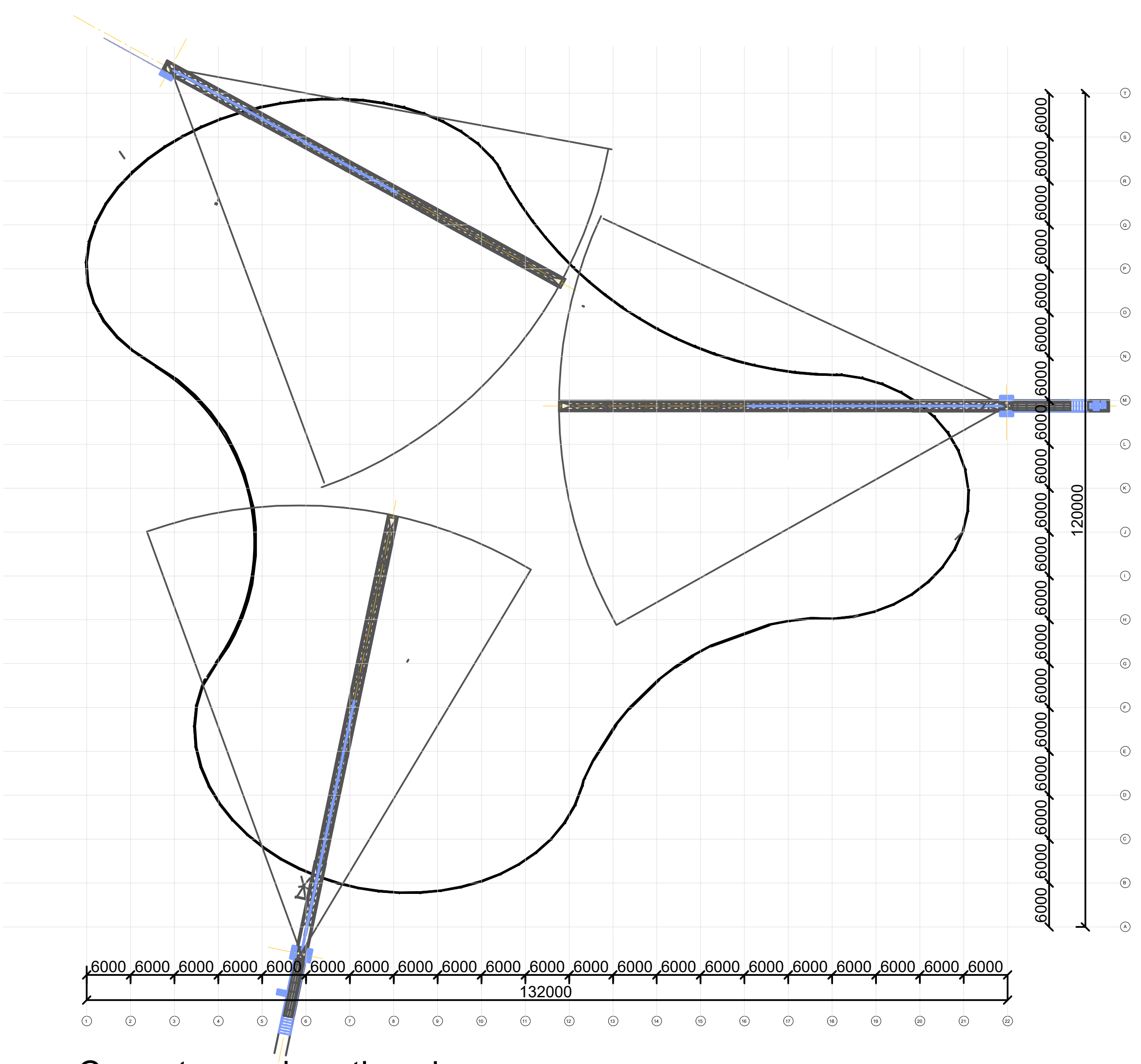
Architecture design part

stage	list	scale
DP	1	1/100

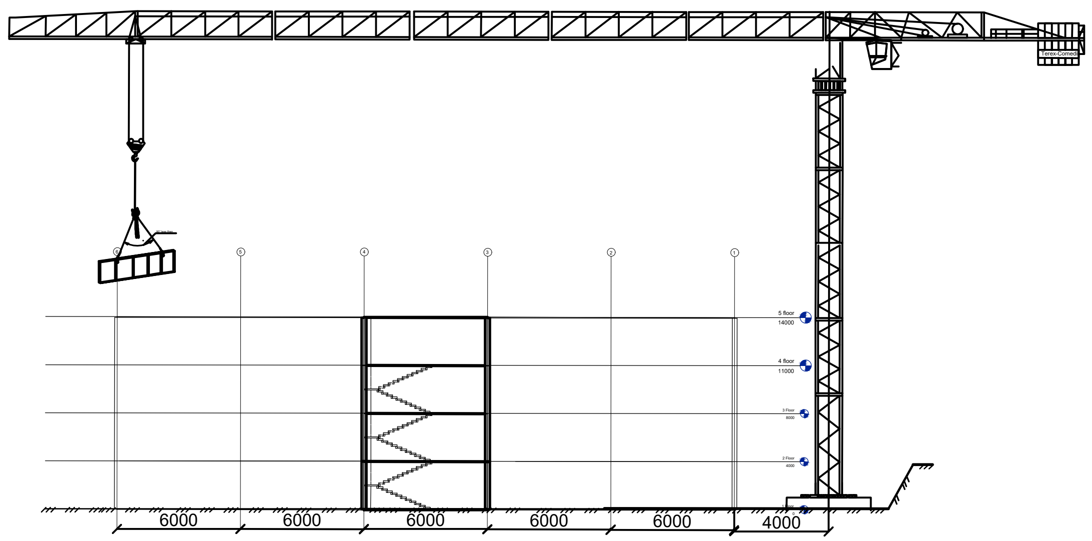
Beam Schemes

Construction and building materials departmen

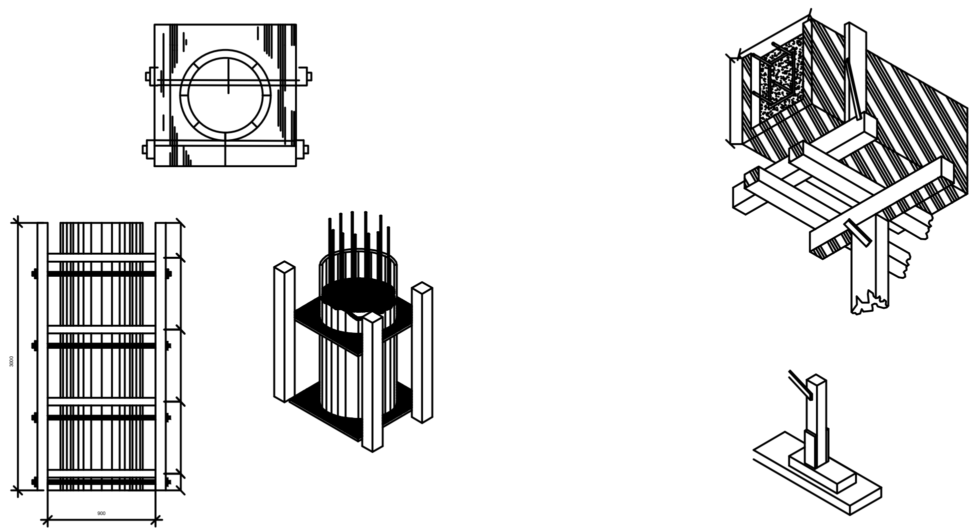
Installation of formwork



