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

Shafi Mohammad Ashrafullah

« Library with regenerative ventilation system in Atyrau »

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 « Library with regenerative ventilation system in Atyrau »

5B072900 - "Civil Engeneering"

Prepared by Shafi Mohammad Ashrafullah

Scientific adviser N.V.Kozyukova
Master of technical science,
Lecturer
«_____»___2021 yr.

Almaty 2021

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Specialty 5B072900 – Civil Engineering

I APPROVE
Head of Department
_____N.V. Kozyukova
Master of technical science, lecturer
«___»_____20__ yr.

ASSIGNMENT
Complete a diploma project

Student: Shafi Mohammad Ashrafullah
Topic: «Library with regenerative ventilation system in Atyrau»
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: Library construction area in Atyrau
Structural schemes of the building - frame-wall with cross-beams, structures are made of monolithic reinforced concrete and architectural solution (partition walls with glass, timber and other materials shown in Drawings.
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;
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 earthworks and reinforcing bar works, calendar plan, construction site plan - 4 sheets.
11 slides of work presentation are provided.

Recommended main literature:

1 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	N.V. Kozyukova Master of technical science, lecturer		
Calculation and design	N.V. Kozyukova Master of technical science, lecturer		
Organizational and technological	N.V. Kozyukova Master of technical science, lecturer		
Economic	N.V. Kozyukova 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 _____ N.V. Kozyukova

The task was accepted
for execution student _____ Shafi Mohammad Ashrafullah

Date "___" _____ 2021 y.

АҢДАТПА

Бұл дипломдық жұмыстың тақырыбы -Атырау қаласындағы регенеративті желдету жүйесі бар кітапхана. Диссертацияға келесі бөліктер 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 19.8.

3. құрылыс өндірісінің технологиясы мен ұйымдастырылуы - негізгі жұмыстарды жүргізуге арналған машиналар-механизмдер таңдалды, кесте құрылыс және еңбек шығындарының есептеулері есептелді.

4. Құрылыс үнемдеуі - есептеу Экономика бағдарламасындағы құрылыс жұмыстарының құнын немесе Қазақстан бойынша қолмен.

АННОТАЦИЯ

Тема диссертации - Библиотека с регенеративной системой вентиляции в г. Атырау. Дипломная работа включает в себя следующие части:

1. Архитектурно-строительная-содержит объемно-планировочные, аналитические архитектурно-проектные решения и теплотехнические расчеты ограждающих конструкций,

2. Конструктивно-конструкторские -расчет железобетонного монолитного каркаса здания в разрезе. программа ETBAS 19.8.

3. технология и организация строительного производства - выбраны основные Машины-механизмы для выполнения наземных работ, составлен график и произведен расчет затрат на оплату труда

4. Экономика строительства - расчет стоимости строительных работ в программе Экономическое вручную по Казахстанской.

ANNOTATION

The topic of this thesis is “Library with Regenerative Ventilation System in Atyrau 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 19.8.

3.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 Economic Software, program or manually according to Kazakhstan.

CONTENT

INTRODUCTION

Civil and municipality industry expansion of the Republic of Kazakhstan is looking create, the plans of construction until 2021 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 Atyrau city they most make a new urban plan for all production companies outside of the city and there is no modern library and other educational complex for the people. Scientifics and new generation based, reasonable It is planned to bring it to a reasonable and high-quality level.

The project on the theme: “Library with Regenerative Ventilation System in Atyrau City” was developed by the opinion of Satbayev university student S.M. Ashraf.

Which include good-looking, sustainable, calm, Economical, and safe building for the people of Atyrau City. According to the above things we will make it.

The main goal of architecture has always been to create an auspicious natural environment for social life, the nature and suitability of which is strongminded by the level of cultural and technical development of people, the achievements of knowledge and technology. Every building or structure has its own purpose etc... And according to the norms that we have for every field of construction we should do our architectural and structural design of the building, for whom and for what purpose it is built. Public buildings are relatives, creativities, administrations, etc. And the human society needs those all to be design and construct with all kinds of modern facilities.

The public library today is not only booking a progressive library, first, is an information center for keeping and studying of books. Now days people do not keep books hardware they used softs of the book. In this public library project as I worked, we will have ancient library and modern library system which modern library system can trash its physical borders, moves from definite space to virtual. On the other hand, it advises access to data supplies on the Internet. On the further hand, it establishes its specific electronic data resources available behind its physical fences: frequent databanks, collations of digitized files, web site and web portals. And a safe zone for study because the building is about -10 meters underground and for the ventilation of building, we will use ancient and modern technologies.

Where air wetness should be inside 60 Percentage for a temperature range of 20 to 22 degrees, Air speed should be 0.1 meter over second in all categories of rooms whatever its near to the main corridor or in central part. Large number of people are in the library during the day, so the air circulation system should confirm that they are relaxed in the reading room and it is required for all building. If not, people will simply stop going to this library for study, because it is unpleasant to be in it: the premises can become smoky, humid, and so on.

1 Architectural part

1.1 Architectural planning solution

The topic of the scheme was chosen as a communal object, which is required for a given region. Public library is planned for quick and extensive stay of people, and appropriate Educational serving their, because this building should be well-fixed with all types of landscape gardening to safeguard superiority service to students and other Didactic organization. The project "public library " in the city of Atyrau located 10km away from Caspian Sea Kazakhstan region where the town is about 20 m above the sea. For the given project that I made it, we have the following condition and facilities.

1 For conditional BS mark plus 1m accepted the level of the clean floor of the first floor, which relates to the certain mark of topography plus 200 plus100 which is Approximately 1700 centimeter above the sea level on the general plan. Section I-I

2 Working drawings of the building are developed in harmony with the architectural canons of the Republic of Kazakhstan.[10]

3 Technical Facilities schemes that need to be examined are: Structural and adding elements. Lighting requirements inside and outside, Heating, ventilation and air conditioning requirements, Water and sewage and plumbing system needs for the public library.[10]

The interplanetary-planning decision of the construction is strongminded by such conditions like high insolation materials, noise fascination of enclosing and bearing structures and the need to protect many underground engineering networks of the library.

From this project we know that we have three floor and for only two floor we need staircase and escalator. The staircase only we can use for emergency, but the escalator will work during the working hours as well, the technology of escalator is ordered with 0.5 meter over second speed which cannot make a big noise for the people, the entire project escalator cannot lift 1500 kilo gram by the Hight of 10 meters.

The projected object with a height of 21 meters Where two floors are underground about -10 meters and one floor as above the ground plus 11 meters has a total area of 22,500-meter squire. The future construction area is 3.0 hectares (30,000-meter squire). The center is hypothetical public library objects, the area around the center is as green as possible and includes a Parks projected for walking through around the parks and whole project, recreation areas, a zone for gathering companies and Parking spaces for working stuffs and people the center is planned to be located on Atyrau in the square of tow streets. The area of natural landscaping is the most landscaped area. In command to create regularized salubrious and sterile circumstances and diminish the influence of injurious atmospheric precipitation of the air, the project offers for the establishing of deciduous trees, shrubs and artificial grass and blending and lighting in the land of the public library.[10]

1.2 Climate Characteristic of Atyrau City

Climate features of the edifice according to the Atyrau town Climatical characteristics of the erection area which 10 kilometers away from sea:[7]

Outside air temperature of the building. The average temperature in the unkindest five days minus 37.3 Celsius of winter season, (reliability 0.98). Average temperature on the coldest days minus 30 Celsius (reliability 0.92. Wind speed pressure minus 0.40 kilopascal (district V). Weight of snow layer - 0,8 kilopascal (I area) totally 0.96 kilo newton. Seismic properties of the construction site - 5 points. It is not dangerous for our project,

For more information you can check Appendix A Figure A.1- Climate graph of Atyrau city.[7]

1.3 Thermomechanical calculation of the outer wall

Conferring to the dual originality of the Republic of Kazakhstan 2.04-01-2017- Building climatology and "Erection hotness engineering" it is necessary to fix the stiffness insulation for the outer wall according to its materials.

Warming period dd-degrees-day RK KN 2.04-03-2011 Well-defined by "Updraft defense of buildings". T_{int} = 21 degree. Inside strategy of air temperature T_{ext} = -37.3 degree. Outside strategy of air temperature (coolest five) Everyday) MF RK 2.04-03-2011 "Thermal defense of buildings "are known according to the adjunct. ΔTn = 4 standardized temperature variations conferring to Table 2 2.04-03-2011 "Existing shelter of buildings" of the Office of Finance of the Republic of Kazakhstan. Rendering to the subsequent formula of degree-accuracy of heating season (GMS) to be single-minded.[7]

$$ГСОП = (tв\text{-}totпер). Zотпер. \quad (1)$$

Where tв - buildings and constructions in accordance with Inside design air temperature in accordance with design canons, ° C (16 ÷ 18); from 8 ° C according to the Civil Building Climatology of the Civic Code of the Republic of Kazakhstan normal daily temperature and duration of low-slung and equivalent, day.

For the city of Atyrau:[7]

$$Zотпер= 202 \text{ days}; totпер = -7{,}2 \text{ °C}.$$

$$ГСОП = (20 + 7.2) \cdot 202 = 5494{,}4 \text{ °C} \cdot \text{day}$$

Resistance to heat dishonesty of envelopment structures. Internal values should be strongminded by scream.

$$Rтр = 3{,}234 м.\frac{C}{Вт}$$

Dd = 5490; standardized value of heat confrontation 2.04-03- RK 2011 is strongminded according to Table 4 -Current defense of buildings:

$$Rsi = \frac{1}{\alpha i}.\alpha i = 8.7$$

The shallow of the structure for railing inside heat stock schedule Table 4 RK TL 2.04-107-2013 - Involved heat method ».

$$Rse = \frac{1}{\alpha e}.\alpha e = 23$$

Coefficient of the outer assembly of the hurdle Table of surface heating Table 6 RK TL 2.04-107-2013-Active heat technique ». The required heat handover resistance of the infoldings structure is as follows determined by the formula:[7]

$$R0 = \frac{1}{ai} + \frac{\delta 1}{\gamma 1} + \frac{\delta 2}{\gamma 2} + \frac{\delta 3}{\gamma 3} + \frac{\delta 4}{\gamma 4} + \frac{\delta 5}{\gamma 5} + \frac{1}{ae} \quad (2)$$

$$R_0=0.125+0.023+\frac{X}{0.375}+0.11+0.037+0.0937+0.05=0.388+\frac{X}{0.375}=145cm$$

$$R0=5.08 \geq R_{тр} = 3.234m\ \frac{C}{W}$$

$$D = R\ 1.S1 + R\ 2.S2 + R\ 3.\ S3 + R\ 4.\ S4. \quad (3)$$

$$0,02.9,6+4,6.7,9+0,11.0,67+0,037.9,6+0,0937.0,67=37,1\ ^0C$$

1.4 Energy Efficiency of the building

My building is 3-storey public library with tow 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 4320-meter squire but in the outside, we also need Energy for parking walkthrough, polls, and entertainment Area which is approximately 9000m2.

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, double glassing system, reheating system, ventilation system, warm air stoves are used in a mode which do not loss vigor and heat from the edifice. Besides, we are mostly intensive on renewable energy (Solar panels) in this construction. According to the area (4320 square meter) we use 36 solar panels, due to the standard for 2000 square meter we need to use 16-18 solar panels.[11]

There are some substitutes performs which was inappropriately not applied in this building are obedient lines techniques, which distillate mostly on inside heating source like reheating of shower apartment, kitchen, and heat from social frame.

We evaluation the process of concluding energy use for planetary boiler, airing, tap water warming and domestic and capability of electricity with the active energy equilibrium program. The space heating demand is modeled for climate conditions of the city Atyrau, assuming indoor temperatures of 20 Celsius -21celsius for the Studding areas and 18 Celsius for the mutual areas of the buildings. The primary energy required to suggestion the final energy for the technique activities is calculated with the ENSYST computer software separately. We analyze the main energy use for suitcases

where the buildings are heated with cogeneration-based region heat or rechargeable-based substratum heat impel. The COP of the heat pump for heating is supposed to be 3. 0.. The solar panels are assumed to swap energy mostly. [11]

To accomplish, this 3-storey public library building applied some energy efficiency techniques and methods to save energy and heats inside of the building. We only used Solar panels and a general electricity of Kazakhstan. In this building which is quite well-organized and warming radiators plus thermal heat pumps are connected in a way that uphold the sensible temperatures, low humidity, and increased air superiority inside the building. In addition, for future work we need to depend on more on renewable energies such as (Wind Turbines, Biomass, geothermal etc.) and some of inactive house practices and devices for making the building extra energy efficient.

1.5 Calculation of the ventilation system of the building

Ventilation system is one of the most important part of MEP, that can make us a great facility inside of our construction, for the entire project we divided our ventilation system by four blacks where every blacks. Every black has return diffuser, supply diffuser, Ducts and Air handing unit.

For further information you can check Application A Figure 2- Plan of ventilation system for the library project.

The composition of the indoor air is not constant but changes all the time. The breathing of people is accompanied by the consumption of oxygen and the release of carbon dioxide. In addition, in industrial and commercial facilities, oxygen can be consumed during certain technological processes, which are also often accompanied by the release of various gases, dust and other pollutants. As a result, the concentration of oxygen in the air decreases, which makes it poorly breathable. Finding people in such an atmosphere leads to a deterioration in well-being and can negatively affect health. The presence of various pollutants in the air can be directly hazardous to health, create a fire or explosion hazard. Therefore, a mandatory requirement is to equip any building with a ventilation system. It provides air exchange in the interior of the building, removing exhaust air from them, which is replaced by fresh air supplied from the street. Thanks to this, the rooms remain in the optimal amount of oxygen for breathing, there are no harmful gases and suspensions. Also, ventilation should maintain optimal values of temperature, humidity, air velocity. This allows you to maintain a safe and comfortable indoor environment, prevent dampness, mold, and mildew on surfaces. For some rooms, natural ventilation is sufficient, which does not involve the use of ventilation equipment. However, at many facilities, it does not allow achieving the required air exchange parameters. In such cases, you must mount the system forcibly.[11]

Area calculation for ventilation system

Area calculation is the easiest way to determine the required air exchange. It is carried out based on the norm that 3 cubic meters of fresh air should be supplied to 1

square meter of air within an hour. In this case, the ratio of supply and exhaust ventilation is assumed to be 1: 1.

$$L = S .3. \quad (4)$$

where L is the required performance of the ventilation system, m^3 / h.

S is the total area of ventilated premises in buildings, m2.

L = 106.5=530 m3 / h.

To calculate the required performance of the ventilation system in terms of frequency, the following formula is used:[11]

$$L = n. V. \quad (5)$$

where L is the required performance of the ventilation system, m3 / h.

n - standard rate of air exchange.

V is the volume of the room, m3 / h.

L=1,1.2000=2200 m3 / h.

For more information check out Application A Figure 3-Floor plan of ventilation system.

1.6 Space Planning solution

The public library construction project is Developed by Shafi M. A Student of Institute of Architecture and Civil Engineering named after T. Basenov. Under the advising Kozyukova N V head of the Department.

The library Building Master plan is Consist of residential building Public Garden and Library building with all modern facilities,

The master plan is generally Divided by three parts west and East of the Library is residential buildings and small river, in the north direction we have 5 km a small lake of Natural water, in the south of the library we have a public Garden with entertainment places and with large pool. Also, between library and Public Garden we have Main Double way Road 15km along to the city.

Inside of the current Public Library Project we have the following contents.

The space-planning decision around the building is.

Fire safety of buildings and structures, Car Parking, Smoking area, Accessibility of buildings and structures for people with limited mobility, Walkthrough on site plan, Entertainment places, Waterfall, Roads for cars around the building and Polls

Areas For entertainment and outside study for further information You can look at the Drawing part of the building.[12]

In library construction project I have divided into 3 to 4 block which defined for each floor, that contain the various cabinets characteristic for a certain type of block. Such as print room in every floor , work space of library workers in every floor ,stock materials in 2 ground ,electric station ground 2,ventilation and heating system station in 2 ground, computer lab (PACs0 in every floor , security control room, first floor,

meeting room in every floor, rest space in every floor ,a big Auditorium in Ground tow and first floor , bath room for man and woman in every floor(wc), magazine and paper in first floor, group study cabinet in every floor, reference room in first floor, library Director office in ground one and contain or shop in middle part of first floor without this rooms in our space plan we have a small storages stair case and escalator areas.

2 Constructive solution

2.1 Geotechnical characteristic of the project in Atyrau City

The geotechnical characteristic of Atyrau city Kazakhstan is sandy and Loamy earth. There are different types of soil conditions calculation of ag (g shares) at construction sites acceleration standards. I took it from national Appendix of Republic of Kazakhstan.[4]

Table 1- Type of soil in their coefficient in Atyrau city

Type of soil	IA	IB	II	III
Sand and loam	0,025	0,03	0,039	0,059

Maximum depth of soil compaction - 1.43-1.8 m. The thickness of the layer is 4.7–10 meters. Below it is sand pitches There is a loamy soil. Loamy soils do not have silty properties. Verge weight - 18.4 kN / m 3, interior resistance angle 22° maximum stiffness -5 KPa, modulus of buckle - 4.0 MPa. The information is got from National Adjunct of the Republic of Kazakhstan. [4]

2.2 Seismic zone of construction

Consuming measured the position of the projected building, which cannot be in seismic region, but we need to determine it from Defrayals of the Republic of Kazakhstan situated in seismic zones and prove that I do not had seismic zone for my project, for which seismic danger points and speeding up. Stated list. Construction behavior assemblies and mixture of their bulges, joints are made in obedience with the structural design of the building and considering the necessities of the combined enterprise of the Republic "Building in seismic areas of the Republic of Kazakhstan". According to this SP table KR KZH 2.03-30-2017 earthquake of our construction site of the intended building is 5 point.[5] The building is located 10 km away from sea where the type of soil and sea cased a less point of seismic but instead of seismic, we have wind and snow loads.

Table 2 - Seismic region in Atyrau city

Place of seismic		Seismic hazard		
	In ball on the map		accelerations (in shares g)	
Atyrau	1	2	3	4
	ZCA-2475	ZCA-22475	ZCA-1475(agR (475))	ZCA-12475 (agR (2475))
	5	6	0,016	0,037

As we did our serving in Atyrau city according to the seismic hazard table we found 5 band earth quick which does not need to consider it for our construction project.[5]

2.3 Basic Materials of Construction

1) External walls -of construction are shear wall up to first floor by the thickness of 25 centimeter, on the first floor for external walls I have 37-centimeter thickness with brick, aluminum varnish with lagging in a metal frame, aluminum multilateral glazed window and in some parts cladding of slates.[12]

2) Internal walls - standard and partition Blocks 200-millimeter bushy, Sore construction brick. But the brick wall is only for the contain room that located on the middle part of first floor.

3) Overlap - monolithic reinforced concrete but only in 2nd ground floor as walking through around the building.

4) Roof - is monolith with aptitude slates, and ventilation holes of main system.it will increase the energy efficiency of the building and we will have natural lighting during the day.

5) The crypt is confronted with sandstone on a mineral mohair lining only for 2nd basement. Flooring and central ornamentation - according to wholesome standards and design of public library building.

6) The middle layer is thermal insulation polyurethan foam $\delta = 50$ mm, $\rho = 80$ kg / m Stucco on equally sides, cement sand resolution $\delta = 30$ mm, $\rho = 1800$ kg / m 3. And finishing shaping a layer for protection alongside atmospheric precipitation of the air. Stucco with two festivities, from an adhesive-sand mortar $\delta = 30$ mm, $\rho = 1800$ kg / m 3

2.4 Fine materials of the project

The stratagem insulation of external walls. Stratagem for vapor barrier of walls and roofs include water proofing materials and so on. This material was not essential for the blocks hedge because the block of entire project is thermal block which can guard the building from vapor barrier illness but after blocking work we will use only surfacing with pointing, for the floorings it must be use. Reinforcement and fastening of external walls in every 1,5 m by the height of 2 m inside of the blocks. Reinforcement and fastening of dividers Fiberglass disposable for covering gypsum bandage 15 millimeter up to 18 millimeter "grander Alinex" Covering putty "Glatt" with 3,5-millimeter Putty coating "Finish" 2-millimeter Water dispersion paint with some good-looking colors. Window number 21 by 1400.1200 millimeter in first floor. Automatic gate 4 by- 3000.3000 for more information you can check the drawings part of floor 1,2 and 3. Foundation under PV1.2 m stature = 100 millimeter 200.1500 [12].

P = 1900 kg,

Kadin = 1.2.

Cross breaker = 1.2-meter height

M200 Reinforced concrete with net 5Vr1 100.100, 55 millimeters multiply 40-millimeter squash out polystyrene M350 Floor. Slab Concrete preparation stiffness= 100-millimeter, RC slab stiffness = 300 millimeter. Columns made of huge, reinforced concrete, square in plan. Section of Rectangular columns 30x40cm for boundary wall and 30.70 centimeter but it was not satisfiable for structural part of the building, I changed to the circular sheep. It is made of concrete of class C 30 over 37. For circular sections we have Diameter 60 and Diameter 80 centimeter with the same class of concrete and Reinforcement class A400 and higher.

The floor slab is designed from monolithic Reinforced concrete class C30 over 37, with stiffness 300mm. Shelter plate made of monolithic reinforced concrete class C30 over 37, 300 millimeters copious.