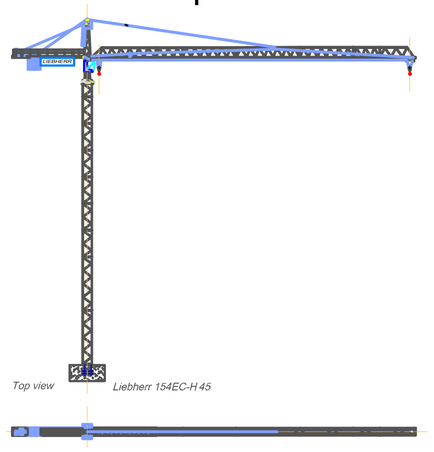
Section view 2



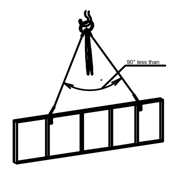
formwork 3d and section view



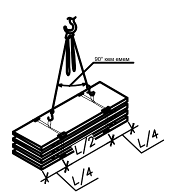
Crane top and section view



Hinging scheme of prefabricated molds



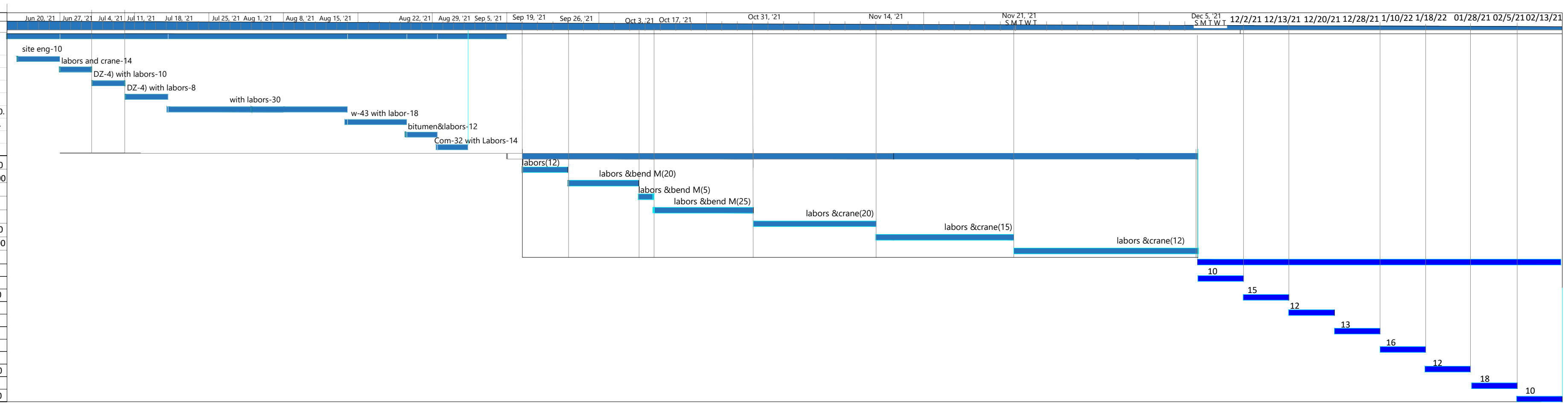
Scheme of looping the package



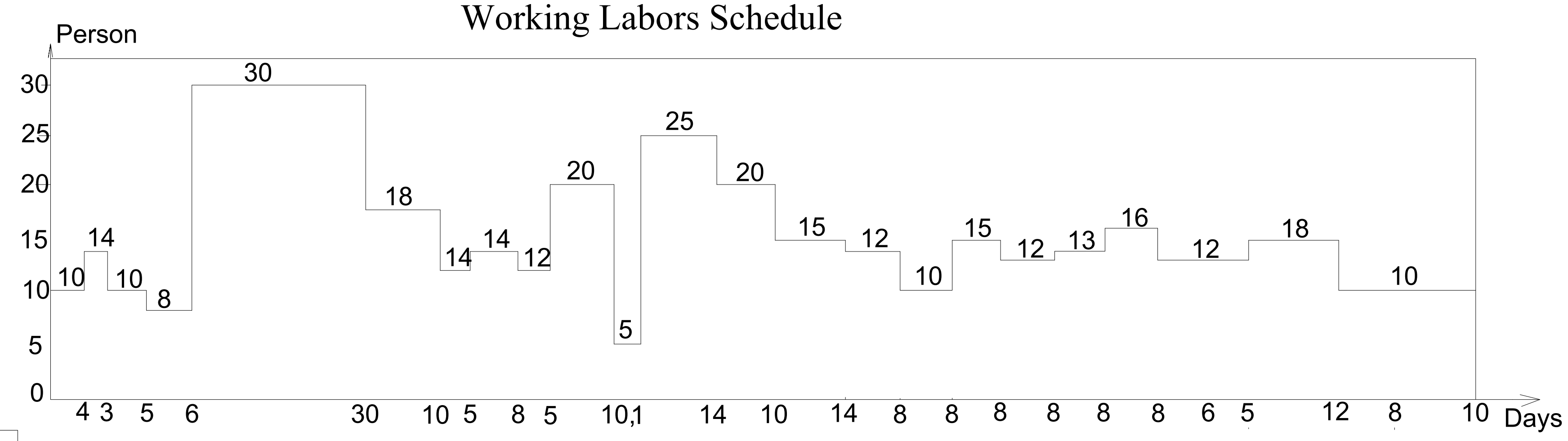
					KazNITU-5B072900-Civil Engeneering-Stb-24.03.2021-DP			
					Architectural part of shopping center with cinema			
Chan	Num.par.List	№doc	Sign	Date				
Head of Dep		Kozyukova .N.V			Architecture design part	stage	list	scale
Consultant		Kozyukova .N.V				DP	11	1/100
Supervisor		Turganbayev A.P						
Controller		Bek.A.A			floor scheme	Construction and building materials departmen		
Created		Habibi S.H						

Gaunt Chart of the Project

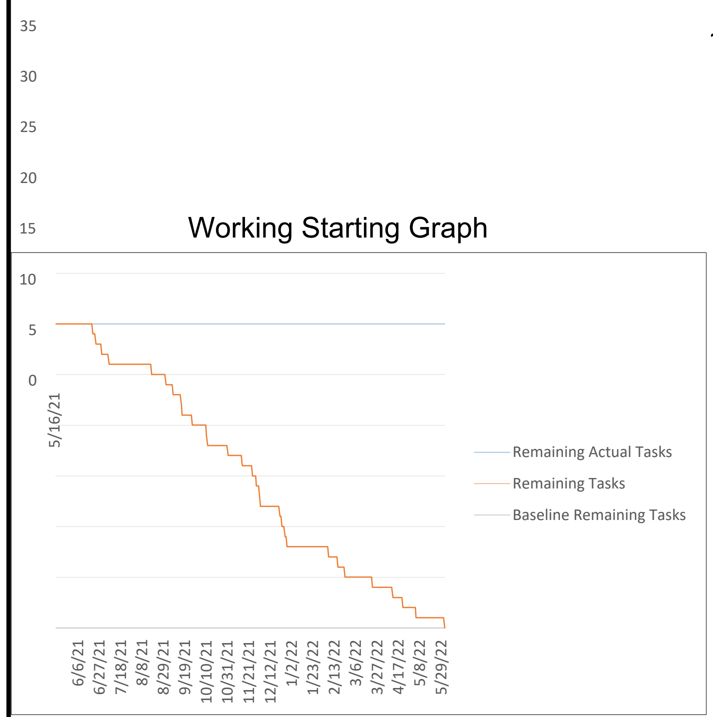
ID Task	Task Name	Duration	Start	Finish	Resource Names	volume of work	Cost
1	construction of shopping mall in Kokshetau kz	69 days	Tue 6/15/21	Fri 9/17/21	OASIS construction		$12170
2	Preparation of the site	4 days	Wed 6/16/21	Mon 6/21/21	site eng	344	$350
3	fencing of the site	3 days	Tue 6/22/21	Thu 6/24/21	labors and crane	344	$250
4	leveling of the area	5 days	Thu 6/24/21	Wed 6/30/21	DZ-4) with labors	344m2	$370
5	removing of top soil	6 days	Wed 6/30/21	Wed 7/7/21	DZ-4) with labors	s=9765	$400
6	Excavation of the pit	30 days	Thu 7/8/21	Wed 8/18/21	E-507with labors	Vp=38507	$8,000.
7	Removing of water	10 days	Thu 8/19/21	Wed 9/1/21	w-43 with labor	22323,65M3	$1,200.
8	watre profing	5 days	Thu 9/2/21	Wed 9/8/21	bitumen&labors	1449m2	$700
9	Soil compaction	8 days	Thu 9/9/21	Thu 9/16/21	Com-32 with labors	4647m2	$900
n	RCC work	50 days	M 9/20/21	Fri 11/26/21	OASIS		$35150
10	preparation for rcc	5 days	Tu9/21/21	Mon 9/27/21	labors	4320m2	$500.00
11	single net	10 days	Tue 9/28/21	M10/11/21	labors &bend M	14400	$4000
12	chair in net	1 day	M10/11/21	M10/11/21	labors &bend M	2215	$1400
13	2nd Net	14 days	T10/12/21	Fri 10/29/21	labors &bend M	14400	$4000
14	shear wall	10 days	Sat10/30/21	Thu11/11/21	labors &crane	86m2	$11000
15	columns	14 days	Fri 11/12/21	Wed 12/1/21	labors &crane	1180m2	$14000
16	slab single net	8 days	Thu 12/2/21	M12/13/21	labors &crane	4320m2	$2500
17	concreting	8 days	Thu 12/2/21	M12/13/21	labors	4320m2	$2500
18	Removing of form	8 days	Th12/13/21	M12/20/21	labors &crane	4320m2	$2500
19	For all premises	58 days	Th12/20/21	M02/23/21	labors &crane	4320m2	$35150
20	Tiles flooring	8 days	Th12/20/21	M01/28/21	labors	4320m2	$4000
21	Tiles of walls	8 days	Th12/28/21	M01/10/22	labors	4320m2	$2500
22	Decoration	8 days	Th 1/10/21	M1/18/22	labors	4320m2	$900
23	plumbing	6 days	Th 1/18/21	M1/28/22	labors	4320m2	$900
24	Electricity	5 days	Thu 01/28/21	M02/5/22	labors	4320m2	$4000
25	Decoration of Ceiling	12 days	Thu 02/5/21	M02/13/22	labors	4320m2	$11000
26	Final land	8 days	Th02/13/21	M02/29/22	labors &crane	4320m2	$2500
27	Construction OUTSID	10 days	Th02/29/22	M03/13/22	labors &crane	9000M2	$14000