2.5 Anti seismic activity

The main feature of the seismic maintenance of great frame buildings is determined by the detail that these structures have a huge tow ground floor with height of -10 meters made from load bearing wall and the first floor is about +11 meter with create frame which combined from columns, waffle slab 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.[5]

3 Structural part of the project

3.1 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 four project we ought to take 0.9 according to the EN1990, 4.1.2.[1]

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.[1]

Table 3 - 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 the G+1 floor		
Insulation	0.08 200	16
Plastering	0.005 2040	10.2
Reinforced cement-sand screeds (PCC)	0.1 2400	240
Glue		1.2
Parquet board(flooring)	0.015 780	11.7
Total for first floor		2.79 KN/m^2
Own weight of roof floor		
Roof cladding	0.0012 7850	9.42
Vapor barrier		0.015
Insulation foam concrete	0.088 200	17.6
Reinforced cement-sand screeds (PCC)	0.1 2400	240
Plastering	0.01 2040	20.4
Bituminous waterproofing bottom layer	0.001 100	0.1
Bituminous waterproofing top layer	0.001 100	0.1
Total for a flat roof		2.87 KN/m^2

For wall materials we have the following properties

-Shear wall 25cm by the height of 5 m in two floors underground.

-External self-supporting wall 37cm made of brick, glass and building insulation materials by the height of 9m only for the first floor.

-Internal self-supporting walls 20cm made of blocks by the height of 4 and 5m

Table 4 - Calculation of wall loads

Wall construction	Layer thickness, m density, kg / m3	Characteristic load, kg / m
External self-supporting walls (wall height 9 m):		
Plaster based putty.	0.05 95	4.75
Aerated concrete	0.015 600	9
Glassing	0.04 2600	104
Air gap	0.001	0
Brick as main material	0.3 1800	540
Total for self-supporting walls:	With 2m glassing wall in middle pare	5.11 KN/m
External supporting (shear) walls by height 5m		
RCC concrete	0.25 2400	600
Plastering	0.05 95	4.75
Insulation materials	0.12 1800	216
Total for parapet:		8.2KN/m
Partitions (height 4 and 5m)		
Drywall	0.125 600	33
Sound insulation Isover.	0.075 14	4.62
Drywall	0.0125 600	33
Total for partitions:		0.7 KN/m

1)Temporary Load.

To find out provisional loads we should check the CH-PK EN 1991-1:2000/2011 table 6.1 to 6.2 there we will take rendering to the given region Atyrau and we will also see the category of our building which are divided into four (A, B, C&D) so here I chosen category C1 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.[6]

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 5 - 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

1)Increase the qi and Qk values as necessary (egg for stairs and balconies, depending on their use and size).

2) For local confirmations, only the concentrated load Qk should be used, without interaction with qk.

3) Concentrated loads Qk for tall racks and lifting platforms should be determined on a case-by-case basis, see 6.3.2.

4) A concentrated load should be applied at every point in the structure of a floor, balcony, or staircase. The base area should be determined depending on the use and type of floor structure.

$\alpha A \geq 0.6$ - for categories C and D.

load of escalator is accepted as 6ton for 10m height of the escalator in two floors.

2)Calculation of Snow Load.

Snow loads on the building should be determined from the following formula. For coefficient of snow load I have the I region Atyrau city.[17]

$$S = \mu 1 \times C_e \times C_t \times S_k \quad (6)$$

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 =1.2

Ct is the temperature coefficient if heated = 1

μ1 is coefficient of snow load form for general buildings=1

$$S = 1\times 1.2 \times 1 \times 0.8 = 0.96 Kpa$$

3)Calculation of Wind load.

The wind load acts on the building from the windward (vigorous pressure) and the windward side (pressure). Calculated intensity value of wind load. And we have 3 floors which have difference height and position, while two floors are underground which are do not affected by wind load and one floor is above the ground by the height of 11m. Span between two columns is 6 for 10 span we have 60m, the load will affect

15.5 present from the East and by the other side we have 6.12=72, where the load will affect from south east. The dimensions of the building are 60,72.11m.

The wind load is taken from Eurocode EN 1991.1-1 2002/2011 is V region, in Atyrau city.[17]

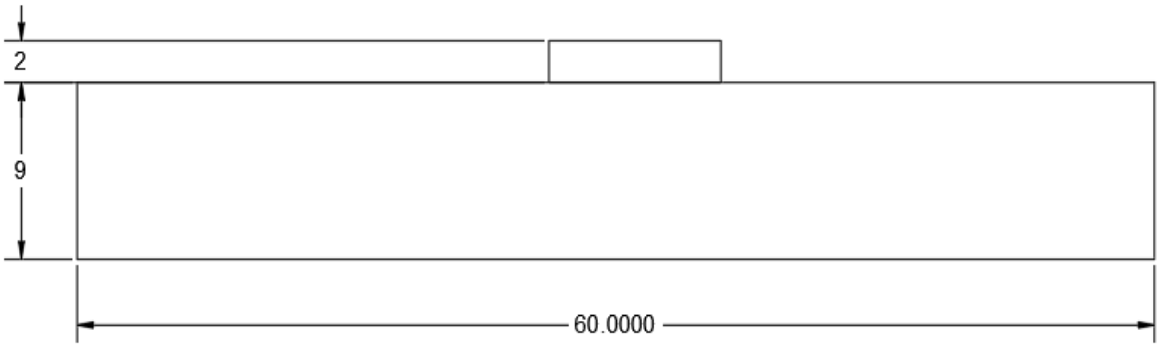

Figure 1- Construction parameters on the east

1 External pressure on the windward side (zone D): Separation of the building in height into zones corresponding to the base height for outside pressure Ze according to method 7.2.2 (1) at b = 60 m <h = 11 <2b = 120 m
In this we only need to calculate only one zone of the construction because the height is less than b. [17]

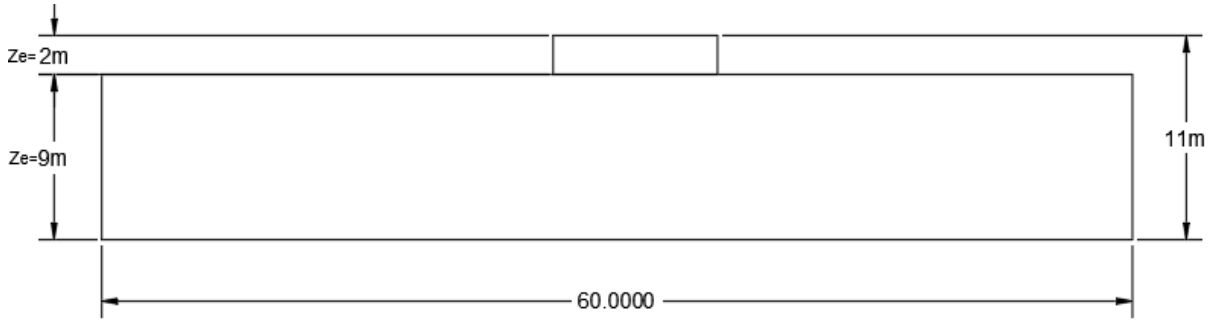

Figure 2 - Zones D corresponding to a base height of 11 m

For the windward side, two zones in the first zone from 0 to 9 m include first floor up to 9 second from 9 plus 2 =11meter roof

Wind pressure according to formula w_e:

$$W_e=q_p(z_e)*c_{pe} \quad (7)$$

where $q_p(ze)$ is the peak value of the velocity wind pressure

Z_e is the base height for external pressure according to section 1-1 [5].

C_{pe}-aerodynamic coefficient of external pressure according to table .7[5].

$$q_p(ze)=c_e(z)\times q_{b.} \quad (8)$$

where h/d=V and c_{pe} =1.2 by the speed of 40m/sec

q_b=1kpa. Basic speed wind pressure for wind region

The wind pressure.[17]

Table 6 - Wind pressure w_e

A	Cpe=-1,2	Ce (11) =1,2	We=1,2.1000. (−1,2)= -1440pa =-1,440KN/m^2
B	Cpe=-1,4	Ce (11) =1,4	We=1,4.1000. (−1,4)= -1960pa =-1,960 KN/m^2
C	Cpe=-0,8	Ce (11) =0,8	We=0.8.1000. (−0,8)= -640pa=- 0.640.5KN/m^2
D	Cpe=-1,1	Ce (11) =1,1	We=1,1.1000. (−1,1)= -1210pa =- 1,210KN/m^2
E	cpe=- 0,5	Ce (11) =0,5	We=0,5.1000. (-0,5) =-250pa=- 0,250KN/m^2

Wind loads are applied at the floor level by 4m,9m and up to 11m:

Table 7 -Wind pressure on levels

	1 floor by the height of 9m
A	1,440KN/m^2. 4=-5,76KN/m
B	-1,960 KN/m^2. 4= -7,8KN/m
C	- 0,640.5KN/m^2. 4= -2,55KN/m
D	- 1,210KN/m^2 .4= -4,8KN/m
E	- 0,250KN/m^2. 4= -1KN/m
	Typical floor (roof level) 11m
A	1,440KN/m^2. 11=15,8KN/m
B	-1,960 KN/m^2. 11= -20,7KN/m
C	- 0,640.5KN/m^2. 9= -5,768KN/m
D	- 1,210KN/m .9= -10,8KN/m
E	0,250KN/m^2. 9= -2,25KN/m

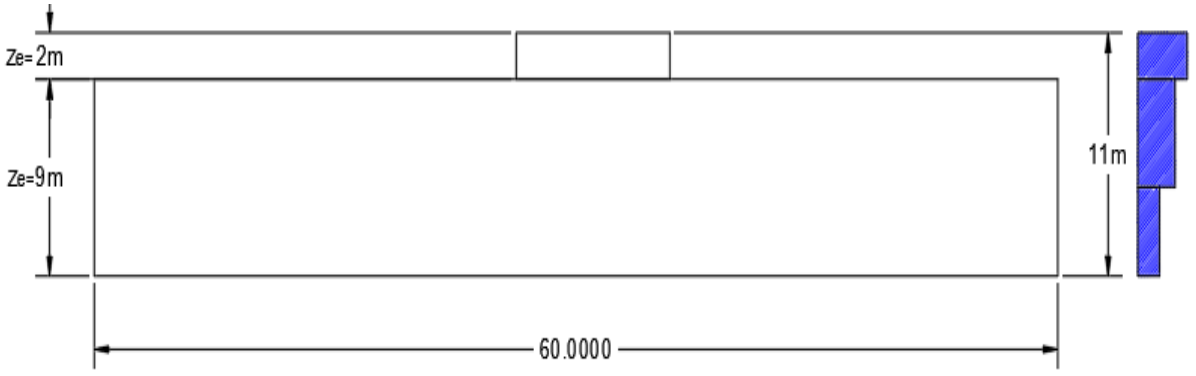

Figure 3 -Wind pressure in zones

3.2 Horizontal ground pressure

The heaviness of the soil on the walls be contingent on their design topographies (disposition and stiffness of the wall, the occurrence of unloading elements, etc.), on the properties of the soil interacting with the wall, on the magnitude and direction of displacement, rotation, and rebound of the wall. The active soil pressure sigma a is realized when the wall is displaced from the ground and corresponds to the minimum pressure value. Passive soil pressure sigma p is appreciated when the wall is exiled on the ground and resembles to the maximum pressure value. In the absenteeism of wall displacements, the rest pressure sigma 0 is realized. The alteration in soil pressure depending on the movement of the wall. In the case of a load-free persuaded backfill surface and an inclined rear face of the wall, the horizontal σ ah and vertical σ av components of the active soil pressure at a depth.

E = 250 Kg см2,

γ = 1.95 т м 3,

φ = 22 grad.

c = 0.34.

So finely I have the Horizontal strength of active soil pressure at mark 10 and Ground level relative to clean floor minus 0.1m where Horizontal strength of active soil pressure at 10m, from spread load.[4]

$$q = \frac{16\ t}{m3P1} = \frac{0\ t}{m2}. \quad (9)$$

P2=10 *1.85=18.5 t/m2

We will use non uniform loads of shell for assigning this pressure.

p (X, Y, X) =Ax +By+Cz+D with A=0, B=0, C=-1 and D=p2With Z=0 P=-z+p2 with =0 then p=p2With z=10m then

p= -10t+18.5=8.5>0

It is not ok we will assign.

c=-1.85Z=-11 then

p= -10. 1,85+18.5=0

so, 0=0 its ok

For more information Checkout the Appendix B figures of shear walls deformation. [4].

4 Analyzing of the structural parts of the building by Etabs

Analyzing result of the entire project in Etabs is done well and we got all the necessary tables, figures, and project summary report you can check Application B for structural design of the whole building and the design of columns. For the detailing of column reinforcement, you check the structural drawing of the column in drawings part sheet 4.

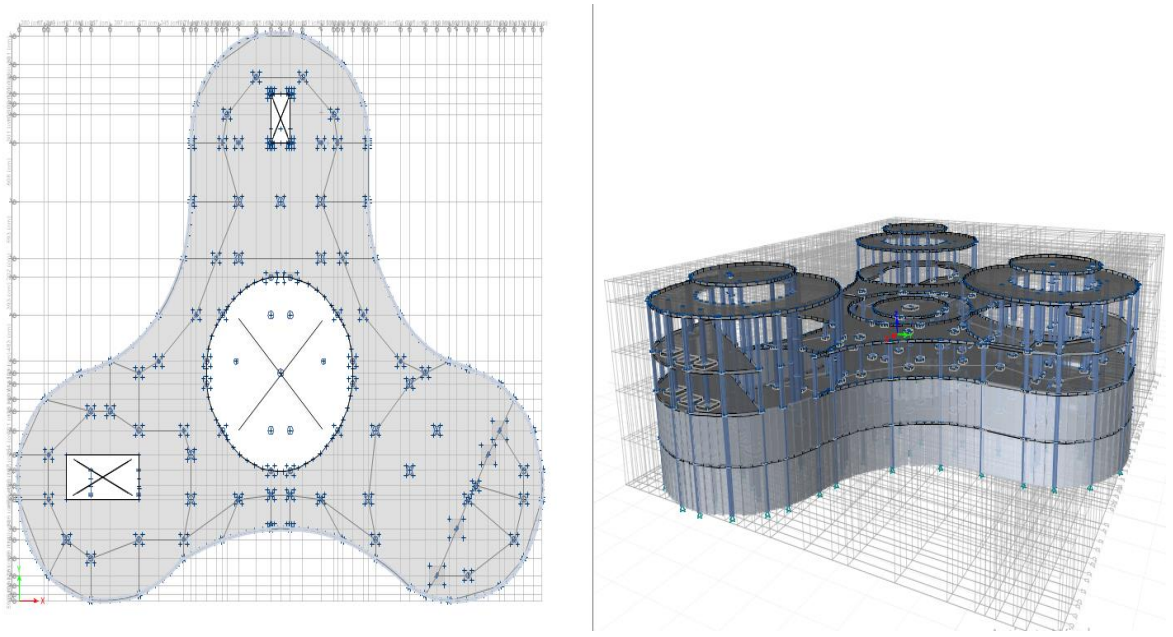

Figure 4 - Floor plan and 3D view of the building

4.1 Designing of concert elements (columns).

For the design of reinforcement elements, I will calculate and design the reinforcement columns for that the moment and force was a little bit more in the middle part of the building that's way I selected cc62 with cc59 for design and these columns we can use for the whole building.[3]

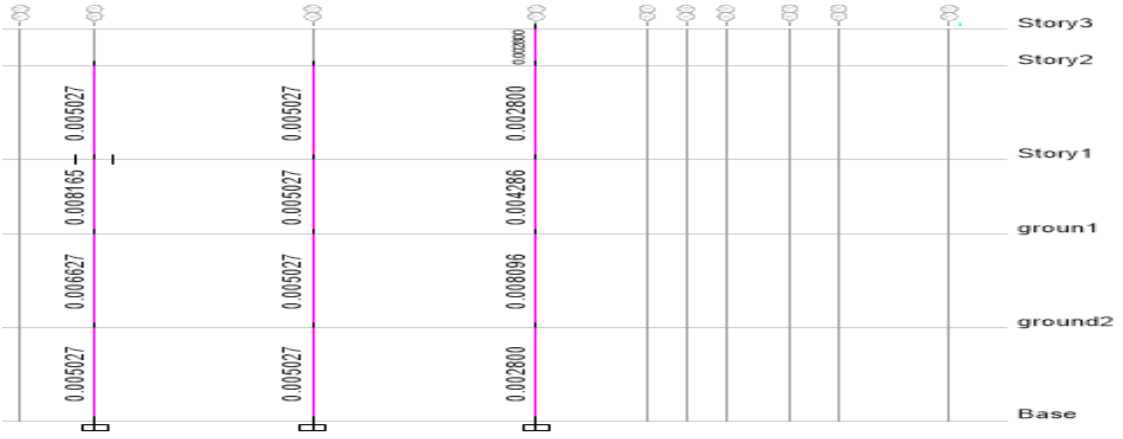

Figure 5 - Longitudinal reinforcement

5 Manual Calculation of Circular Columns

For the calculation of column, we need to find the forces from DCL table of Etabs that we already find it for all columns of the building. Then the main system is sequentially loaded with constant and temporary loads (N, M, H, p), which cause corresponding reactions and bending moments in the racks.[3].

Load area of the middle column with a grid of columns 5, .6,6= 33.6м^2

Constant load:

According to my calculation in ETABS Software the moment is equal to M=1308 and the shear force N=-516

5.1 Determination of Longitudinal forces From Design Loads

First, we need to find the length of column:

$$lc= h_f - h_{sl} =5000– 300=4700mm$$

Area of Column:

$$d=0.8m$$

$$A=\pi (\frac{d}{2})^2 =3.14 (\frac{0.8}{2})^2=0,5024m^2$$

Constant load: -from overlapping according to the table 2 [9]:

$$N_1 = \gamma_n . g . A_{\text{гр}} \quad (10)$$

where g – floor Design load,

$A_{\text{гр}}$–middle column cargo area

$$N_1= 0,95.2,87.33,6= 91,61 KN$$

Column dead weight according to the table 3,4 and 5 [9]:

$$N_2 = \gamma_n . \gamma_f . h_{\text{p}} . b_{\text{p}} . L_{\text{p}} . \rho \quad (11)$$

where γ_f – Coefficient equal to 1.1,

h_{p} – Crossbar height,

b_{p} – Crossbar width,

L_{p} – Crossbar length,

ρ – reinforced concrete density

$$N_2 =0,95.1,1.0,5.5.30=78,3 KN$$

$$N_3 = \gamma_{n.} \gamma_f . A_C . H_{\text{эт}} . \rho \quad (12)$$

where A_c – Column Area,

$H_{\text{эт}}$– Floor height

$$N_3 =0,95.1.1.0,5024.5.25 = 65,63 KN$$

-From the coating is determined by the formula from 48 [9]:

$$N_4 = \gamma_n.\gamma_f.g_{\text{покр}}.\text{A}_{\text{гр}} \quad (13)$$

where $g_{\text{покр}}$–temporary load from the coating and $g_{\text{покр}}$ – temporary load from the coating I toke 6 because the cross section of column is 0.5m2.

$$N_4 = \gamma_n.\gamma_f.g_{\text{покр}}.\text{A}_{\text{гр}} = 0{,}95.1{,}1.6.33{,}6 = 210{,}6\text{KN},$$

The total constant load is:

$N_{\text{пост}}$ = (91,6+ 78,3).2 + 78,3.6 + 210,6 =339,8+469,8+210,6=1020.2 KN.

Live load: -from the overlap is determined by the formula from 49 and table 6 [9]:

$$N_5 = \gamma_n.\gamma_f.\vartheta\text{A}_{\text{гр}}.n_{\text{перекр}} \quad (14)$$

where ϑ – temporary design load

$$N_5 = 0{,}95.1{,}2.6.33{,}6.5 = 1149\text{ KN}$$

-From snow is determined by the formula from 6 [1]:

$$N_6 = \gamma_n.\gamma_f.p.\text{A}_{\text{гр}} \quad (15)$$

where p – snow load

$$N_6 = 0{,}95.1{,}4.0{,}96.33{,}6 = 42{,}9\text{ KN}$$

Longitudinal force acting on the column:

$$\text{N} = V_{Ed} = N_{\text{пост}} + N_{\text{врем}} = -2212{,}1\text{KN}.$$

Shear Force according to ETABS software:

N=-516,16 KN

M=1308KN.m

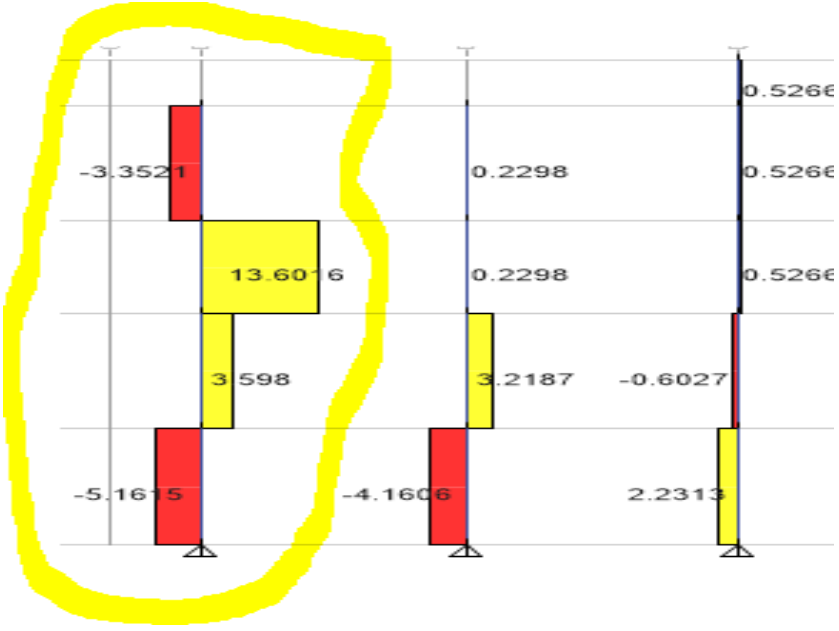

Figure 6 -Shear for column design.