Working Labors Schedule

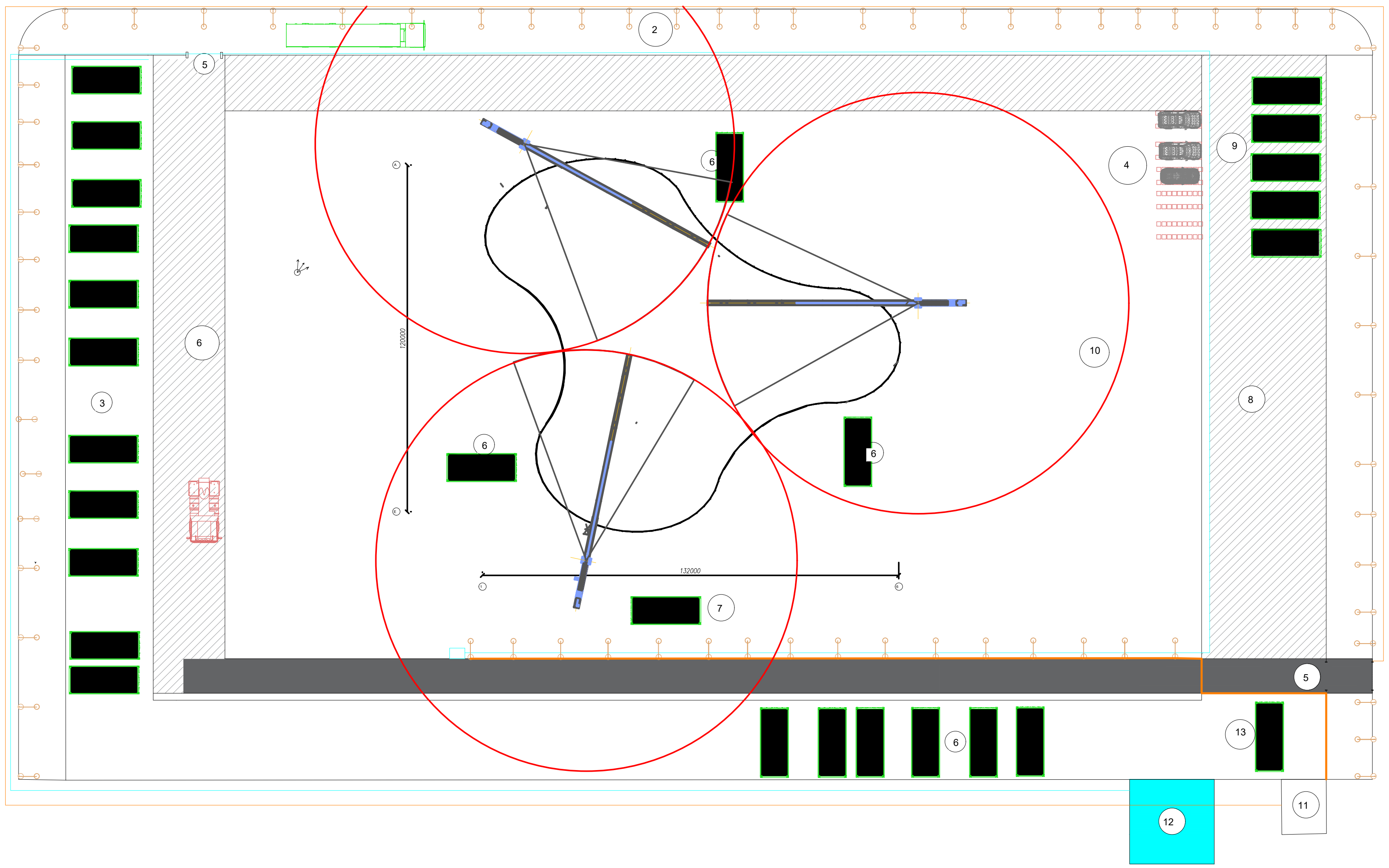


Working Starting Graph



					KazNITU-5B072900-Civil Engineering-08.03.02.2021-DP		
					On the them of 'Library with a recuperative ventilation system in - Atyrau City'.		
Chan	Num.par.List	№doc	Sign	Date			
Head of Dep		Kozyukova .N.V			Organizational and Technological Part	stage: DP	Sheet: 11 / scale: 1/100
Consultant		Kozyukova .N.V					
supervisor		Kozyukova .N.V					
Controller		Bek.A.A			Gaunt Chart	Civil engineering and building materials department	
Created		Habibi S.H	I				

Master General plan of working site



Site premises

NO	Name of construction	Area
1	Main construction	8500m2
2	Temporary Inside road for Transportation	645m2
3	Temporary houses for Labors	55m2
4	Car parking only for 5 Cars	30m2
5	gate of construction	Site parking
6	Temporary house for materials	730m2
7	Tower crane controller room	7m2
8	Area for organizing of a construction materials	300m2
9	Engineering 5 Offices	6m2
10	Parking Area for large cars	1500m2
11	Electricity Room	6m2
12	Water Tang	17m2
13	Security room	12m2

Safety measurement

In the production of reinforced concrete works, it is necessary to strictly comply with the requirements of SNiP 1-85-2001 "Occupational Health and Safety in Construction" and observe certain rules:
The formwork used for the erection of monolithic reinforced concrete structures must be manufactured and applied in accordance with the PPR approved in accordance with the established procedure.
Formwork should be developed after the concrete has reached the specified strength with the permission of the foreman.
The preparation and processing of the reinforcement must be carried out in specially designated places for this purpose.
The given reinforcing mesh is lowered over the place of its laying not lower than by 80 cm and only then the reinforcement workers direct it to the design position.
Walking on reinforcing elements is allowed only on the gangways of a width of 30-40 cm.
When cranes are working, people are not allowed to stay in the zone of operation. Do not carry the load over workers.
It is forbidden to swing a suspended cargo and leave it without supervision, as well as to conduct installation with a wind of more than 6 points.
It is prohibited to operate the boom crane directly under the wires of operating power lines of any voltage.
The descent of workers into the pit or trench is allowed only on the stairs.
If cracks or trenches appear in the slopes of the trench, which threaten the collapse, it is necessary to fix the walls or reduce the steepness of the slope before the work begins.
Welding transformers and lighting fixtures must only be connected to an electrician on duty.
For a temporary power grid on a construction site, an insulated wire should be used and suspended on reliable supports at a height of at least 2.5 m above the workplace, 3 m above the aisles and 5 m above the thoroughfares. At an altitude of at least 2.5 m from the ground, the electrical wires must be enclosed in cords or boxes.
Welding transformer housings and welded products are grounded in accordance with SNiP 1-85-2001 n 6.15.
Welding transformers are only included in the network with the use of closed types.
When working with an open electric arc, electric welders are provided with a helmet-mask or a shield with protective glass filters for protecting the face and eyes, and all those working in the electric welding zone - glasses with protective glasses. The electric welder is obliged to warn the people around him about starting work.
Electric welding work is prohibited in the open air during a thunderstorm and rain. The length of the wires between the supply network and the welding transformer must not exceed 15 m. It is recommended to place the wires in a rubber hose to avoid mechanical damages.
Do not use wires with damaged braids and insulation. Before starting work, check the insulation of welding wires and the electrode holder, as well as the tightness of the connections of all contacts. The electrode holder must have a reliable insulation, ensure a quick replacement of the electrical wire without touching live parts and securely clamp it.
The voltage at the terminals of the welding transformers at the time of ignition of the arc must not exceed 70 V. Switching of the jumpers of the transformer stages is possible only when the tg is switched off.
When preparing a concrete mixture with the use of chemical additives, measures should be taken to prevent skin burns and damage to the eyes of workers.
Installation, dismantling and repair of concrete trucks, as well as removal of delayed concrete from them is allowed only after reducing the pressure to atmospheric.
Workers with electric vibrators are allowed to work only after medical conclusion. Medical re-examination is carried out regularly and on time.
Concrete workers are provided with overalls, including shoes and vibration-proof dielectric gloves.
The vibrator housings are reliably grounded, and the wires feeding the vibrators are enclosed in rubber pins.
When compacting the concrete mix, the electric vibrator must not be moved by current-carrying hoses, and at the end it must be switched off.
After every 30-35 minutes of operation, the vibrators are switched off for 5-7 minutes for cooling.

Chan	Num.par.List	№doc	Sign	Date
Head of Dep		Kozyukova .N.V		
Consultant		Kozyukova .N.V		
Supervisor		Turganbayev A.P		
Controller		Bek.A.A		
Created		Habibi S.H		

KazNITU-5B072900-Civil Engeneering-Stb-24.03.2021-DP

Architectural part of shopping center with cinema

Architecture design part	stage	sheet	scale
	DP	2	1/100

General plan scheme	Construction and building materials departmen

МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ РЕСПУБЛИКИ КАЗАХСТАН
СӘТБАЕВ УНИВЕРСИТЕТІ

RESPONSE

OF THE SUPERVISOR
For the graduation project
Habibi Sayed Hamez
5B072900-Civil Engineering

Topic: “Shopping and entertainment center with a cinema in Kokshetau”

The following tasks were solved in the work: a space-planning decision was made, the thermomechanical calculation of the enclosing structures was performed, the calculation and design of building structures, technological maps, a construction plan were developed, and the cost of construction was also calculated.