5.2 Selection of section and calculation of the sectional area of reinforcement

Effective length of column:

$$l_0=0,8 \cdot l = 0.8 \cdot 4700 = 3760mm$$

Calculate the eccentricity of column [3].

$$e_0 = \frac{lc}{400} \quad (16)$$

$$e_0 = \frac{4700}{400} = 9,25mm$$

$$M_{Ed} = e_0 \cdot N \quad (17)$$

$$M_{Ed} = 0,00925 \cdot 2212. = 20,46KN.m$$

Calculate the slenderness value:

$$\lambda = \frac{4 \cdot l_0}{d} \quad (18)$$

$$\lambda = \frac{4 \cdot 3760}{800} = 18,8$$

Design shear force caused by the load on column:

$$V_{Ed} = \frac{N_{Ed}}{(Ac.f_{cd})} \quad (19)$$

$$V_{Ed} = \frac{-2212100}{(5024 \times 20)} = -22,015$$

$$V_{Ed} = \frac{-516000}{(5024 \times 20)} = -5,135$$

$$a_{Eds} = \frac{M_{Ed}}{(Ac .h .f_{cd})} \quad (20)$$

$$a_{Eds} = \frac{13080000000}{(502400.800.20)} = 0,162$$

$$\omega_{tot} = 0,5$$

The total area of the longitudinal reinforcement in the section [10].

$$A_{s,tot} = \frac{\omega_{tot} Ac}{(\frac{f_{yd}}{f_{cd}})} \quad (21)$$

where fyd is 500pa

$$A_{s,tot} = \frac{0,5.502400}{(25)} = 10048 \text{ mm}^2$$

$A_{s1} = A_{s2} = 5024$ mm^2, accept 8Ø40 S800 ($A_s = 10080$ mm^2).

But in Etabs I had 10 Ø25 As=5025 but the load and moment

The step is taken based on the conditions about 150mm.

-the cover is no more than 500 mm.

- No more than the minimum side of the section.

- No more $20d_{min}$.

The step is taken equal to 150 mm.

1) Checking the percentage of column reinforcement:

$$\mu = \frac{As}{Ac} \cdot 100\% = \mu = \frac{10024}{502400} \cdot 100\% = 1.99 \text{ percent}$$

2) Assign the diameter of the cross bars:

dsw≥0.25ds = 0.25 · 40 = 10mm (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 dsw = 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:[3]

$$N \leq \varphi (R_b A_c + R_{sc} A_{s,\,tot,}) \quad (22)$$

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

$$l / h = 4700/800 = 5.87 \Rightarrow \varphi = 0.85$$

$$2212.1 \leq 0{,}85 * (20 * 10^6 * 0{,}50 + 500 * 10^6 * 10024 * 10^{-6})$$

$$2212.1 \text{ KN} \leq 12760\text{KN}$$

4) Column stability check is performed according to the condition:

$$\sigma = \frac{N}{\varphi \cdot A} \leq Rb.\ yc \quad (23)$$

$$\sigma = \frac{2212}{0{,}85 \cdot 0{,}50} \leq 20.1{,}5 = 5{,}2\text{MPa} \leq 30\text{MPa}$$

Condition is met.

6 Organizational and Technology part

Preparing of the construction site before starting construction work is the first technological part of site. The work starts with clearing the construction site from trees shrubs and other natural materials which can increase the quality of building materials. The main stages of work are underground, above ground and finishing of the building consists of works. The underground part of the construction is called the zero cycle and for the entire project we have two underground floors at this stage, dig a pothole, process it, lay the foundation installation of walls, covering the roof of the basement and reinforcement of the foundation and shear wall must considering on this part.[18]

1) Earthworks

Before starting the calculation part of earth, we should have the following characteristic about earth and building.

Stability of soil in slopes is characterized by physical properties of soil, where the soil is in stable condition. The stability of soils in such cases is determined by the steepness of slopes and expressed by an inclination angle of the slope to the horizon at the ratio of 1: m or:

$$H/\text{a}=\frac{1}{\text{m}} \tag{24}$$

where H – slope height.

a– laying of a slope or projection of a slope to the horizon.

m – coefficient of a slope

$$11/\text{a} = \frac{11}{0.5} = 22\text{m}$$

This methodology guidelines contains the angles of natural slope and the largest allowable steepness. In the case of earthworks implementation in winter it is required to specify additional information: temperature zone of construction: the thickness of snow cover and the number of days with a subfreezing temperature: soil freezing depth.

According to the corrected initial data of soil characteristics and work performance conditions to be prepared.

2) Determination of work volume

The construction of temporary fencing, Removal of topsoil, Removal of topsoil, Soil excavation in the pit and trench access to the pit, Excavation of soil shortage, Concrete preparation for foundations, Reinforcement installation, Form work installation and so on. Prior to the construction work necessary to perform the construction temporary fencing, fencing perimeter determined by the formula (for the pit and the trench):[18]

$$\text{P}_{\text{fen}} = (20 + \text{l1}) \cdot 2 + (20 + \text{l2}) \cdot 2, (\text{m}) \tag{25}$$

$$\text{P}_{\text{fen}} = (20 + 60) \cdot 2 + (20 + 72) \cdot 2, (\text{m}) = 344\text{m}$$

3) Removal of topsoil

During pit excavation removal of topsoil to be implemented at the area (only for the pit):

$$S1 = (10+l1s.\ t\ +10) \cdot (10+l2s.\ t\ +\ 10),\ (m^2). \qquad (26)$$

where $l1s.\ t$– the pit length at the top, m.

$l2s.\ t$– the pit width at the top, m,

$l1s.\ b$ – the pit length at the bottom.

$l2s.\ b$ – the pit width at the bottom

$$S1 = (10+85\ +10) \cdot (10+73\ +\ 10),\ =9765(m^2)$$

$$l1s.\ t\ =l1s.\ b+2\text{mh};\ l1s.\ t\ =75+10=85$$

$$l2s.\ t=l2s.\ b+2\text{mh}=63+10=73$$

$$l1s.\ b=\ 72+\ (1,\ 3.2)\ =75\ \text{m}$$

$$l2s.\ b\ =\ 60\ +(1,3.2)\ =63\ \text{m}$$

where -$l1s.\ b$ – the pit length at the bottom.

$l2s.\ b$ – the pit width at the bottom

The whole rectangle of construction is 4320m^2 with slope the excavation will be 6205m$^{2.}$

m– Slope steepness factor we took from (annex № 1. table.2); h–formation level (the height of the pit. 1,3m– distance between the axis and slope bottom, destined for a person access to the structure; $l1$, $l2$– length and width of the structure in plan, respectively (per the task), m [18]

Table 8- Specifications of soil loosening

Type of (Soils)	(Initial increase soil volume later developments, %)	(Residual soil loosening, %)
Супесок (Sandy loam)	12…17 (1,12…1,17)	3…5 (1,03…1,05)

4) Soil excavation in the pit and trench access to the pit.

For determination of the Pit volume, we have,

$$Vp=\frac{h}{6}\cdot\ [(2l1s.\ b+l2s.\ t)\ l2s.b.\ +(2l1s.t.\ +\ l1s.\ b)\ \cdot l2s.\ t],\ (m3). \qquad (27)$$

where, h– depth of pit, m.

$$Vp=\frac{11}{6}\cdot\ [(75+73)\ 63+(85+\ 75)\ \cdot 73],\ =38507\ (m3)$$

Earthwork's quantity of the trench access to the pit is calculated by the formula (only for pit):

$$V_{tr.a.} = \beta\left(\frac{bh^2}{2} + \frac{h^3.m}{3}\right) \quad (28)$$

where, B – factor of access trench bottom construction, β=100/ i – access slope, percent (for the project can be accepted 10 percent and I:10=10).

h– depth of pit, m.

b–access trench width on the bottom, is accepted independently and equals 3,5 (with one–way traffic) or 6 (with two– way traffic), m.

M–slope construction factor (annex. №1. table.2). All soils for backfilling, forming further the foundation basis for the equipment, floors, a perimeter walk, access roads to be compacted. During determination of filled and compacted layers' thickness, number of passes of soil compacting machines it is reasonable to implement it per the ENiR.[18]

$$V_{tr.a.} = \frac{100}{10}\left(\frac{(6 * 11^2}{2} + \frac{11^3 * 0.5}{3}\right) = 5848\text{m}^3$$

1. The amount of uncultivated soil (volume of soil insufficiency)

$$V_{\text{shortage}} = F_{(tr)} \cdot \Delta h_{sh}, (m^3). \quad (29)$$

$$Fp = l1s.b. \cdot l2s.b. \quad (30)$$

where $F(tr)$ – area of the pit (trench) bottom

Δhsh – 0,05÷0,2 – quantity of soil shortage level during excavation, m

$$Fp = \cdot AB = 75 .63 = 4725 \text{ m}^2$$

$$V_{\text{shortage}} = 4725 .0,2 = 945\text{m}$$

5) Concrete preparation for foundations

In soft soils for monolithic foundations is arranged concrete preparation from lean concrete. The quantity of concrete preparation for one foundation is (for strip foundation and columnar foundation we have the following calculation.[18]

$$Wp = Fp \cdot hp, m^3. \quad (31)$$

where hp – thickness of concrete preparation,

hp=0,1m; Fp – area of preparation:

$$Fp = a1 \cdot b1, m2. \quad (32)$$

Where, a1 and $b1$ – the dimensions of concrete preparation, ref. foundation section.

$$Fp = 2.1.5 = 3\text{m}^2$$

$$Wp = 3 \cdot 0.1 = 0.3m^3$$

6) Reinforcement installation

Reinforcement consumption for the strip foundation:

$$G1 = g \cdot \frac{\text{Vs}}{\text{f,}}, \text{t.} \quad (33)$$

where g – reinforcement frame consumption for $1m3$ of concrete, kg/$m3$ (100–150 kg/$m3$)

$$\frac{\text{Vs}}{\text{f,}} = (hf\ (s) \cdot 0{,}3 \cdot \text{P}base.) + (hf\ (b) \cdot 0{,}8 \cdot \text{P}base),\ m^{3.} \quad (34)$$

where $\frac{\text{Vs}}{\text{f,}}$ volume of strip foundation, m^3.

$hf\ (b)$– the height of the foundation base, ref. monolithic strip foundation.

$hf\ (s)$– the height of the structure basement, ref. monolithic strip foundation section.

P$base$ − total foundation length per the scheme (8 page). Reinforcement weight distribution between grid and frame conditionally accepted as: for the network–0,7$G1$; for the edge – 0,3$G1$.

$$\frac{\text{Vs}}{\text{f,}} = (1\ (s) \cdot 0{,}3 \cdot 72.) + (1\ (b) \cdot 0{,}8 \cdot 60),\ = 70.5m^3$$

$$G1 = 100 \cdot 70.5,\ = \frac{7050\text{kg}}{1000} = 7.05\text{t}$$

The quantity of formworks is equal to the area of the surfaces form. It is necessary to count the area of rectangular side faces of the foundation and trapezoidal inner glass surfaces. The scheme of foundations reinforcement, type of reinforcement structures and reinforcing bars consumption in real conditions is included in the working drawings of the foundations. In the Course Project the amount of reinforcement work is defined as follows. Accepted the foundation reinforcement in the form of a horizontal grid at the bottom and vertical spatial frame at the entire height of the concrete preparation to the top of column footing. For the formwork of the construction, we will discase later.[18]

Table 9- Technical characteristics of large panel formwork

Name of indicators, units of measurement)	(The size)
(Height of linear and universal boards)	(300–3300 mm in increments of 300 mm)

7) Foundation waterproofing

In the Diploma project accepted the following form of waterproofing – waterproofing coating. Painting is done by applying bituminous mastics to the surface to be painted. The number of applied layers is 2. Waterproofing is carried out in accordance with E4-3- 184.

For the strip foundation: To calculate the amount of work necessary to find the surface waterproofing area.[18]

$S_{waterproof}$= [(hf (s) · P $_{\text{exterior walls}}$) + ((0,25 + 0,3) · P $_{\text{exterior walls}}$)] · 2, $m2$. (35)

where hf (s)– the height of the structure basement, ref monolithic strip foundation section (figure.3)

P $_{\text{exterior walls}}$– perimeter of the exterior walls of the building.

$S_{waterproof}$= [(10 (s) · 72) + ((0,25 + 0,3) · 60)] · 2, =1449 m^2

8 Backfilling.

The volume of soil to be backfilled in the pit gaps, in structures with basements is calculated by the formula (for pit):

$$v_{b.f} = \frac{vp\ \_\ v_{s/f} \_ v_{cellular}}{1 + kir} \quad (36)$$

where $V_{s/f}$–volume of strip foundation, m^3.

V_{cellar}– volume of cellar:

K_{rl}– Index of residual soil loosening.

$h_{(s)}$– the height of the structure basement, ref. monolithic strip foundation section.

$$V_{cellar}= l_1 \cdot l_2 \cdot h_{f(b)}, m^3 \quad (37)$$

$$V_{cellar}= 72 \cdot 60 \cdot 10 = 43200 m^3$$

$$v_{b.f} = \frac{38507 - 70.5 - 43200}{1 + 1.05}$$

$$= -2323{,}65\ m^3$$

9) Soil compactions

Compaction volume is measured mainly by the area of compaction that can be found, given by the average value of the compacted layer thickness (for the pit):

$$v_{com} = \frac{v_{bf}}{h_c}, m^{2.} \quad (38)$$

where V_{bf}– backfilling **v**olume, m^3.

h_c– compacted layer thickness, 0,2÷0,4 m

$$v_{com} = \frac{2323{,}65}{0.5} = 4647\ m^2$$

10) Final land planning.

The final planning is made after the completion of all excavations and communication devices (for the pit):[18]

$$S_{planning}= S_{1(a)} - S_{building}, m^2 \quad (39)$$

where $S_{1(a)}$– cutting area of the vegetation layer of the pit (trench).

$S_{building}$– area of the building.

$$S_{building}=72.60 = 4320m^2$$

where 72, 60 – length and width of the structure in plan,

$$S_{planning}= 9765– 4320 =5445m^2$$

11) Removal of temporary fencing.

After finishing the construction work necessary to remove the construction temporary fencing, fencing perimeter determined by the formula **(**for the pit):[18]

$$P_{fen} = (20 + l_1) \cdot 2 + (20 + l_2) \cdot 2, m, \quad (40)$$

where l_1, l_2– length and width of the structure in plan.

Distance from the axis of the building in each direction is 20m.

$$P_{fen} = (20 + 72) \cdot 2 + (20 + 60) \cdot 2 = 344$$

7 Method choice of complex mechanized earth works process

During the comprehensive mechanization, the processes are performed by machine sets, complementing each other, and linked to each other on the basic parameters and the location in the processing chain.

When choosing methods of production work to be considered: the type of soil, the size of earth construction, the groundwater level, the range of soil haulage and the season of the work.

Excavation and haulage of soil during pits and trenches excavation can be carried out by bulldozers, excavators, in set with dump trucks.

The choice of a complex– mechanized production process of excavation is carried out on the basis of technical and economic comparison of options of different sets of machines. For comparison to be chosen 2–3 cars of one or different types.

In the diploma Project it is necessary to implement options comparison per the leading earthmoving machine. Topsoil removal is carried out by bulldozers or scrapers. When choosing types of machines must be considered that the process actually involves topsoil removal and soil transportation. Bulldozers to be used preferably to move the soil at a distance of 50–150 meters (depending on the power of a bulldozer). Maximum efficiency is achieved when moving soil at the following distances: for bulldozer on the basis of tractors DT–74, DT–75, T–4AP1 – 30–50 m; on the basis of tractors T–100, T–130 – 50–70 m; on the basis of tractors T– 180, DET250, T–330 – up to 150 m.

During design of topsoil removal by earthmovers, to be set the haulage distance of topsoil and in accordance with this distance to select the brand of bulldozer or scraper, using the recommendations trough the construction practice (table 5) and machine specifications (annex №1 tables 7,8) [18]

Table 10 - Earthmovers recommended for topsoil removal with the different distance of topsoil haulage table.3. Appandix.1

(The average distance of soil haulage)	(Up to 50)	50…70	70…150
(Recommended equipment)	(Bulldozer on the tractor basis with the power, kW (l.s.))		
(Equipment features)	(Up to 59)	80…108	108…130

We choose bulldozer on the tractor basis with the power 79 kw.

Because of 5 km soil transportation I choose tractor (T-100M) and bulldozer (DZ-4) with power (Power 40, kW).

Shift operating of the bulldozer is calculated per the formula.

$$p_{sh.o} = \frac{60*T*q*\alpha*C_{time}}{T_1+T_s+\frac{L_r}{V_r}+\frac{L_n}{V_n}} \quad (41)$$

where T – bulldozer working hour in a shift,8h.

q– the soil volume moved with a dump, m3.

α– factor, including the loss of soil in the process of haulage, α = 1 + 0,005 ·l_r;

$$\alpha = 1 + 0{,}005 \cdot 3 = 1.012$$

C_{time}– factor of the equipment usage in time (during haulage of loosened rock material 0,75; in other cases – 0,8) for sandy and loam we will use 0,36;

T_l– time for a set of soil category, min

T_s– time spent on switching speeds, min.

l_r, l_n– estimated haulage distance with the load and empty, $l_r = l_n$,

V_r,V_n–bulldozer speed during soil transportation (charged) and forward drive (empty), m / min,

$$p_{sh.o} = \frac{60 * 60 * 0{,}75.1{,}012.0.36}{90 + 0.10 + \frac{2{,}4}{4{,}5} + \frac{2{,}4}{5}} = 19\text{min}$$

1)Selection of the excavator.

Selection of excavator depends on the soil volume in the pit To determine the cost of 1$m^3$of soil in the pit (trench) for each excavator type:

Soil volume in pit (More than 15000).

Capacity of excavator 17, 47 so type of excavator (E –504) with power (80–100) KW.[18]

$$C_{(1,2)} = \frac{1.08 C_{eqp-shift}}{p_{shf.pr}} \quad (42)$$

where 1,08– factor including overheads.

$C_{eqp.-shift}$– cost of equipment– shift of excavator

$P_{shf.pr.}$– excavator shift production, including soil excavation for dump and with loading in vehicles.

$$C_{(1,2)} = \frac{1.08*23.78}{3.65} = 6.51$$

Shift production can be calculated by the following formula.

$$P_{shf.pr.(1,2)} = \frac{V_{k(tr)}}{\sum N \ qp_{-shift}} \quad (43)$$

$$P_{shf.pr.(1,2)} = \frac{38507}{10549} = 3.65$$

where, $\sum N_{qp.-shift}$– total number of equipment–shifts of excavator

For the pit**:**

$$\sum N \, qp_{-shift} = \frac{V_{tr}}{100} H_{sd} \quad (44)$$

$$\sum \mathrm{N\ qp_{-shift}} = \frac{38507}{100} * 23.78 + \frac{5848}{100} * 23.78 = 10549$$

where H_{sd}– standard duration of the excavation cycle

$V_{p(tr)}$–soil quantity of the pit

$V_{tr.a.}$–access trench quantity.

To be determined the specific capital investments forthe development of 1m3 of soil in the pit (trench) for each type of excavators:

$\mathrm{P_{shf}} = 350$

$\mathrm{shift} = 16{,}62$

$$C_{sp.(1,2)} = \frac{1.07 C_{i.e}}{P_{shf}} \quad (45)$$

$$C_{sp.(1,2)} = \frac{1.07 * 16.64}{350} = 0.05$$

where $C_{i.e.}$ – inventory–estimated cost of excavator.

$P_{shf.}$– number of excavator work shifts in a year. Approximately it can be accepted as 350 shifts for machines with bucket capacity of up to 0,65m^3inclusive and 300 –for the bucket more than0,65m^3.

The final selection of the excavator is produced on the basis of comparison of specific reduced development costs of 1$m^3$of soil:

$$P_{sp.(1,2)} = \mathrm{C}_{(1,2)} + (\mathrm{E}_n \cdot C_{sp.(1,2)}) \quad (46)$$

where, E_n– normative factor of effectiveness of capital investments, equal to 0,15.

The operational capacity of the excavator is calculated using the formula and we took the data from table 1 enex1.

$$P_{sp.(1,2)} = 6.5 + (0.15 \cdot 0.05) = 6.50$$

$$P_{sh.o.} = \mathrm{T} \cdot 60 \cdot g \cdot n \cdot K_l \cdot K_b \quad (47)$$

where T–shift duration, 1 hour.

g–bucket volume

n– number of cycles per minute 60;

K_l– bucket volume usage factor

K_b– shift percent uptime (0,8–0,85);

t_c– time of one cycle

$P_{sh.o}$ =1.60.0,5.0,4.0,8.2,7=25,92

2) Selection of mechanisms for soil compaction.

Soil compaction work in the pits are implemented in two steps:

-Soil compaction between the column’s foundations.

-Over the column’s foundations.

Depending on the lack of space of works performance conditions, can be used:

-Motor rollers with smooth rolls – for cohesive soil;

-Vitriolled– for non–cohesive soils.

-Hydraulic–mechanical vibratory compactors – for all soils;

-Electrical self–moving vibrating rammer – for non–cohesive and lowly cohesive soils;

-Electrical rammer – for cohesive and non–cohesive soils.

Shift operating performance of rollers is calculated by the formula:

We chose DU–32A (Trailed).[18]

$$P_{sh.o.} = \frac{(B - b) \cdot \nu \cdot 1000 \cdot h \cdot T}{m} \quad (48)$$

where B– width of compaction line, 2,6

b– width of overlap of adjacent lines (0,1–0,2 m);

ν– average speed (4–6 km / h

h – width of the condensed layer, m); 0,3–0,25

m– required number of blows or passes (8…10).

$$P_{sh.o.} = \frac{(2.6 - 0.1) \cdot 4 \cdot 1000 \cdot 0.3 \cdot 1}{10} 0{,}85 = 255$$

The composition of the machines included in the set to be determined by estimated (operational performance) and selected on the basis of the requirement for mechanization of all processes in the Volume of works, the usage of a minimum number of machines in the set, compliance with the specified flows of excavation in shift.