The student completed all the tasks. Habibi Sayed Hamez conducted an initial study of the assignment at a good level, competently conducted analysis of data from literary sources, applied many years of experience in designing this type of building, based on various design guidelines in the design and construction and technological sections. According to the calculations, the cost of construction was calculated. The design assignment was completed in full and on time.

In the process, the student showed responsibility, independence and showed good knowledge on completed professional disciplines during the educational process.

The project was carried out at a good level and the work fully meets the requirements for graduation projects of the "bachelor" level, the student is allowed to defend.

Supervisor
Master of technical sciences, Lecturer

___________________ Turganbayev A.P.

«30» may 2021 yr.

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Протокол анализа Отчета подобия Научным руководителем

Заявляю, что я ознакомился(-ась) с Полным отчетом подобия, который был сгенерирован Системой выявления и предотвращения плагиата в отношении работы:

Автор: Хабиби Саид Хамез

Название: Shopping and entertainment center with a cinema in Kokshetau

Координатор:Алтай Турганбаев

Коэффициент подобия 1:28.3

Коэффициент подобия 2:26.9

Замена букв:18

Интервалы:0

Микропробелы:1

Белые знаки: 0

После анализа Отчета подобия констатирую следующее:

- ☐ обнаруженные в работе заимствования являются добросовестными и не обладают признаками плагиата. В связи с чем, признаю работу самостоятельной и допускаю ее к защите;
- ☐ обнаруженные в работе заимствования не обладают признаками плагиата, но их чрезмерное количество вызывает сомнения в отношении ценности работы по существу и отсутствием самостоятельности ее автора. В связи с чем, работа должна быть вновь отредактирована с целью ограничения заимствований;
- ☐ обнаруженные в работе заимствования являются недобросовестными и обладают признаками плагиата, или в ней содержатся преднамеренные искажения текста, указывающие на попытки сокрытия недобросовестных заимствований. В связи с чем, не допускаю работу к защите.

Обоснование:

……

……………………… ……………………………………

Дата *Подпись Научного руководителя*

Протокол анализа Отчета подобия

заведующего кафедрой / начальника структурного подразделения

Заведующий кафедрой / начальник структурного подразделения заявляет, что ознакомился(-ась) с Полным отчетом подобия, который был сгенерирован Системой выявления и предотвращения плагиата в отношении работы:

Автор: Хабиби Саид Хамез

Название: Shopping and entertainment center with a cinema in Kokshetau

Координатор: Алтай Турганбаев

Коэффициент подобия 1:28.3

Коэффициент подобия 2:26.9

Замена букв:18

Интервалы:0

Микропробелы:1

Белые знаки:0

После анализа отчета подобия заведующий кафедрой / начальник структурного подразделения констатирует следующее:

☐ обнаруженные в работе заимствования являются добросовестными и не обладают признаками плагиата. В связи с чем, работа признается самостоятельной и допускается к защите;
☐ обнаруженные в работе заимствования не обладают признаками плагиата, но их чрезмерное количество вызывает сомнения в отношении ценности работы по существу и отсутствием самостоятельности ее автора. В связи с чем, работа должна быть вновь отредактирована с целью ограничения заимствований;
☐ обнаруженные в работе заимствования являются недобросовестными и обладают признаками плагиата, или в ней содержатся преднамеренные искажения текста, указывающие на попытки сокрытия недобросовестных заимствований. В связи с чем, работа не допускается к защите.

Обоснование:

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Дата *Подпись заведующего кафедрой /*

начальника структурного подразделения

Окончательное решение в отношении допуска к защите, включая обоснование:

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Дата *Подпись заведующего кафедрой /*

начальника структурного подразделения