3 Measures for water drainage and artificial lowering of groundwater.

During implementation of zero cycle construction works it is necessary that the bottom of the pit (trench) was cleaned from groundwater. For this purpose, is used an open drainage, artificial lowering of groundwater levels and other ways.

The choice of method for groundwater control depends on the nature of the soil and excavation depth. Recommendations for choose of drainage and dewatering systems depends on the soil type that can be accepted from [2].

Open drainage is produced by pumping units, while entering the pit water is collected in areaway (shaft bottom sump), from there it is swap out by pump in the open or underground drains. With an open dewatering can be assumed that 1 square meter of pit surface and vertical projections of the walls, locations below the static groundwater level, the water flow is: with fine–grained sands 0,16; with medium–grained sands 0,24; with coarse sands 0,3–3,0; with fracture rock material 0,15– 0,5 cubic meter over hour. Water inflow into the pit (trench) in cubic meter over hour can be calculated by the formula.

$$Q = (F_{a.b(tr)} + F_{sl.}) \cdot \alpha \quad (49)$$

where $F_{a.\,b(p),(tr)}$– area of a bottom, pit (trench), m^3

$F_{sl.}$– slope area, located below the groundwater level, $m^{2.}$

$$F_{a.b.\,(p)} = 75*63=4725\ \text{m}^2$$

$$F_{sl.}= (\ h_p - h_{gwl}) \cdot \text{P}_p \qquad (50)$$

h_p, htr–pit or trench depth (per the task);
h_{gwl}– level of underground water, m
P_p– perimeter of the pit $(l_1 + l_2) \cdot 2$;

(72+60)2= 264

α– water inflow from $1m^2$, 0,16 – 0,5m^3/h.;

$$Q = 4797+_{72\,=}\ \alpha$$

$$F_{sl.}= (\ -10+11\ )72\ =72\text{m}^2$$

The number of pumps required for water pumping:

$$N = \frac{Q*S_f}{P_n} \qquad (51)$$

where S_f– assurance coefficient, to be taken to be equal to 1,1–1,2.

P_n– hour pump capacitym^3/h.

With a significant inflow of groundwater (in soils with a filtration ratio of 2 to 40 m /day.), it is recommended to use a method of artificial lowering of groundwater using well point systems, which are located along the outer perimeter of the earthworks at a distance from the pit slope edge0,5–1m.[18]

$$N = \frac{Qsf}{pn} = \frac{4725.1{,}2}{120} = 47.25$$

Water inflow to the closed installations for pits is calculated by the formula:

$$Q = \alpha \cdot C \cdot S, \qquad (52)$$

where Q– water inflow, m^3/h.

α– factor varying from 1 to 3m;

C– filtration coefficient (for clay – 0,005; loam – 0,005–0,4; sandy loams – 0,2–0,7; sand small – 1–10; average sand – 10–25; coarse sand – 25–75; gravel – 75–1000 m/days);

S– depth of required lowering of the water level (per the task);

Q=2.0,005.13 = 0,13

4) Reinforcement work of the construction.

Reinforced concrete is a building material in which concrete and steel reinforcement are combined together. The reinforcement is positioned in the tensile zone of the structure to absorb tensile stresses. Compressive stresses are transferred to the concrete. The connection of concrete and steel reinforcement provides high strength of the reinforced concrete structure in compression, tension and bending. In some cases, reinforcement is used to reinforce concrete against compressive forces, to absorb

shrinkage, temperature, transport, and other temporary and permanent loads. The advantages of monolithic reinforced concrete are largely determined by rational reinforcement. For monolithic structures, the type of reinforcement is selected considering the peculiarities of the operation of these structures, their size and configuration, as well as the technology and organization of work on the erection of monolithic buildings and structures. For our construction project we will calculate only the underground RCC of the construction.[18]

5 Calculation of monolithic RCC elements.

Quantity of column steel is Concrete Ratio=1.2.4, Dry volume= 1.54, Cement bag 50 kg, Total required steel=858.2kg=0.8582ton, required pieces for long bar=6 pieces, Required pieces for Ring bar=333 pieces, Long bar pieces length=5m and Ring bar pieces length=2m.We need 118 columns in ground floor which will move to the top floor of the construction while for the whole building we need design of 345 RCC concrete columns. Total required steel= 29,9-ton, Quantity of column concrete, Total column volume=0.854 cu.m., Total cement bag=4.521 bags, Total Aggregate=0.675 cu.m. Total sand=0.538 cu.m. For the whole building columns. Total column volume=294 cu.m. Concrete, Total cement bag=271 bags. Total Aggregate=40.5cu.m. Total sand=32.28 cu.m.

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

Item name	Concrete grade	Size without opening		Element volume	Number of items per floor	Concrete volume
		D	H	51 cu.m	118 elements	For all building
column	B25	0.8	5	30	10.3 cu m	294 cum

Quantity of foundation steel: Concrete Ratio=1.2.4. Dry volume= 1.54. Cement bag 50 kg. Total required steel=654.8kg=0.6548ton. Required pieces for long bar=4 pieces. Required pieces for. Ring bar=2 pieces. Long bar pieces length=2.5m. Ring bar pieces length=2 m. We need 118 monolithic foundation under columns in ground floor -1000 m. Total required steel= 7.67ton

Quantity of beam concrete Total beam volume=3 cu.m. Total cement bag=11.975 bags Total Aggregate=1.634 cu.m. Total sand=0.832 cu.m.

For the whole building beams

Total beam volume=35,4 cu.m. Total cement bag=958 bags.

Total Aggregate=130.72cu.m. Total sand=66.56 cu.m.

Table 13 -Specification of monolithic reinforced concrete beams on the standard floor

Item name	Concrete grade	Size without opening			Element volume	Number of items per floor	Concrete volume
		L	w	H		For floor One element	For all building
Foundation	B25	1.5	1.5	1	3	118	35.4 m2

8 Economic part

8.1 Estimation of construction cost

The estimate is the design required to determine the actual cost of the object.

period. Market based on specific standards and norms Estimates can be made by controlling prices. Due to the complexity of construction, its economic aspects are as follows, puts the condition before us: the responsibility of the construction industry and from an organizational and economic point of view low costs, discipline in the performance of key tasks. Left The main reason is the economy and complexity of construction sections. Estimates of these problems are mathematical, statistical, allows for logical solutions. The budget documentation includes the following documents: explanatory Note, general estimate of the estimate, self-estimate of the estimate, expenses the sum of the sets. Estimated cost of construction of a large facility in turn not included in the set of estimated costs, aggregated indicators only in the technical and economic part of the project considered. Construction, expansion, reconstruction, and technical reconstruction of a new facility Equipment works are carried out in accordance with the estimates of the developed projects carried out. Each project is technical, construction, economic and development of the estimated part. Depending on the complexity of the construction project from the 3rd control supervision is carried out. This is important at the stage of estimates action to be taken. Construction measures, as well as methods of calculating the estimated cost of the object: direct costs (RP), incidental costs (HP) and estimated costs (SP) sum: calculation of the construction of the facility funds are divided into the following chapters and According to the estimate, the total amount is 474,031,316,298 tenge. From the following condition:[19]

1. The cost of initial work.
2. The main objects.
3. Facilities for provision purposes.
4. Facilities for energy supply.
5. Objects for communication and transportation.
6. Outside networks, sewerage, water supply PEM.
7. Land development and greening.
8. Temporary buildings.
9. Unforeseen construction costs.
10. The content of the headquarters.
11. Training.
12. Survey and design work

$$ССМР = ПЗ + НР + СП. \quad (53)$$

$$К = МРП\ 2021 / МРП\ 2001 = 2778775 = 3,58$$

From the above coefficient, the market for 2021, The total amount of prices – 462442304.86 tenge which is equal to10880999$ dollar.[19]

CONCLUSION

The building I am planning is a public Library with other entertainments and living building. Factors affecting the environment in construction due to construction is respected. This is why it is one of factors that have a detrimental effect I thought cars were polluting the atmosphere and this is a harmful effect.

The purpose of this diploma project is to describe the building architecture of the designed object, calculate the structural component of the building, plan the processes and duration of construction, feasibility study of the selected methods, mechanisms, and methods of automated calculations.

The Educational building in Atyrau Kazakhstan is a Library building that will represent the aesthetic beauty and expressiveness of modern architecture, greatness, and the power of engineering, as well as progressiveness and efficiency software systems used in the construction industry. For this building I calculated the space planning solution, specific Construction materials, Energy Efficiency system with ventilation system.

As a result of this work, architectural and planning decisions were adopted and justified, plans, sections, nodes were developed, the main anti-seismic measures. In other sections were calculated. Structural elements using automated calculation systems, selected according to the assignment, technological maps were designed for earthworks and Reinforcement t, as well as concrete works, the process of construction production as a whole and its duration, the main work is described and an estimate is made construction of the facility under construction, the general construction a plan showing the general situation and location of all structures and constructions on the site and the operation of all mechanisms involved in the process erection of a building.

The structural and Architectural design of the building was developed by Ashraf which at least this building can have the capacity of 300 people during the working hours as we know from the Architectural drawings the building is about 10 m underground and for that we have the modern ventilation system with other Energy efficiency facilities.

The skeleton or structural design of the building is made by Etabs.19 only for structural columns (CC62 and CC59) for further information you can check Sheet-4.

The estimation part of the project was developed by Kazakhstan building economical program from those coefficients and rates (3,58) that we had in software according to the market for 2021, The total amount of prices – 462442304.86 tenge which is equal to10880999$ dollar.

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2. Eurocode addation1 - En 1991 movements on building [2]
3. Eurocode addition 2. En 1992 design of concrete structure [3]
4. Eurocode addition 7. En 1997 geotechnical strategy,[4]
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14. NTP RK 01-01-3.1 (4.1) -2017 Loads and impacts on buildings - snow, wind [14].
15. Meticulous instructions for the performance of work. [15]

Appendixes

Appendix A

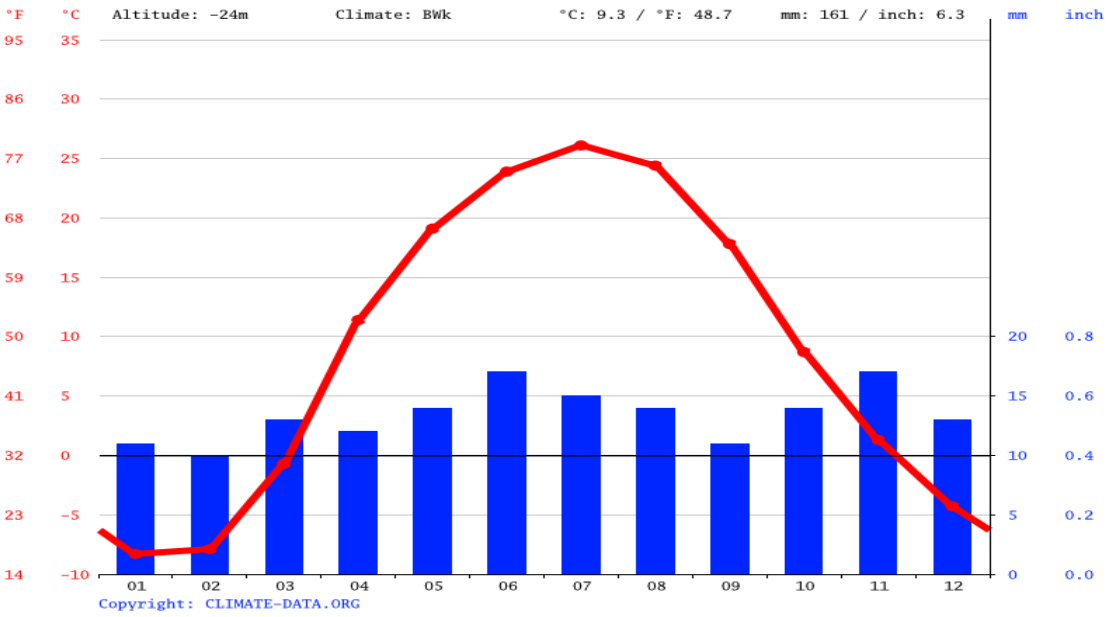


Figure A. 1 - Climate graph of Atyrau city

N Northern	NE Northeastern	E Eeastern	SE Southeastern	S Southern	SW Southwestern	W Western	NW Northwestern
10.8%	10.6%	15.5%	14.6%	14.6%	12.3%	13.7%	7.9%

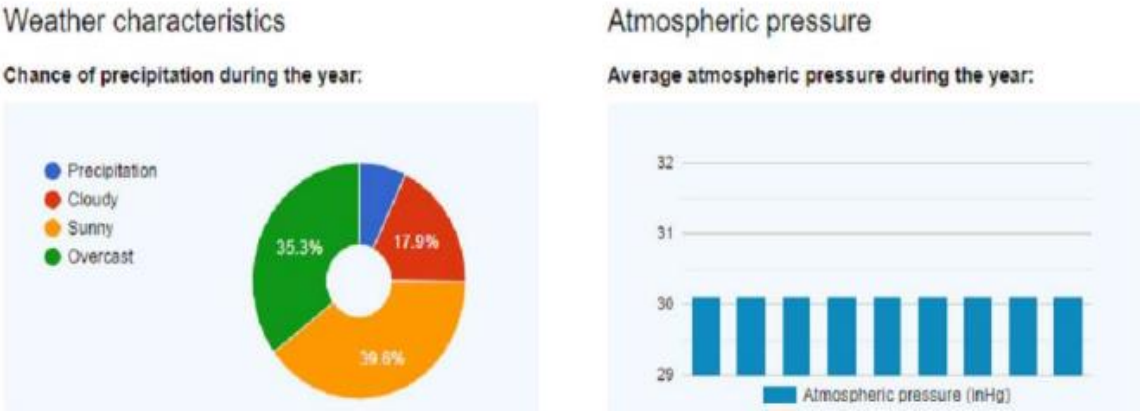


Figure A. 2 - Wind pressure in NESW sides.

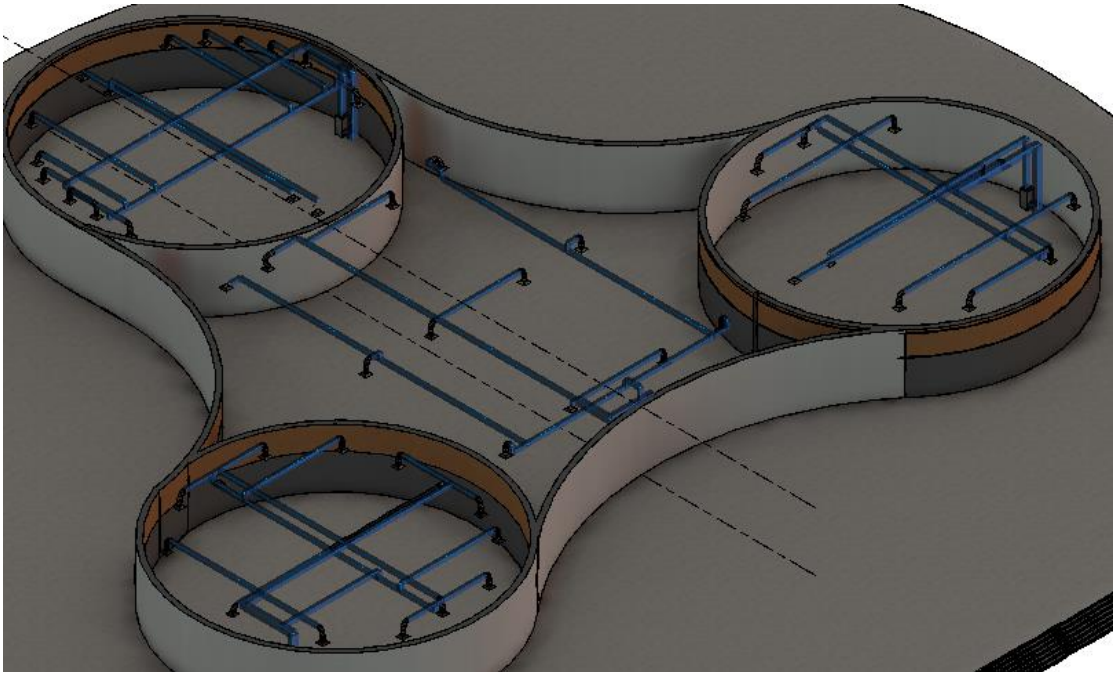


Figure A.3 - Plan of ventilation system for the library project.

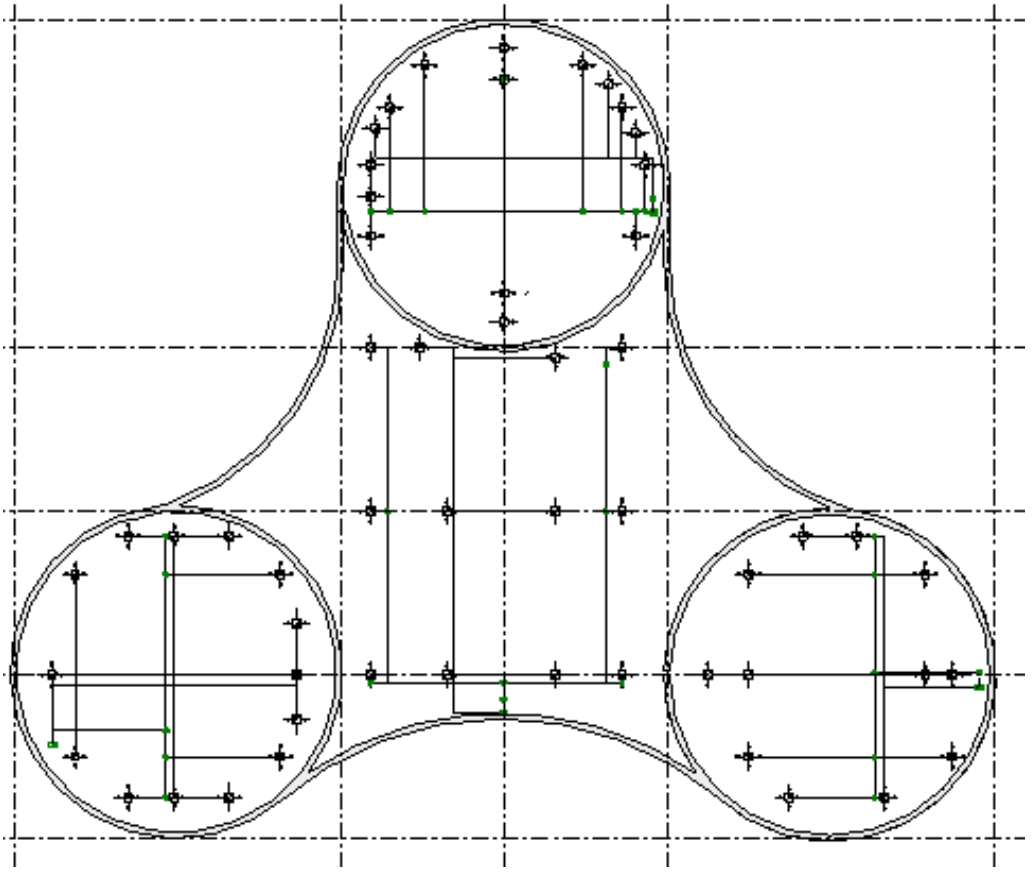


Figure A. 4 -Floor plan of ventilation system.

Appendix B

From all load combination we got the following result. Axial force for super dead load case comb 1.

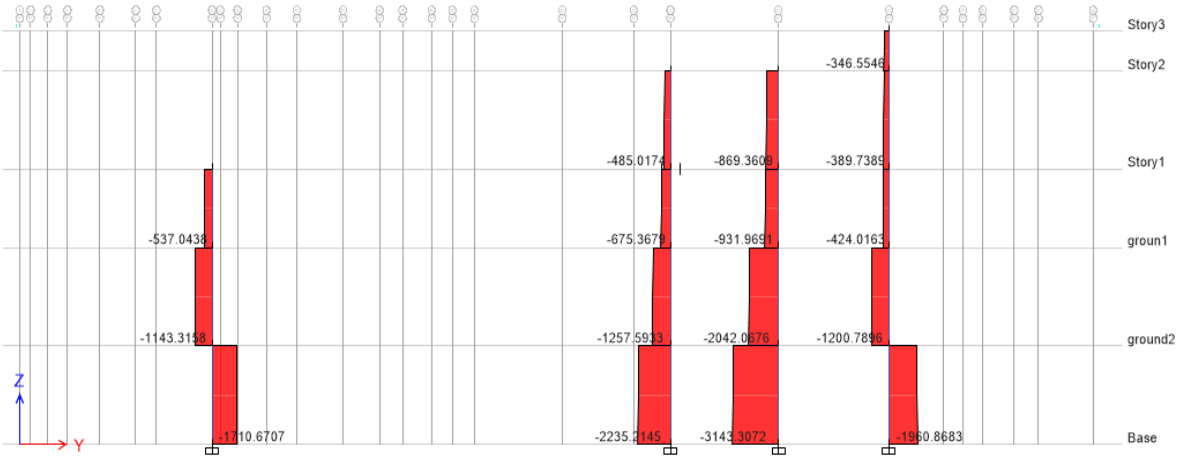


Figure B.1 - Axial force in w-18.

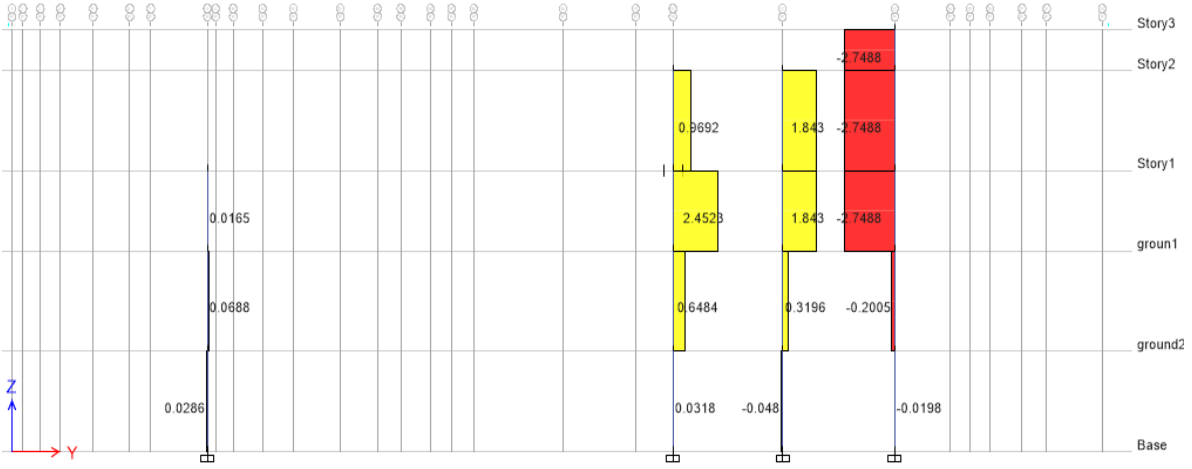


Figure B.2- Torsion in load case SDL.

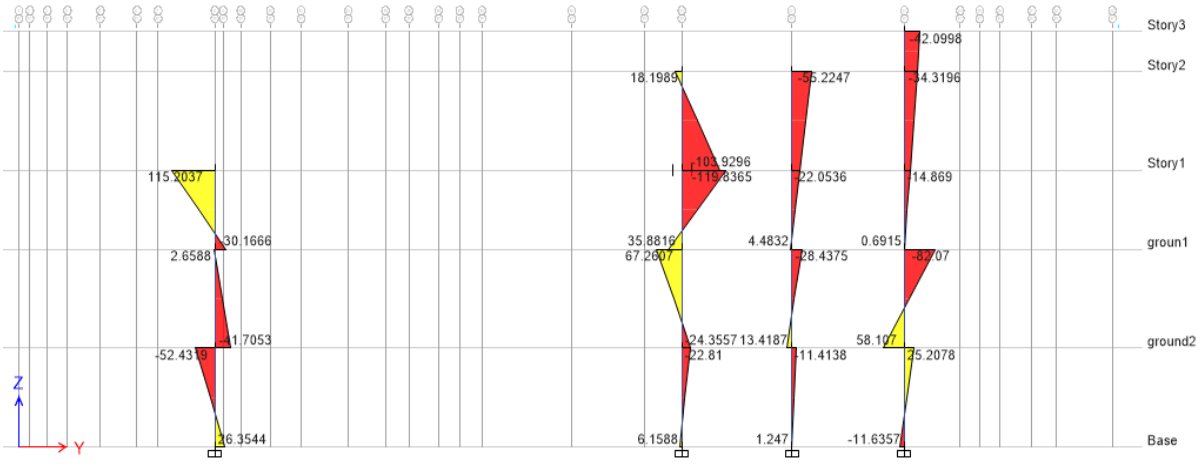


Figure B.3 - Moment 2-2.

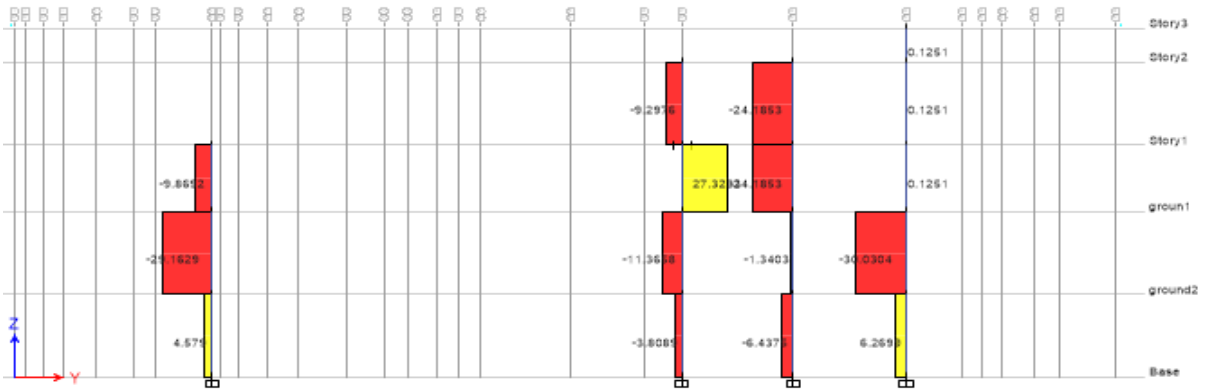


Figure B.4 - Shear force 2-2.

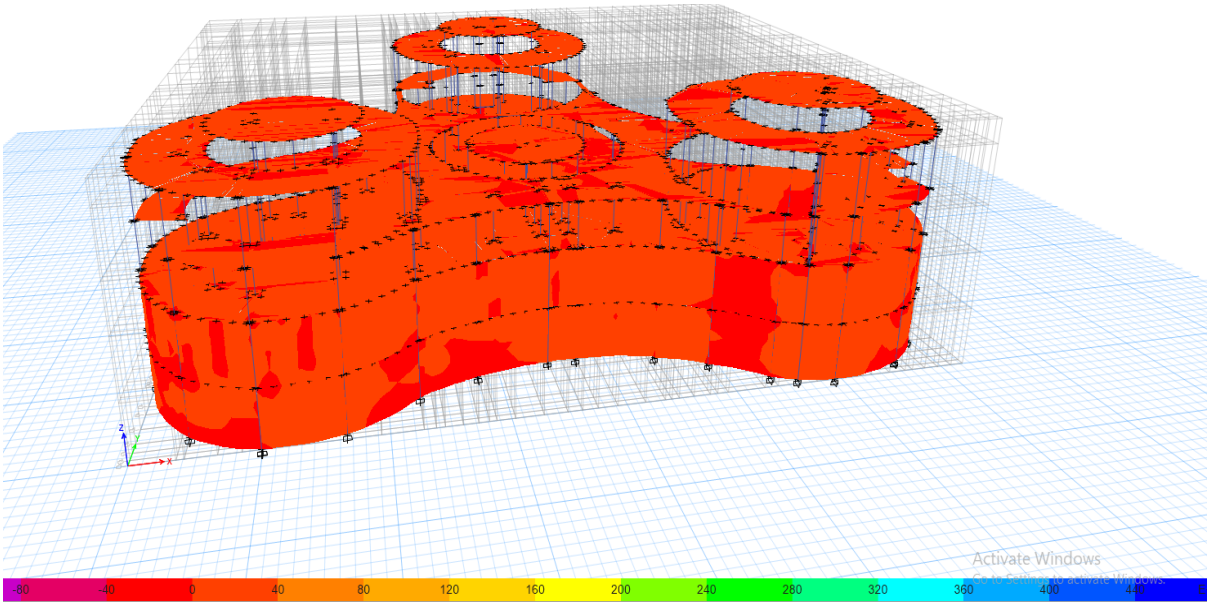


Figure B.5 - F_{max} in dead load.

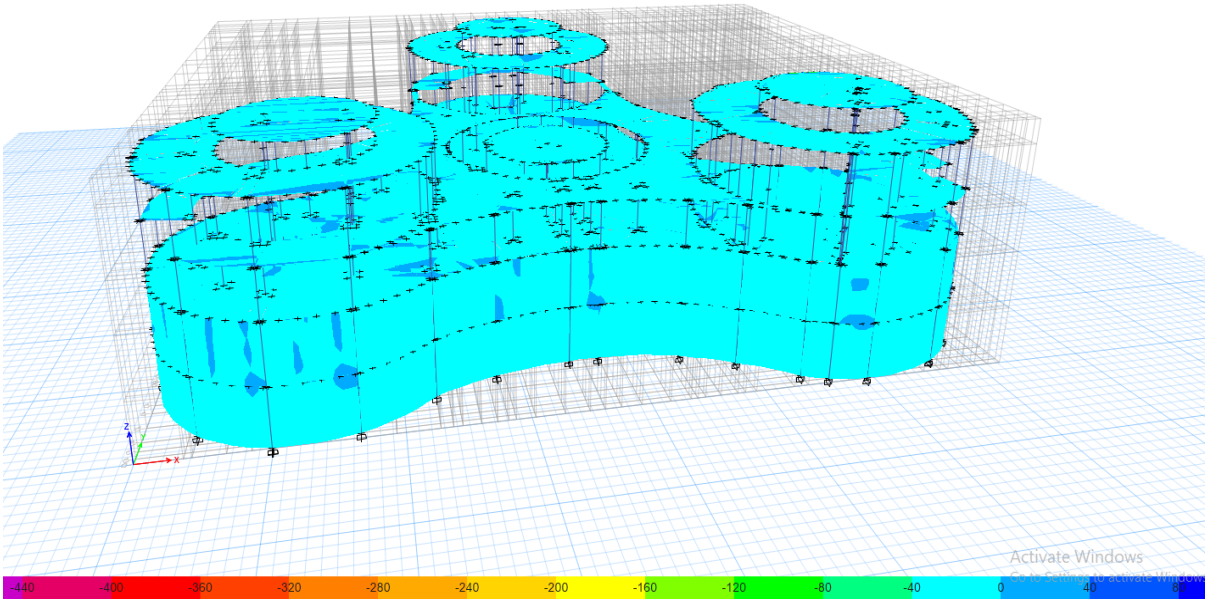


Figure B.6 - F_{min} in dead load.

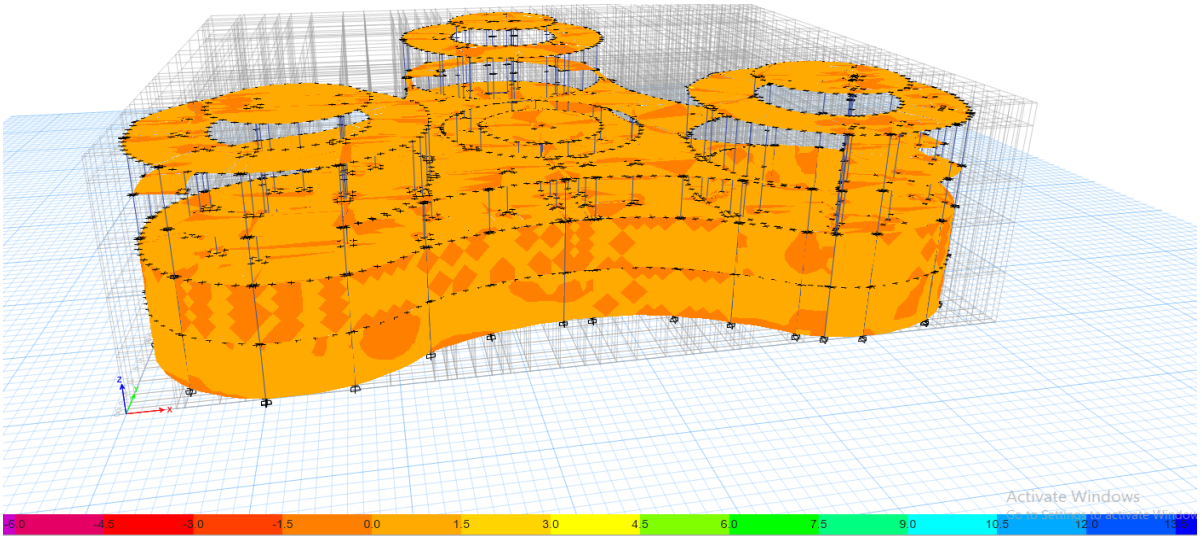


Figure B.7 - M_{max} dead.

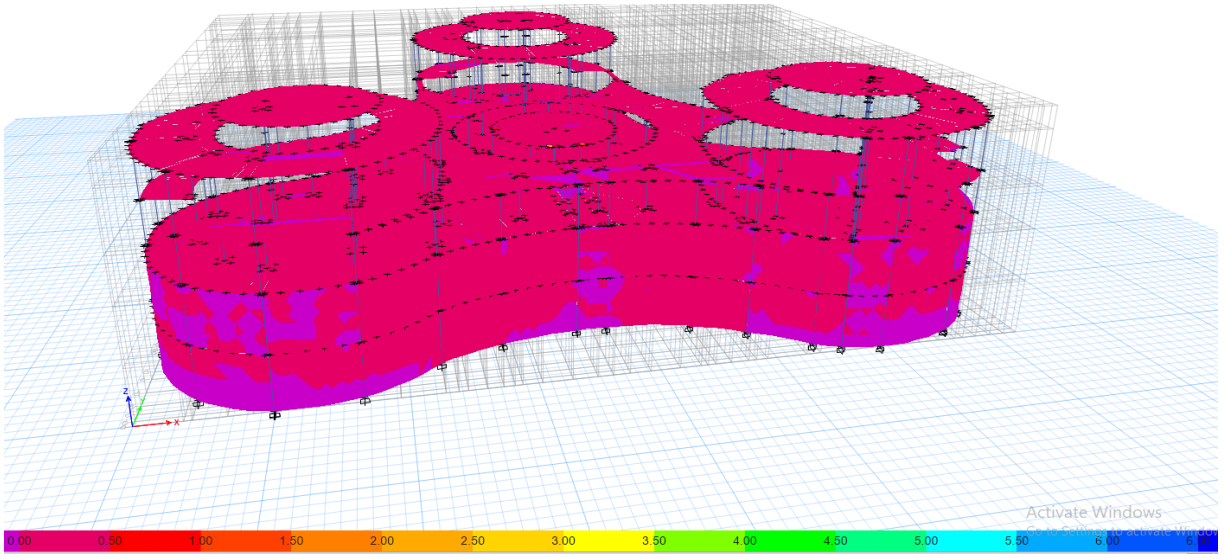


Figure B.8 -Shell stress S_{max} dead load.

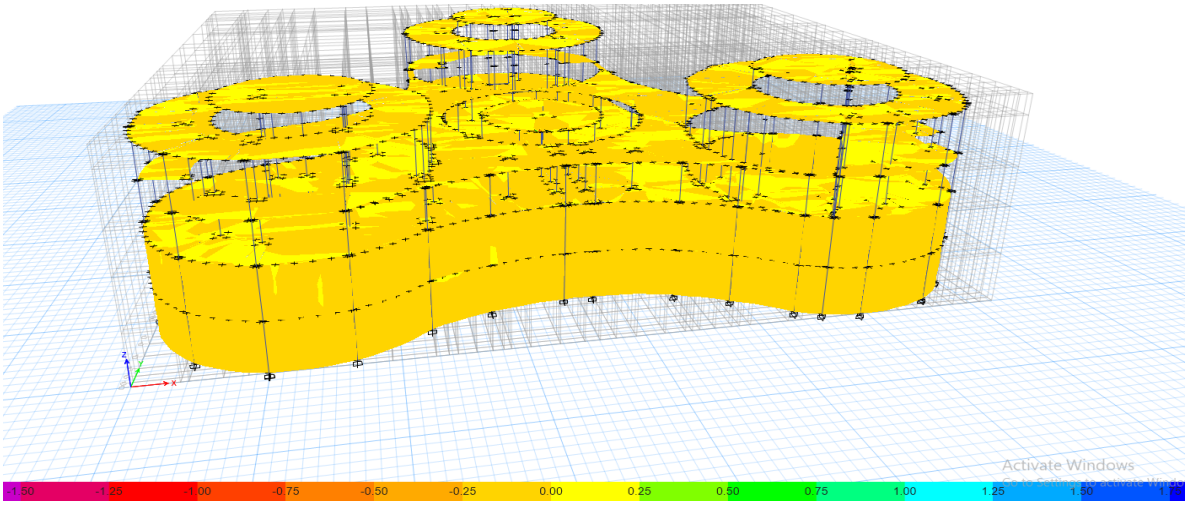


Figure B.9 - Shell stress S_{min} dead load

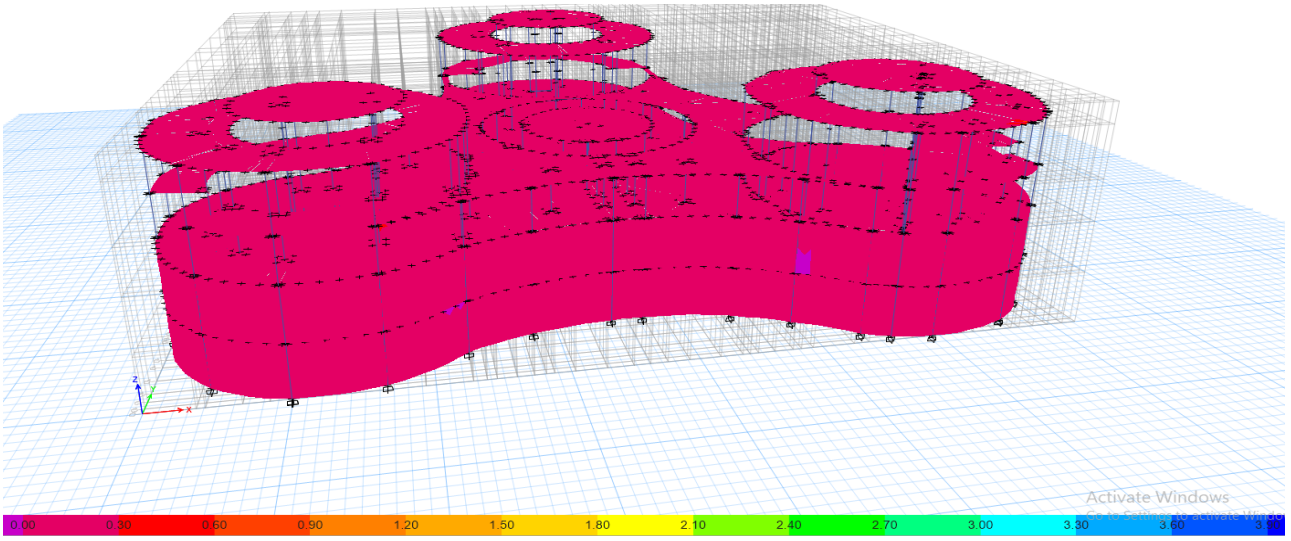


Figure B.10 - Shell strain Emax

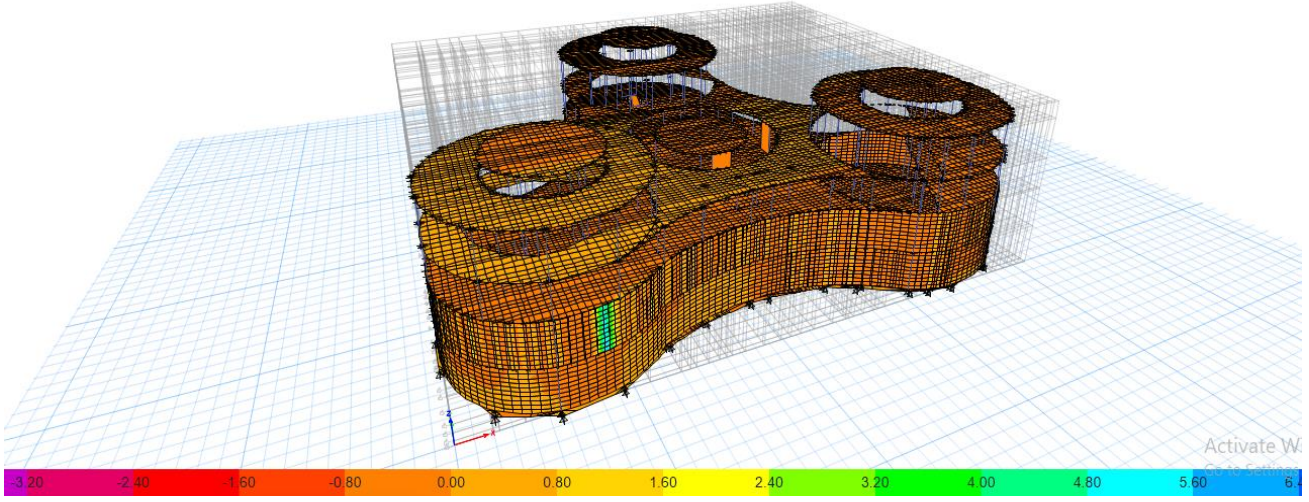


Figure B.11 - Displacement in dead loads.

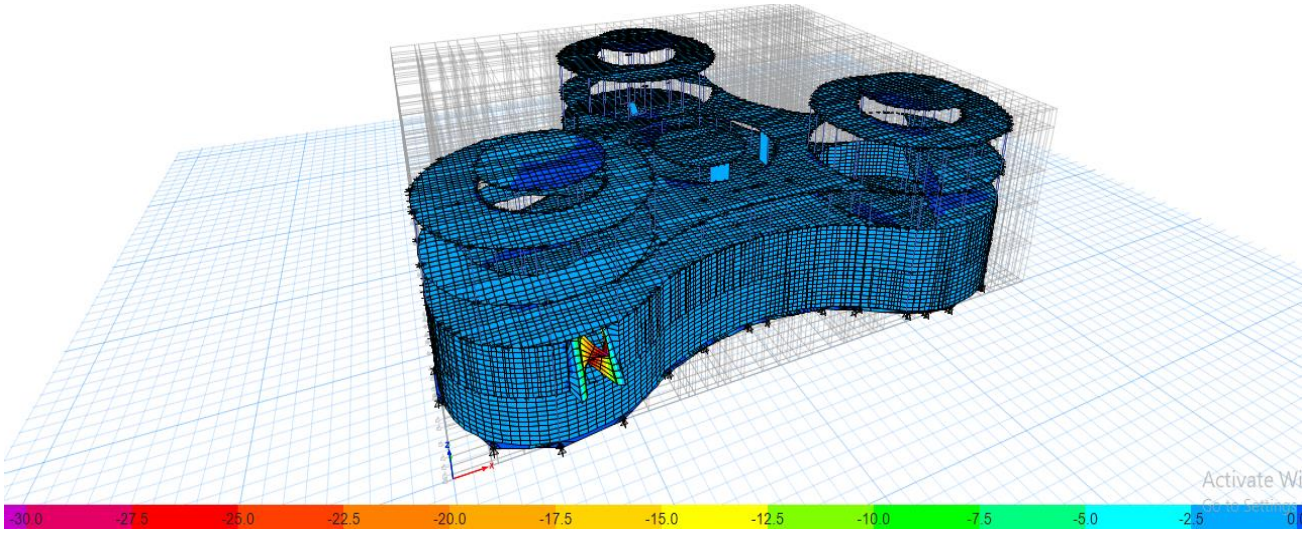


Figure B.12 - Displacement of super dead load.

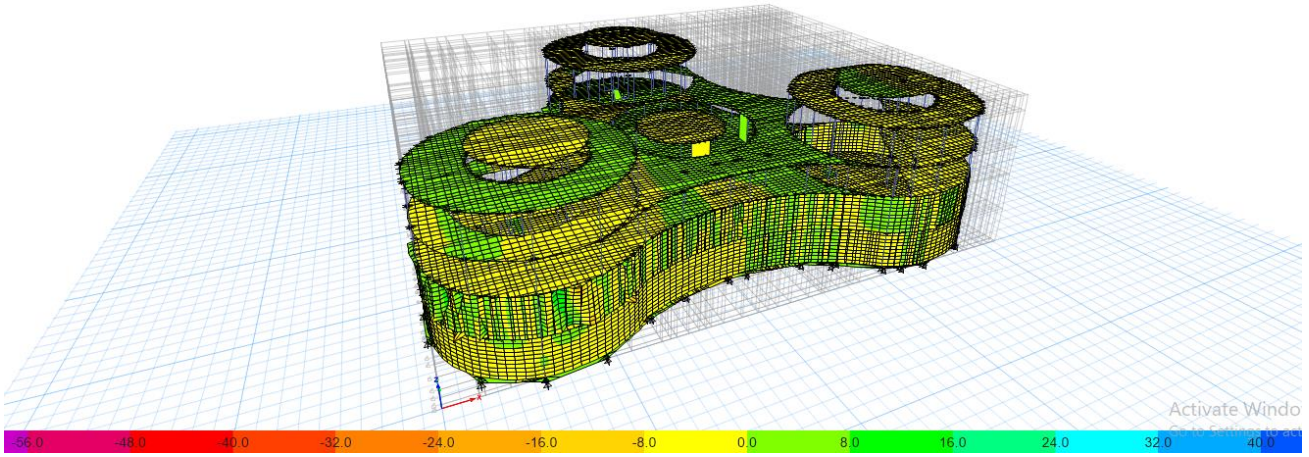


Figure B.13 - Displacement in live loads.

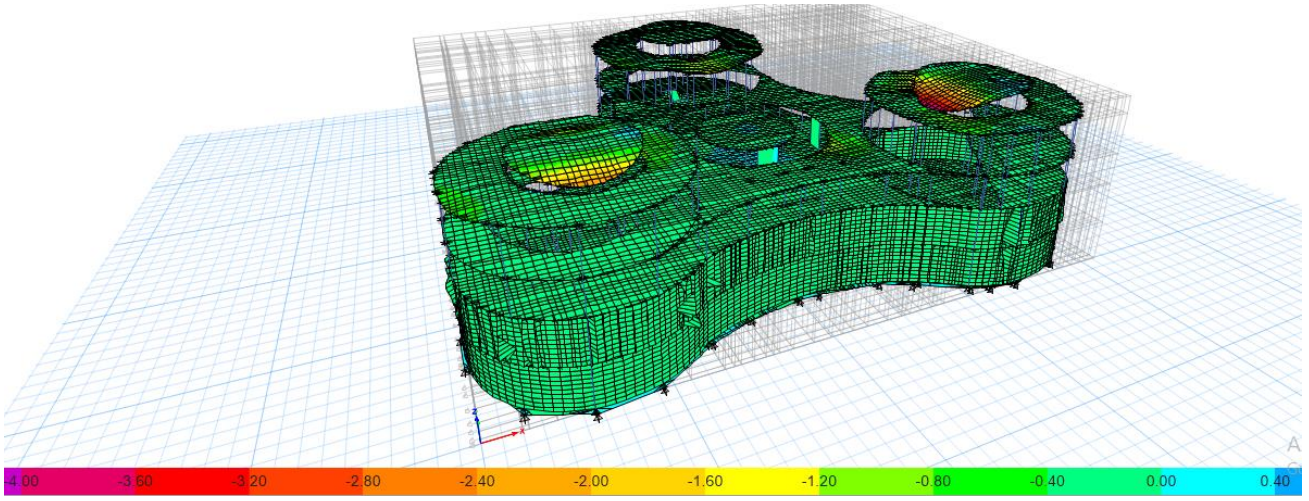


Figure B.14 - Displacement in snow loads.

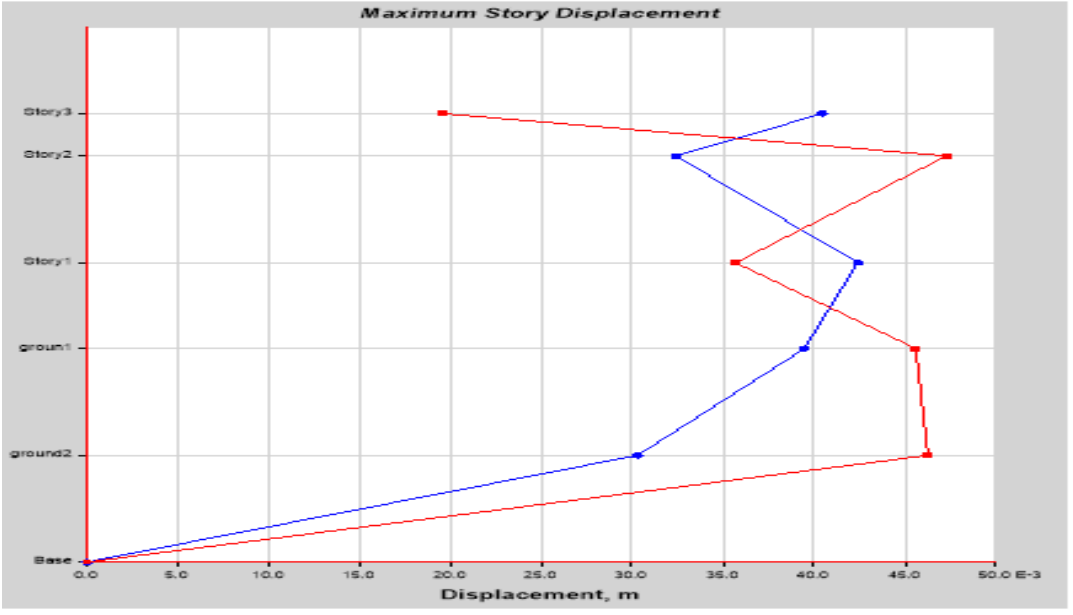


Figure B.15 - Maximum story displacement.

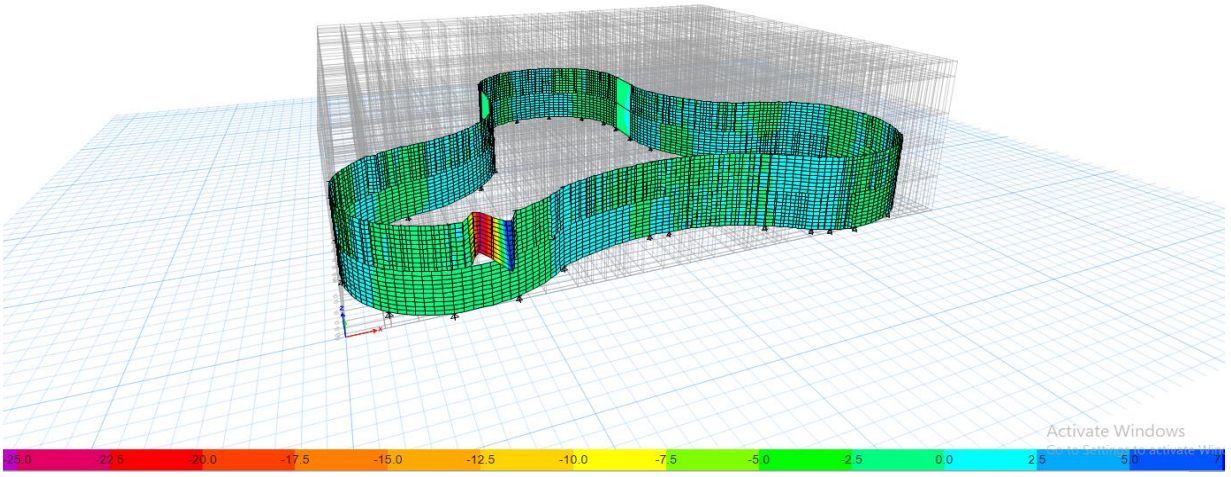


Figure B.16 - Displacement of shear wall against soil pressure.

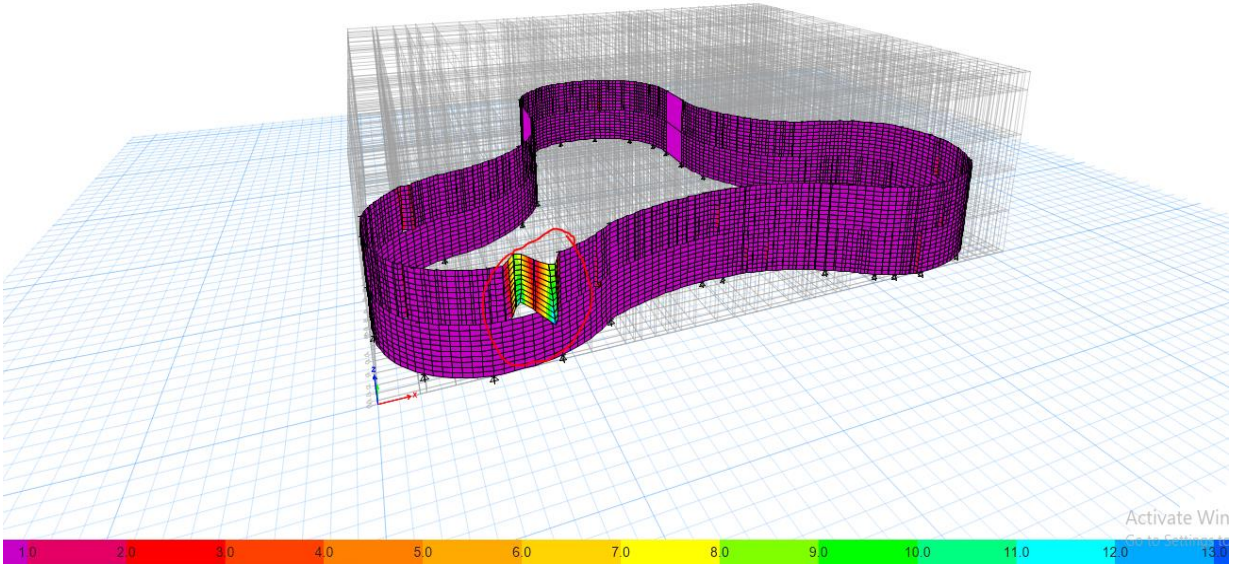


Figure B.17 - Displacement and resultant forces with wall deformed shape.

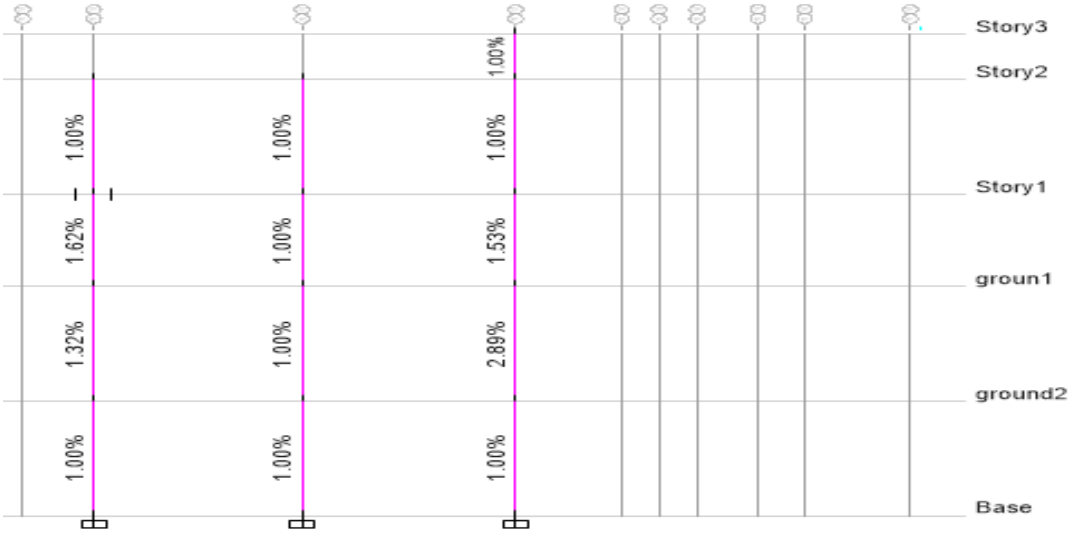


Figure B.18 - Rebar percentage.

Expandatory note of the Design.

The calculation was achieved by the ETABS software package.2019 (non-commercial). "

The calculation is based on the finite element method in movements. The main unknowns are taken the following node movements:

X axis linear X
Y axis linear Y
Z axis linear Z
UX angular around the axis X
UY angular around the axis Y
UZ angular around the axis Z

In the ETABS 19 (non- commercial)" the provisions are implemented

The following regulatory and regulatory documents: Construction in no seismic areas. Updated Edition of Eurocode 7 1997 .. Steel structures. Updated

Edition of Eurocode 3 1993 *. Loads and impacts. Updated edition of Eurocode 2 1992 *Foundations of buildings and structures. Updated Edition of Eurocode 2 1992 *. edition of Eurocode 2 1992.edition of Eurocode 8 1998.Concrete and reinforced concrete structures. The main provisions. Updated edition of Eurocode 2 1992.

Loads and impacts.
Concrete and reinforced concrete structures.
Construction in seismic areas.
Steel structures.
Foundations of buildings and structures.
Concrete and reinforced concrete structures.
Code of rules for design and construction.
Design And arrangement of columns of buildings and structures.
High-rise buildings and complexes.
СНиП 52–01–2003. Concrete and reinforced concrete structures.
НП-031-01. Design standards for earthquake-resistant
According to Eurocode46
Continuation of application A
ДБН В.2.3-14:2006. Transport facilities. Bridges and pipes.
Norms designing.
ДБН В.1.2-2:2006. Loads and impacts. Design Standards.
ДБН В.1.1-12:2006. Construction in seismic regions of Ukraine.
ДБН В.2.2-24:2009. Design of high-rise residential and civil structures.
ДБН В.2.1-10:2009. Foundations and foundations of structures.
ДБН В.2.6-98:2009. Concrete and reinforced concrete structures.
ДСТУ Б.В.2.6-156:2010. Concrete and reinforced concrete structures made of heavy concrete.
ДСТУ 3760:2006. Reinforcing steel for reinforced concrete structures.

СНРА II-2.02-94. Earthquake-resistant construction. Armenia.
КМК 2.01.03-96*. Construction in seismic areas. Uzbekistan
СНТ 2.01.08-99*. Construction in seismic areas. Turkmenistan.
ПН 01.0.1-09. Construction in seismic areas. Georgia
AzDTN 2.3-1-2010. Construction in seismic areas. Azerbaijan.
СНиП РК 2.03-30-2006. Construction in seismic areas. Kazakhstan.
МКС ЧТ 22-07-2007. Earthquake-resistant construction. The types of finite elements used are indicated in document 1. In this document, except for the node numbers related toto the existing element, the types of stiffness's are also. indicated. The following types of elements are included in the design. scheme: Coordinates of nodes and loads given in expanded. Documents 4,6,7 described in the right Cartesian system. Coordinates.

The calculation is made for the following downloads:
Loading 1 - static load
Loading 2 - static load
Loading 3 - static load
Loading 4 - static load
Loading 5 - static load
loading 6 - static load

Design combinations of forces for the rods are selected. Criterion of extreme normal and shear stresses in the peripheral zones of the section. Design stress combinations for plate Elements are selected according to the criterion of extreme. Stresses Considering the direction of the main sites.

Forces (stresses) in elements of the problem under analysis are presented in tabulated form in part 6. Units of measurement for forces are specified in the heading of the table. Type of finite element from the FE library, number of the loading and name of displacement are specified in the first column. In the following columns there are: In the first line of the heading - number of the element and number of the section in the element for which the forces are displayed; in the second and third lines - numbers of the first two nodes. Periods of natural vibrations for every dynamic (or after model analysis) loading are presented in part 9.Values of relative nodal displacements that correspond to forms of natural vibrations for every dynamic (or modal) loading are presented in part 10.Components of dynamic load when it is expanded according to forms of natural vibrations for every dynamic loading are presented in part 11.Masses collected at nodes for every dynamic loading are presented in part 17Units of measurement for masses are specified in the heading of the table. The first column indicates the number of the loading and the characteristic of masses. The other columns indicate numbers of nodes in ascending order and the corresponding values. forces N axial force: positive sign corresponds to tension. MK twisting moment about the X1-axis; positive if it is directed anti- clockwise when you look from the end of the X1-axis at the section that belongs to the end of the bar MY bending moment about the Y1-axis; positive if it is directed anti clockwise.

Continuation of Appendix B

Table B.1-Joint displacements

Story	Label	Unique Name	Output Case	Case Type	Ux	Uy	Uz	Rx	Ry	Rz
					m	m	m	rad	rad	rad
Story 3	189	38	DSlbS 1	Combination	-0.002268	-0.007746	-0.001413	0.000378	0.00017	-0.000037
Story 3	189	38	DSlbS 2	Combination	-0.002304	-0.008044	-0.001732	0.000428	0.000204	-0.000035
Story 3	189	38	DSlbS 3	Combination	-0.002304	-0.008044	-0.001732	0.000428	0.000204	-0.000035
Story 3	189	38	DSlbS 4	Combination	-0.002304	-0.008044	-0.001732	0.000428	0.000204	-0.000035
Story 3	189	38	DSlbS 5	Combination	-0.002293	-0.007955	-0.001636	0.000413	0.000194	-0.000036
Story 3	189	38	DSlbS 6	Combination	-0.002293	-0.007955	-0.001636	0.000413	0.000194	-0.000036
Story 3	189	38	DSlbS 7	Combination	-0.002268	-0.007746	-0.001413	0.000378	0.00017	-0.000037
Story 3	189	38	DSlbS 8	Combination	-0.002268	-0.007746	-0.001413	0.000378	0.00017	-0.000037
Story 3	189	38	DSlbS 9	Combination	-0.00168	-0.005738	-0.001047	0.00028	0.000126	-0.000027
Story 3	189	38	DSlbS 10	Combination	-0.00168	-0.005738	-0.001047	0.00028	0.000126	-0.000027
Story 2	74	706	Dead	LinStatic	-0.001454	-0.005361	-0.005509	-0.00059	-0.000663	-0.000949
Story 2	74	706	wind load x	LinStatic	0	0	0	0	0	0
Story 2	74	706	snow load I	LinStatic	-0.000011	-0.000036	-0.000019	0.000037	-0.000013	3.105E-07
Story 2	74	706	super dead	LinStatic	0.000002	-0.000004	-0.00009	-0.000013	0.000003	1.831E-07

Story 2	74	706	Live	LinStatic	-0.000045	-0.000129	-0.000099	0.000102	-0.00003	0.000002
Story 1	74	97	Dead	LinStatic	-0.000791	-0.003967	-0.005532	0.000592	0.000663	-0.00115
Story 1	74	97	wind load x	LinStatic	0	0	0	0	0	0
Story 1	74	97	snow load I	LinStatic	-0.000004	0.000001	-0.000012	-4.484E-07	0.000001	1.702E-07
Story 1	74	97	super dead	LinStatic	-0.000004	-0.000007	-0.00009	0.000026	-0.000008	3.122E-07
Story 1	74	97	Live	LinStatic	-0.000017	-0.000002	-0.000078	0.000056	-0.000025	0.000001
Story 1	74	97	soil pressure	LinStatic	0.003696	0.0024	-0.001454	-0.000106	0.000415	-0.000347
groun1	74	338	Dead	LinStatic	0.000614	-0.001869	-0.005582	-0.002421	-0.00558	-0.001562
groun1	74	338	wind load x	LinStatic	0	0	0	0	0	0
groun1	74	338	snow load I	LinStatic	-2.418E-07	0.000001	-0.000006	0.000001	-4.985E-07	1.664E-07
groun1	74	338	super dead	LinStatic	-0.000005	-0.000006	-0.000071	-0.000005	0.000003	4.892E-07
groun1	74	338	Live	LinStatic	5.484E-08	0.000002	-0.000043	0.000014	-0.000002	0.000001
groun1	74	338	soil pressure	LinStatic	0.002683	0.00158	-0.001502	-0.001015	-0.001588	-0.000438

Continuation of Appendix B

Table B.2 -Joint reactions

Story	Label	Unique Name	Output Case	Case Type	Step Type	Step Number	Step Label	FX	FY	FZ	MX	MY	MZ
								tonf	tonf	tonf	tonf-m	tonf-m	tonf-m
Base	74	135	Dead	LinStatic				13.2972	65.7252	106.9587	-67.5448	18.1128	-2.3605
Base	74	135	wind load x	LinStatic				0	0	0	0	0	0
Base	74	135	snow load I	LinStatic				0.0091	-0.0063	0.3569	0.0055	0.0001	0.00001006
Base	74	135	super dead	LinStatic				-0.1324	-0.3672	14.5974	0.302	-0.0795	-0.0023
Base	74	135	Live	LinStatic				0.0325	-0.0759	3.7066	0.1164	-0.0207	0.0056
Base	74	135	soil pressure	LinStatic				30.8601	38.6506	50.6874	-42.8084	14.3058	-1.0945
Base	74	135	DSlbS1	Combination				17.7725	88.2333	164.1008	-90.7778	24.3449	-3.1897
Base	74	135	DSlbS2	Combination				17.8213	88.1194	169.6606	-90.6032	24.3138	-3.1813
Base	74	135	DSlbS3	Combination				17.8213	88.1194	169.6606	-90.6032	24.3138	-3.1813
Base	74	135	DSlbS4	Combination				17.8213	88.1194	169.6606	-90.6032	24.3138	-3.1813
Base	74	135	DSlbS5	Combination				17.8067	88.1536	167.9927	-90.6556	24.3231	-3.1838
Base	74	135	DSlbS6	Combination				17.8067	88.1536	167.9927	-90.6556	24.3231	-3.1838
Base	74	135	DSlbS7	Combination				17.7725	88.2333	164.1008	-90.7778	24.3449	-3.1897

Base	74	135	DSlbS8	Combination				17.7725	88.2333	164.1008	-90.7778	24.3449	-3.1897
Base	74	135	DSlbS9	Combination				13.1648	65.3 58	121.5561	-67.2428	18.0332	-2.3628
Base	74	135	DSlbS10	Combination				13.1648	65.3 58	121.5561	-67.2428	18.0332	-2.3628

Continuation of Appendix A

Table B.3 - Assembled joint masses

Story	Label	Point Element	UX	UY	UZ	RX	RY	RZ	X	Y	Z
			tonf-s²/m	tonf-s²/m	tonf-s²/m	tonf-m-s²	tonf-m-s²	tonf-m-s²	m	m	m
Story3	14	1115	0.0021	0.0021	0	0	0	0	30.162	45.131	21
Story3	13	1116	0.00052	0.00052	0	0	0	0	41.7292	51.04	21
Story3	30	1162	0.00551	0.00551	0	0	0	0	42.1267	50.2249	21
Story3	73	1163	0.00491	0.00491	0	0	0	0	58.9178	5.6466	21
Story3	31	1164	0.0062	0.0062	0	0	0	0	61.3968	18.4	21
Story3	83	1166	0.00291	0.00291	0	0	0	0	8.9452	6.5913	21
Story2	97	676	0.17319	0.17319	0	0	0	0	32.73	59.02	19
Story2	98	677	0.00211	0.00211	0	0	0	0	32.5504	58.8868	19
Story2	99	678	0.00316	0.00316	0	0	0	0	32.9443	58.9562	19
Story2	74	706	0.17319	0.17319	0	0	0	0	39.17	59.02	19
Story2	77	709	0.00436	0.00436	0	0	0	0	38.9479	58.9944	19
Story2	78	710	0.00122	0.00122	0	0	0	0	39.3237	58.8576	19
Story1	211	99	0.47978	0.47978	0	0	0	0	34.78	29.83	14
Story1	212	101	0.47968	0.47968	0	0	0	0	37.43	29.83	14
Story1	213	103	0.33668	0.33668	0	0	0	0	36.1	23.79	14

Story1	118	107	0.4791 8	0.4791 8	0	0	0	0	34.78	17.78	14
Story1	119	111	0.4791 5	0.4791 5	0	0	0	0	37.43	17.78	14
Story1	97	87	0.3117 4	0.3117 4	0	0	0	0	32.73	59.02	14
groun1	263	299	0.3352 3	0.3352 3	0	0	0	0	37.43	7.52	10
groun1	262	301	0.3205 9	0.3205 9	0	0	0	0	44.7	6.38	10
groun1	85	303	0.0101 1	0.0101 1	0	0	0	0	9.9203	0.01	10
groun1	239	304	0.3414 2	0.3414 2	0	0	0	0	16.55	0.59	10
groun1	227	305	0.3352 3	0.3352 3	0	0	0	0	4.07	2.62	10
groun1	229	312	0.3194 7	0.3194 7	0	0	0	0	0	10.58	10
ground 2	97	130	0.3755 4	0.3755 4	0	0	0	0	32.73	59.02	5
ground 2	74	136	0.3740 6	0.3740 6	0	0	0	0	39.17	59.02	5
ground 2	102	142	0.3740 2	0.3740 2	0	0	0	0	39.17	54.68	5
ground 2	107	148	0.3820 1	0.3820 1	0	0	0	0	32.73	54.68	5
ground 2	135	184	0.3938	0.3938	0	0	0	0	27.23	56.01	5
ground 2	140	190	0.3905 1	0.3905 1	0	0	0	0	44.7	56.01	5

Table B.4 - Concrete Frame Design Load Combination Data

Combo Type	Combo Name
Strength	DConS1
Strength	DConS2
Strength	DConS3
Strength	DConS4
Strength	DConS5
Strength	DConS6
Strength	DConS7
Strength	DConS8
Strength	DConS9
Strength	DConS10

Continuation of Appendix B

Table B.5 -Concrete Column Design Summary - Eurocode 2-2004

Story	Label	UniqueName	DesignSect	Station	DesignOpt	Status	PMMRatio	PMMCombo	AsMin	As	MidBarAs	CornerBarAs	VMajCombo	VMajRebar	VMinCombo	VMinRebar
				m					m²	m²	m²	m²		m²/m		m²/m
ground2	C59	89	COL60	5	Design	NoMessage		DConS4	0.002827	0.002827			DConS10	0	DConS10	0
ground2	C62	115	COL Circular	2.5	Design	NoMessage		DConS4	0.005027	0.005027			DConS10	0	DConS10	0

Table B.6 - Concrete Column PMM Envelope - Eurocode 2-2004

Story	Label	UniqueName	Section	Location	P	M Major	M Minor	PMM Combo	PMM Ratio or Rebar %
					tonf	tonf-m	tonf-m		
ground2	C59	89	COL60	Top	134.0508	6.5234	-5.1911	DConS4	1 %
ground2	C59	89	COL60	Bottom	138.6365	-11.3747	5.3854	DConS4	1 %
ground2	C62	115	COL Circular	Top	344.1781	9.1781	-19.7398	DConS4	1 %
ground2	C62	115	COL Circular	Bottom	352.3305	-25.7425	9.3955	DConS4	1 %

Appendix C

Table C.1 - Construction of industrial structure foundations with the preparation of temporary excavations includes works listed

№ п	(Name of processes)	(Unit of measure)	(Volume of work)	
			(onone base)	(in total)
1	(The construction of temporary fencing)	(m)	344	
2	(Removal of top soil)	(m3)	s=9765	
3	(Soil excavation in the pit (trench) and trench access to the pit)	(m3)	Vp=38507 Vtra=5848	
4	(Excavation of soilunderrun)	(m3)	2160	
5	(Concrete preparation for foundations)	(m3)	0.3	
6	(Reinforcement installation, incl.:)	t	7.05t	
	a) grids installation	(pieces/t)	4964.4	
	b) frames installation	(pieces/t)	2127.6	
7	(Formwork installation)	(m2)	1241.8	
8	(Concreting of foundations)	(m3)	70.92m^3	
9	(Formwork removal)	(m2)	1241.8m^2	
10	(Foundation waterproofing)	(m2)	1449	
11	(Backfilling)	(m3)	-2323,65	
12	(Soil compaction)	(m2)	4647	
13	(Final land planning)	(m2)	5445	
14	(Removal of temporary fencing)	m	344	

Continuation of Appendix C

Table C.2 – Warehouses for the construction

Number	Temporary repair list	Unit size	Norms		Number of workers	Area for temporary Building s (m^2)	Type of building	The size of the Building plan, (m^2)	Number of building
1	Gards room	m^2	5worker	$7.5m^2$	5	7.5	Constant	2.5x3	1
2	Engineers office	m^2	One person	$5\text{-}6m^2$	1	55	Temporary	5x6	2
3	Dressing rooms	m^2	For one person 70%	$0.5m^2$	7	34	Temporary	4x4.5	2
4	Shaver	m^2	For 8 persons	$2.5\text{-}4m^2$	5	30	Temporary	1.5x2	10
5	Dining	m^2	For 1 person %05	$1\text{-}2m^2$	8	48	Temporary	5x5	2
6	Toilet	m^2	For 30 person	$2\text{-}2.5m^2$	5	8	Temporary	1x2	4
7	Health Room	m^2	For 1 person	$0.05m^2$	5	4.8	Temporary	2x2.5	1
8	Hall	m^2	For a person	$9.6m^2$	5	9.6	Temporary	3x4	1
9	Room warm-up workers	m^2	For a person	$0.1m^2$	5	9.5	Temporary	3x3.5	1

Distinctive features of works performance in winter season.

The production of earthworks in winter conditions is allowed if this ensures the efficiency of the entire construction process and the timely performance of construction and installation work. During this period,

excavations and reserves are developed in dry sands, gravel-pebble and rocky rocks, erecting embankments from concentrated reserves, developing dry grooves with a depth of more than 3 m from clayey soils, setting up embankments from sandy soils in swamps, drainage slots, e.

Features of earthworks in winter are the negative air temperature, the presence of snow and ice. Freezing of soils complicates their development, transportation,

packing and compaction. The rise in construction costs caused by winter works should be compensated.

The performance of excavation works during the winter period allows us to extend the construction season and, at the same time, increase the rate of construction

and ensure the uniform use of the means of mechanization. At the same time, the production of work under these conditions should not lead to a decrease in the quality, stability and durability.

The most effective measure to reduce the cost and complexity of the soil excavation in winter is the protection of soil from freezing, which is produced by plowing, harrowing, snow keeping or insulation layer construction. The depth of soil freezing H with the protection of plowing surface, harrowing, or covering with melted soft snow is calculated by the formula: $H = A(4P - P^2)$,

H= 2,5

Where A– accepted factor depending on the P:

$$P = -\frac{\sum z.t}{100} = (31+31+28)/1000=0.09$$

$\sum z$– the number of days with a freezing temperature (December–31d; January–31d; February–28d);

t– the average monthly freezing temperature (from weather table);

The depth of soil freezing H with insulation layer is calculated by the formula:

$$H = A((4 \cdot P) - P^2) \cdot C_{ins} \quad (54)$$

$$H = 30((4 \cdot 0.09) - 0.09^2) .2=21.11$$

Where C_{ins}– accepted factor depending on the type of insulation: for loosened soil–1,2÷1,4; slags–1,6÷2; sawdust 2,3–2,8; soft snow– 2,0–3,0; shavings – 2,6–3,2.

Soft snow, A=30

H=21.11

A – factor taking into account the soil insulation method for plowing to a depth of 35 cm,

Recommendations for method choosing of earthworks implementation in winter are set out in [2,p.80].

Continuation of Application C

During the period of established negative temperatures (below -10 ° C) it is allowed to develop trenches up to 4 m deep in unstable soils by the method of natural deforestation of slopes, taking the steepness of the slopes for hard-frozen soils.

Work process scheme development with calculation of mine face operating conditions.

During the development of the technological works scheme it is required to pay special attention to work place organization for earthmoving machines, i.e. machines working place illustrated for all specific areas of the pit. The graphical part of the project draws the mine face plan, longitudinal and cross sections, which indicate the excavator position (cutting radius, the height or depth of cut, the angle of the excavator rotation, unloading range, loading height), the location of vehicles, traffic ways and other required data

Depending on the excavator parameters and pit size, the excavation if carried out in one or several passes at a width and in one or several layers at abottom.

During pit excavation, the first pass to be carried out by frontal mine face, the other – by the side face, and trench excavation – by the frontal face.

During development of face parameters of excavator passes, equipped with shovel, first to be defined the largest width of the first (front) pass at the level of excavator datum level B_l in m:

$$B_l = 2 \cdot 0,9 R_{dl.} \quad (55)$$

$$B_l = 2 \cdot 0,9.6.3 = 11,34 \ldots.$$

Where R_{dl}– digging radius at the level of the parking, m.

So B_l = 11.34m

The largest width of the(front) pass at the top B_p is calculated byte formula:

$$B_p = 2\sqrt{(0,9R_{max})^2 - l^2} \quad (56)$$

Where R_{max}– the maximum digging radius

l_n– the length of working transfer

$$B_p = 2\sqrt{(0.9 * 9,9)^2 - 2^2}$$

$$B_p = 17.36$$

Maximum width of the second (side) excavator pass:

$$B = b_1 + b_2, \quad (57)$$

where,$b_{1,2}$– the maximum distance from the axis of excavator motion to the face frontal toe, m.:

$$b_1 = 0,9R_{dl} = 0.9*6,3 = 5,67$$

$$b_2 = 0,7R_{dl} = 0.7*6,3 = 4,41$$

$$B = 5,67+4,41 = 10,08 \quad (58)$$

In order to reduce the average work cycle duration, the rotation angle of the excavator front sinking should take no more than 70–90^0. When excavation the trench by side passes with unloading to the dump or in vehicles, the optimum width of the pass at the top is assumed to be 1,2– 1,3R (R – the maximum digging area at the level of the excavator datum level). When working for the dump, the width of the front pass is linked to the size of earth deposit and practically is assumed to be 0, 5–0,8R.

Dimensions of the faces depend on the excavator operating parameters digging radius, unloading radius, depth of the face. The width of the excavator front face – backhoe at the top (figure 11) adopted within:

$$B_l = (1,3 \ldots .1,5) \cdot R_{dl}, \quad (59)$$

$$B_l = 1.4 \cdot 10{,}08 = 14{,}112$$

where R_{dl}– the largest digging radius on the level of excavator datum level. The axis of excavator movement – the axis of pass with front face.

The pass width with front face at the bottom:

$$b = \mathrm{B}_l - 2mh, \tag{60}$$

where, – slope laying coefficient, h – depth of a pit, m.

$$\mathrm{b} = 14,\ 112 - 2 * 1.5 * (-10) = -15.8\mathrm{m}$$

The axis of excavator displacement during the pass with face (figure 12), generally coincident with the lower edge of the slope formed during the pass, i.e. soil basically excavated on one side from the axis of excavator movement. The width of the side pass is accepted within

Excavation of a separate pit is possible with one (figure 12) or several (figure 13) excavator datum level – backhoe. Starting excavator datum level has the maximum distance L from the top edge of the first excavated slope:

$$L = \sqrt{Rdl^2 - (\frac{a}{2})^2} \tag{61}$$

Where R_{dl}– the largest radius of digging at the levels of excavator datum level (annex. №1.table.9.1);

a – size on the pit (trench) top perpendicular to the axis of excavator movement, m and a=1.25 R_{dl}=9.8

$$L = \sqrt{10.08 - (\frac{15{,}12}{2})^2} = 6.85$$

The quantity r_{dl}it is possible to accept:

Continuation of Application C

$$\gamma_{dl} = \frac{c}{2} + 1 \tag{62}$$

Where c – base of the excavator (2,5÷3,5), m.

$$\gamma_{dl} = \frac{3}{2} + 1 = 2{,}5$$

If from the first datum level is excavated only part of the pit (trench) ($B_p > L - r_{dl}$ where 17.36>6.85-2,5

pit excavation is implemented from the several excavator data levels. The first datum. Excavator movement step depends on the size of working equipment and excavation depth. Which is equal to -15.8m.

As a set of equipment for haulage of extra soil out of pit (trench) and ensuring of joint work with excavator to be chosen dump trucks. Dump trucks are selected by two parameters: the capacity of the body and carrying capacity. The solid soil volume

in excavator bucket is determined:

$$V_{soil} = V_{buck} \cdot C_f / V_{buck} \cdot C_f \quad (63)$$

Where V_{buck}–accepted volume of excavator bucket, m^3.

C_f–bucket filling factor: for front shovel from 1 to 1,25; the backhoe – from 0,8 to 1;

C_{fr}– Initial increase soil volume later developments

V_{soil} = 0.65*1.25/7=0.116

The soil volume in excavator bucket is determined:

$$Q = V_{soil} \cdot \mathcal{V} \quad (64)$$

Where $\mathcal{V}$–average soil density (on ENIR), kg/m3, for:

Sandy Loam–2300 kg/m^3.

Q = 0.65·2300= 1495

Number of soil buckets, loaded into dump truck body.

$$n = p/Q \quad (65)$$

Where P– truck carrying capacity.

The solid soil volume in excavator bucket, loaded into dump truck body is determined:

N=16/1495=0.010

$$V = V_{soil} \cdot n \quad (66)$$

V=0.65*0.010=0.0069T

Continuation of Application C

The duration of one work cycle of the truck is calculated:

$$T_c = t_l + 60L/Vr + t_p + 60L/Vn + t_m \quad (67)$$

Where t_l– time of soil loading (min.) determined by a formula:

$$t1 = \frac{v.Ntm.60}{100} \quad (68)$$

Where N_{tm}– standard of machine time per the ENiR

L– distance of ground transportation, (km);

V_r–average speed of loaded truck Required number of trucks

0.0069*20*60/100=0.083 hour

So, we have T_c 0.083+60*6.85/25+1+60*6.85/30+1 = 32,22min

$$N = \frac{Tc}{tl} \quad (69)$$

Where The number N is rounded to the nearest smallest integer number, including the over–fulfillment of the shift tasks during excavator work.

So, it is equal to 32.22/19.8=1.68

KAZ-600B N= $\frac{3,5x1000}{79}$=43,80

Selection of the assembly crane:

As an initial data in cranes selection serves the dimensions of pit for foundations and the basement of the structure, dimensions and weight of mounted structures. In the crane's selection for installation of column foundations need to be used self–propelled jib cranes. When mounting the structure monolithic strip foundations with basement to be used column– tower crane. Cranes selected by the technical parameters: load capacity, hook lifting height, working radius and the largest load moment. When choosing the crane, it is required: To determine the technical capacity of crane type. To prepare feasibility evaluation of its use. Initial data in this case are: Dimensions and space. Planning decision of a building or structure. Dimensions, weight, and operating position of mounted element with allowance for mounting equipment. Mount technology. Work performance conditions (access roads, storages, proximity of adjacent Structures and utilities, soil and climatic features, structure of the underground part, etc.). The schemes for determination of the mounting characteristics of tower cranes and jib rail cranes when mounting (a) aboveground and (b) underground structure parts. Lifting height of crane hook H_r, m is calculated using the formula:

$$H_r, = h_1 + h_2 + h_3 + h_4 \quad (70)$$

Where h_1– the height of mounted structure from the crane base (taken equal to 0), m.

h_2 – the height of mounted element (1,5÷2 m).

h_3 – the height from the top level of the structure to the bottom of the cargo (0,5÷1 m).

h_4 – the height of lifting equipment (2÷4,5 m).

H= 1.80+1+4+20=26.8m

In certain cases, the amount of h_4 to be selected through the catalogs of lifting equipment in relation to the mounted elements.

Crane working radius during construction of underground part L_u, m, is calculated using the formula:

$$L_u = a + c + B_p + 0,5, \quad (71)$$

Where B_p the width of structure underground part (l_1+ (0,5 · 2)), m; 0,5 – reserve zone width.

a– the distance from the crane rotation axis to the pit edge, m, is equal to:

$$a = 60/2 + 0{,}5 + r1 = 36.5$$

Where b – width of the crane track (5÷ 7), m;

0,5 – half the width of the sleeper or sleeper unit

r_1– minimum allowable distance from the slope base to the sleeper structure, m, accepted per.

$$C = \frac{l_{1s.t.} - l_{2s.t}}{2} . \quad (72)$$

Where c – slope construction, m.

$l_{1s.t}$– length of a pit on top, m;

$l_{2s.t}$– width of a piton top, m,

$$C = (75\text{-}63)/2 = 6$$

$$36 + 6 + 15 = 57{,}5\text{m}$$

According to the basic characteristics of the directories or catalogs to be selected corresponding crane. Required carrying capacity of the crane is calculated using the formula:

$$Q_{cr} = (q_1 + q_2) \cdot K, \quad (73)$$

$$q1 = m_{b1} + m_{c2} \quad (74)$$

Where q_1–maximum weight of the mounted element, t.

m_{b1}–bucket weight (annex.1, tab.18);

m_{c2}– concrete weight (2÷2,5) t/m^3.

$q_1 = 3.15$

$q_2 = 0.6$

q_2– lifting equipment and tools weight (0,1÷0,15),t;

K– factor including the deviation of lifting device weight, taken equal 1,08÷1,12.

$$Q_{cr} = (3.75 + 2) \cdot 1.12 = 644$$

Required working radius is determined by the formula:

$$L_{cr}^{tr} = b/2 + a_1 + c, \quad (75)$$

$$L_{cr}^{tr} = 7/2 + 1.5 + 72 = 77$$

Where b– width of the crane way (track), (5÷ 7), m;

a_1– the smallest admissible distance from the slope basis to the closest support of the crane (portable, wheel, caterpillar), for tower cranes – to a sleeper design at not bulk soil.

c – the distance from the gravity center the farthest from the crane mounted element to the protruding part of the crane (taken equal to the width of the structure – l_2) for the crane hook we have the following calculation. Lu=l1+l2+l3

Lu = 2.6 +6+ 72 +0.5 = 81.1

Determination of work labor input and crew composition.

The labor input of operations is calculated based on the ENiR on respective works (ENiR E–2, E–4, E–11, E–22, etc.), performed by equipment or manually. For manual processes in the column "operator" put a dash. Total labor costs and wages are obtained by multiplying the amount of work on the standards of time and rates. The calculation is presented in tabular form (tab. 10) in the calculation of labor costs; make it only by the accepted type.

At the end of the table are summed up totals in columns 10, 11, 12 and 13, which are used in the future to determine the technical and economic indicators.

Data of columns 10 and 11 to be calculated.

Labor costs of processes in main hours are determined by the formula:

Table 5 - Cost calculations of machine time, labor costs and salary

The amount of the salary is determined by multiplying the volume of work on pricing. According to the accepted number of machines and composition of units recommended by ENiR is determined the team.

Preparation of work schedule.

The planned schedule of works specifies sequence of the processes and the duration of their mutual coordination. Schedule of work production plan is recommended to be prepared as per the table. 5 given in SNIP–3.01.0185. The data in columns 1, 2, 3, 4, 6 are transferred from the calculation of labor input and machine input in Table 5. The duration of the mechanized processes is determined by:

$$Pm = Nm.sh/n \cdot A \qquad (76)$$

Where N (m.sh) – required number of machines–shift.

n – Number of machines.

A – Number of shifts per day.

Continuation of Application C

Determination of the required number of machine shifts

$$N_{мс} = \frac{Q}{Псм} . \qquad (77)$$

Where Q is the amount of work to be performed on this operation, ha.

$П_{см}$ –changeable productivity of the unit, ha / shift.

Removal of topsoil.

Pm=368*2/1*9765=5 day

Soil excavation in the trench and trench access to the pit

Pm=87.86/1*2*38507=16 days

Formwork installation of columnar foundation manually

Pm=11032.32/2*2*1241= 5 days

Concreting of columnar foundation

Pm=56.784/1*2*35.4=2 days

Backfilling

Pm=2179.68/2*2*200=3 days

Soil compaction

Pm=7265/2*2*4647=5 days

Final land planning

Pm=1540/2*2*5445=2 days

Duration of manual processes is determined by:

$$P\text{p}=Q/n\cdot A \quad (78)$$

Where –Q labor costs (table 10), (human –day).

n– number of workers per shift.

The construction of temporary fencing

Pp=344/2*10=17 days

Soil excavation in the trench and trench access to the pit

Pp=5848/2*5=2 days

Excavation of soil under run

Pp=19469.03/2*20=15 days

Concrete preparation for foundations

Pp=692.12/2*10=3 days

Reinforcement installation of columnar foundation manually

Pp=92008.16/2*20=23 days

Formwork installation of columnar foundation manually

Pp=3971.64/2*20=9 days

Concreting of columnar foundation

Pp=68.14/2*2=2 days

Formwork removal of columnar foundation

Pp=3420.02/2*10=9 days

Foundation waterproofing

Pp=670566/2*20=17 days

Final land planning

Pp=508.2/2*10=3 days

Removal of temporary fencing

Safety measures.

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.

Continuations of Appendix C

Table C.3 - Cost calculations of machine time, labor costs and salary.

№	Nameofprocesses	Justification (ENIR, No., table, point)	Unitofmeasure	Volume of work	Standardtime		Quotation, i.e.,		Laborcosts		Salary	
					Workingh–h.	Driversofm–cm.	Working	Drivers	Working, h–d	Driversofm–cm.	Working	Drivers
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
1	The construction of temporary fencing		m	200	1,2	–	1,3	–	240	–	312	–
2	Removal of topsoil		m2	3628	–	0.56	–	0.6	–	564,8	–	338,88
3	Soil excavation in the pit and trench access to the pit		m2	386,38	2.8	3.56	1.48	1.7	1081,8	1601	3851	1837,7
4	Excavationofsoilunderrun		m3	2160	1.64	–	0.54	–	3542,4	–	10513,28	–
5	Concretepreparation forfoundations		m3	360	0.79	–	0.49	–	284.4	–	339,14	–
6	Reinforcement installation of columnar foundation manually		т	2340	22,17	–	15	–	51877.8	–	138012,41	–
7	Formwork installation of columnar foundation manually		m2	1241,8	0,36	0,12	0,35	0,17	447.048	1323,88	1390,07	225,06
8	Concretingofcolumnarfoundation		m3	70,92	1,2	0,89	0,34	0,31	85.10	50,54	23,17	15,67

9	Formwork removal of columnar foundation		m2	1241,8	0,31	–	0,08	–	384,95	–	273,6	–
10	Foundationwaterproofing		100m2	300	10	–	7,15	–	3000	–	4794546,9	–
11	Backfilling		m2	193,49	–	0,39	–	1,58	–	850,08	–	13433,12
12	Soilcompaction		m2	387.5	–	0,92	–	0,26	–	6683,8	–	17337,79
13	Finallandplanning		m2	1866	0,33	0,49	1,58	1,65	508,2	615,78	802,96	12455,09
14	Removal of temporary fencing		m	200	0,90	–	1,05	–	331,2	–	347,8	–

Continuation of Application D

Library with Regenerative Ventilation System in Atyrau

(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 cost, tenge		Overheads	Labor costs, man-hour construction workers	
				Total	Expl. machines	Total	Expl. machines			
				Salary of construction workers	incl. Salary of drivers	Salary of construction workers	incl. Salary of drivers	tenge	workers serving machi	
								%	for one.	Tot
one	2	3	four	five	6	7	eight	nine	10	elev
		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 -	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 -	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 periodic profile of class A-III, d 16-18 mm**	**3.14**	**67,412.88**	**-**	**211,570.62**	**-**	**-**	**-**	**-**
		t		**-**	**-**	**-**	**-**	**-**	**-**	**-**
12	**S121-050301-3001**	**Reinforcement blanks not assembled into frames and meshes: smooth steel of class A-I, d 8 mm**	**1.57**	**65,745.09**	**-**	**103,167.85**	**-**	**-**	**-**	**-**
		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 -	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 -	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 ceilings 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 meshes: smooth steel of class A-I, d 6 mm**	**2.00**	**65,745.09**	**-**	**131,304.78**	**-**	**-**	**-**	**-**
		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 -	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

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 -	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 -	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				

Continuation of Application D

Object estimate

Library with Regenerative Ventilation System in Atyrau City

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	2835	

Continuation of Application D

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

Continuation of Application D

RESOURCE ESTIMATE

on the video surveillance system

Object name - Library with Regenerative Ventilation System in Atyrau City

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		**WAGE OF MACHINERY**	
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 OASIS

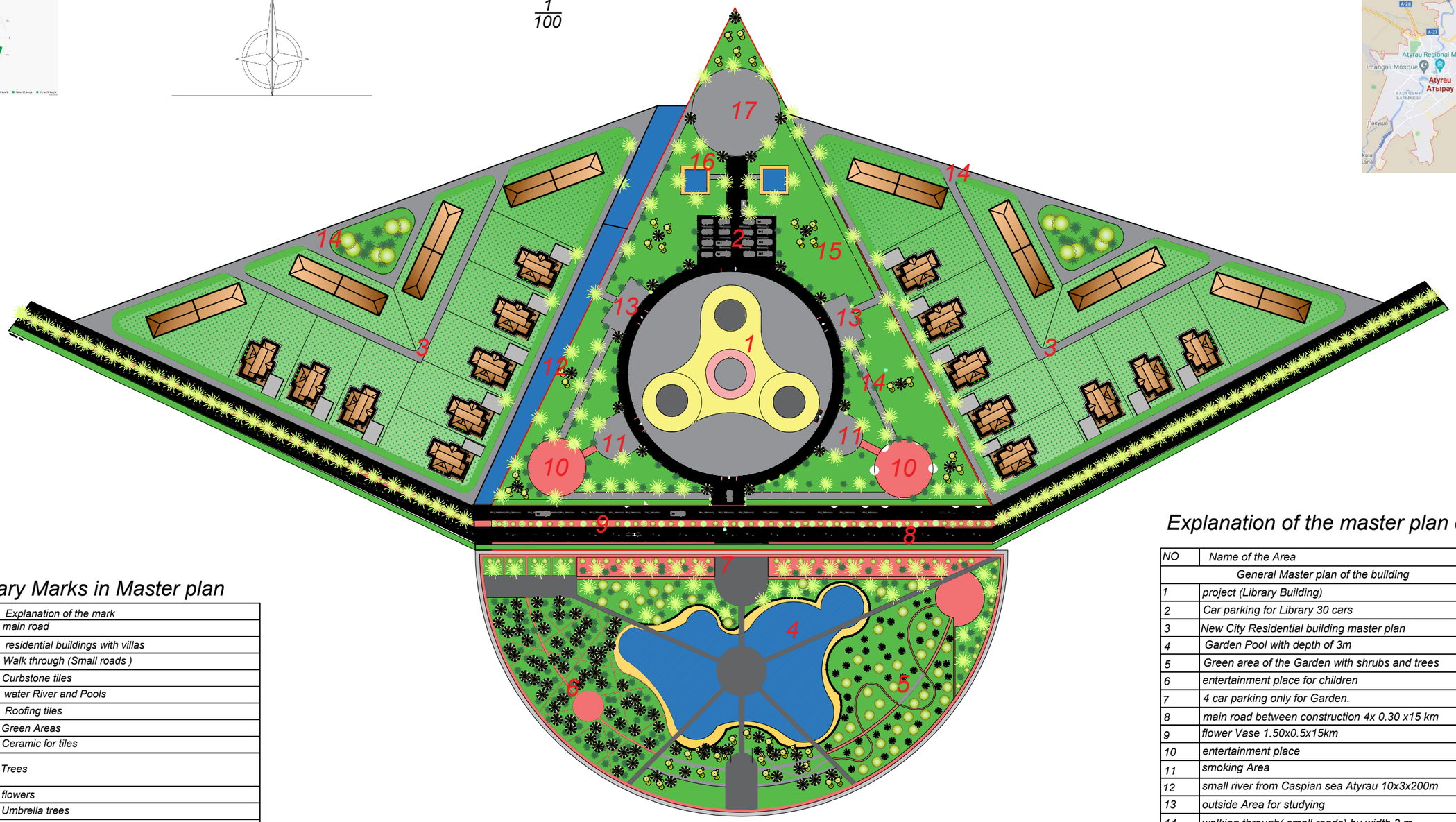
wind Rose in Atyrau city

N

Master Gaming plan of the construction

1/100

Atyrau Map GPS survey



Necessary Marks in Master plan

NO	Mark	Explanation of the mark
1		main road
2		residential buildings with villas
3		Walk through (Small roads)
4		Curbstone tiles
5		water River and Pools
6		Roofing tiles
7		Green Areas
8		Ceramic for tiles
9		Trees
10		flowers
11		Umbrella trees
12		Flower like a tree

Explanation of the master plan of the building

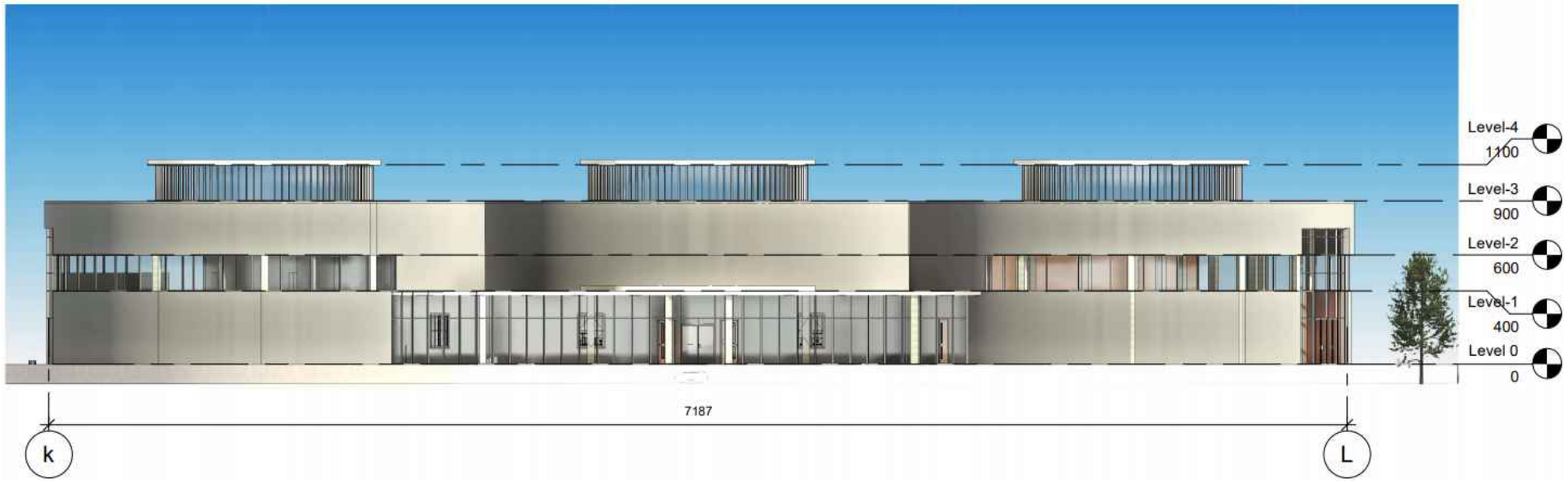
NO	Name of the Area	Area (m^2)
	General Master plan of the building	
1	project (Library Building)	2000 (m^2)
2	Car parking for Library 30 cars	500 (m^2)
3	New City Residential building master plan	12000 (m^2)
4	Garden Pool with depth of 3m	2500 (m^2)
5	Green area of the Garden with shrubs and trees	9000 (m^2)
6	entertainment place for children	18 (m^2)
7	4 car parking only for Garden.	25 (m^2)
8	main road between construction 4x 0.30 x15 km	60000 (m^2)
9	flower Vase 1.50x0.5x15km	7(m^2)
10	entertainment place	91 (m^2)
11	smoking Area	60 (m^2)
12	small river from Caspian sea Atyrau 10x3x200m	6000 (m3)
13	outside Area for studying	65 (m^2)
14	walking through(small roads) by width 2 m	none (m^2)
15	Green area of the Library building	9000 (m^2)
16	pool for C,&H students 8x8x1.5m	64 (m^2)
17	Entertainment and study place outside of the library	150 (m^2)

3D View of Public Library in Atyrau city

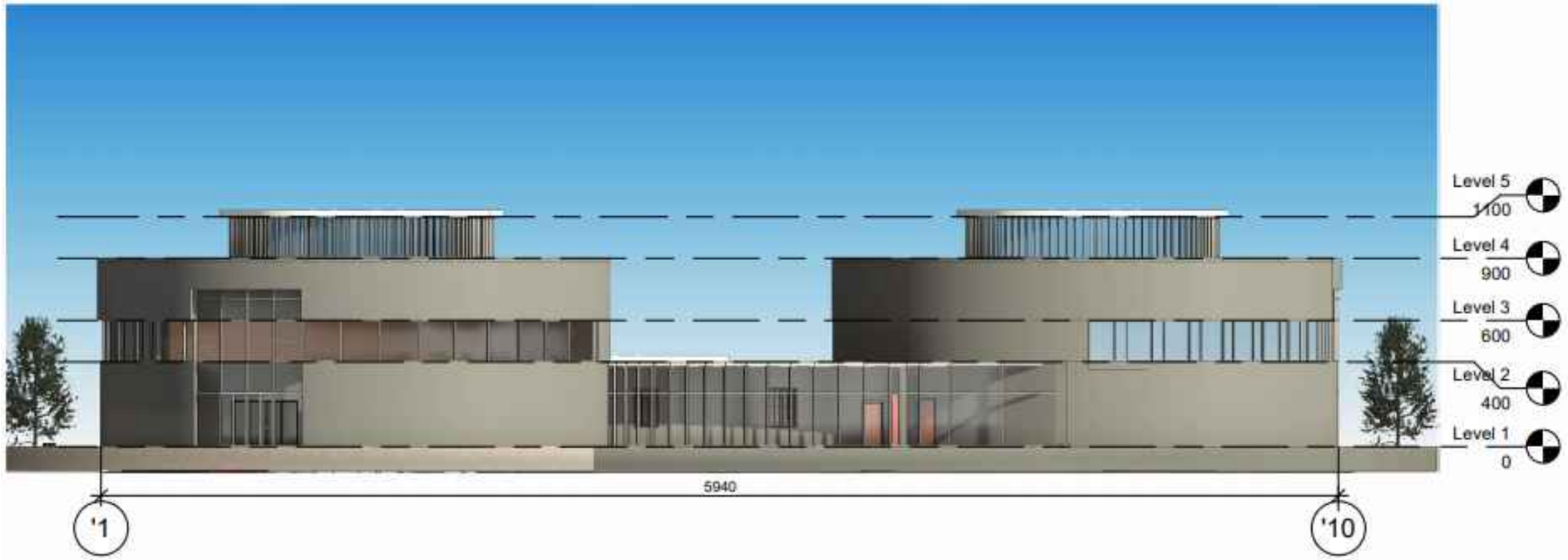
Note: For further information of Gaming plan see Explanatory page 7 and Appendix A figure A.1,figure A.2 and figure A.3

					KazNITU-5B072900-Civil Engeneering-08.03.02.2021-DP
					On the them of 'Library with a recuperative ventilation system in - Atyrau City'.
Chan	Num.par.List	Nedoc	Sign	Date	
Head of Dep		Kozyukova .N.V			Architecture and Analytical part — stage: DP; Sheet: 1; scale: 1/100
Consultant		Kozyukova .N.V			
supervisor		Kozyukova .N.V			
Controller		Bek.A.A			Gaming plan — Civil engineering and building materials department
Created		Shafi.M.A			

South Elevation 1/100



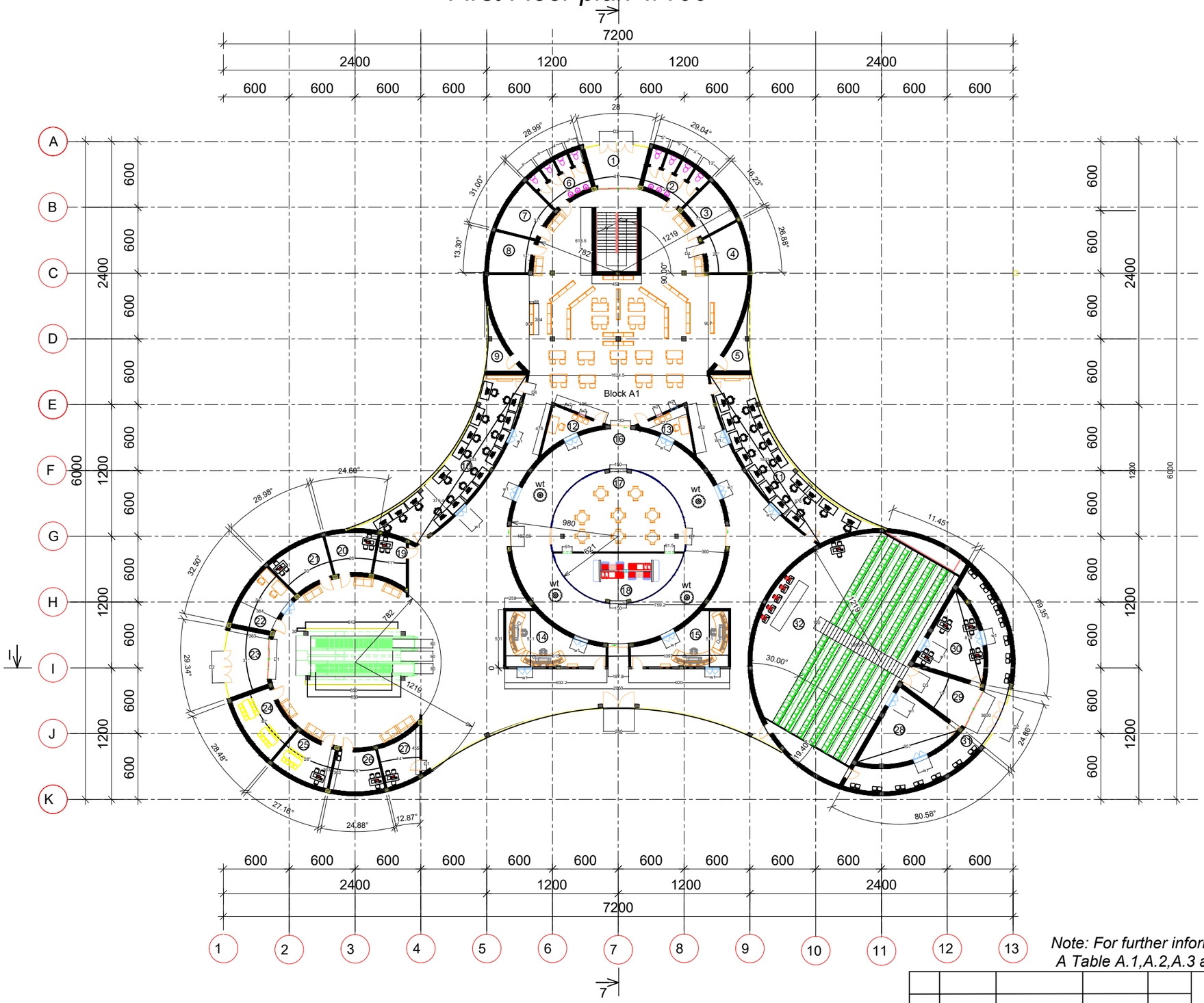
East Elevation 1/100



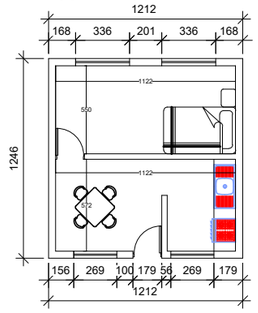
Note: for further information check Explanatory note section 1 page 14 and Appendix A Table A.1,A.2 and A.3

					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	Nedoc	Sign	Date			
Head of Dep		Kozyukova .N.V			Architectural and Analytical part	stage: DP	list: 2 / scale: 1/100
Consultant		Kozyukova .N.V					
Supervisor		Kozyukova .N.V					
Controller		Bek.A.A			East and South Elevations	Civil engineering and building materials department	
Created		Shafi.M.A					

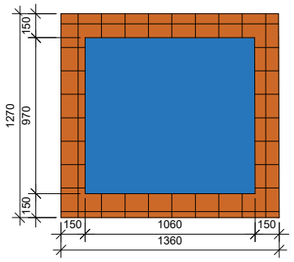
First Floor plan 1/100



External Guard security room 1/200



Outside pool for students 1/200



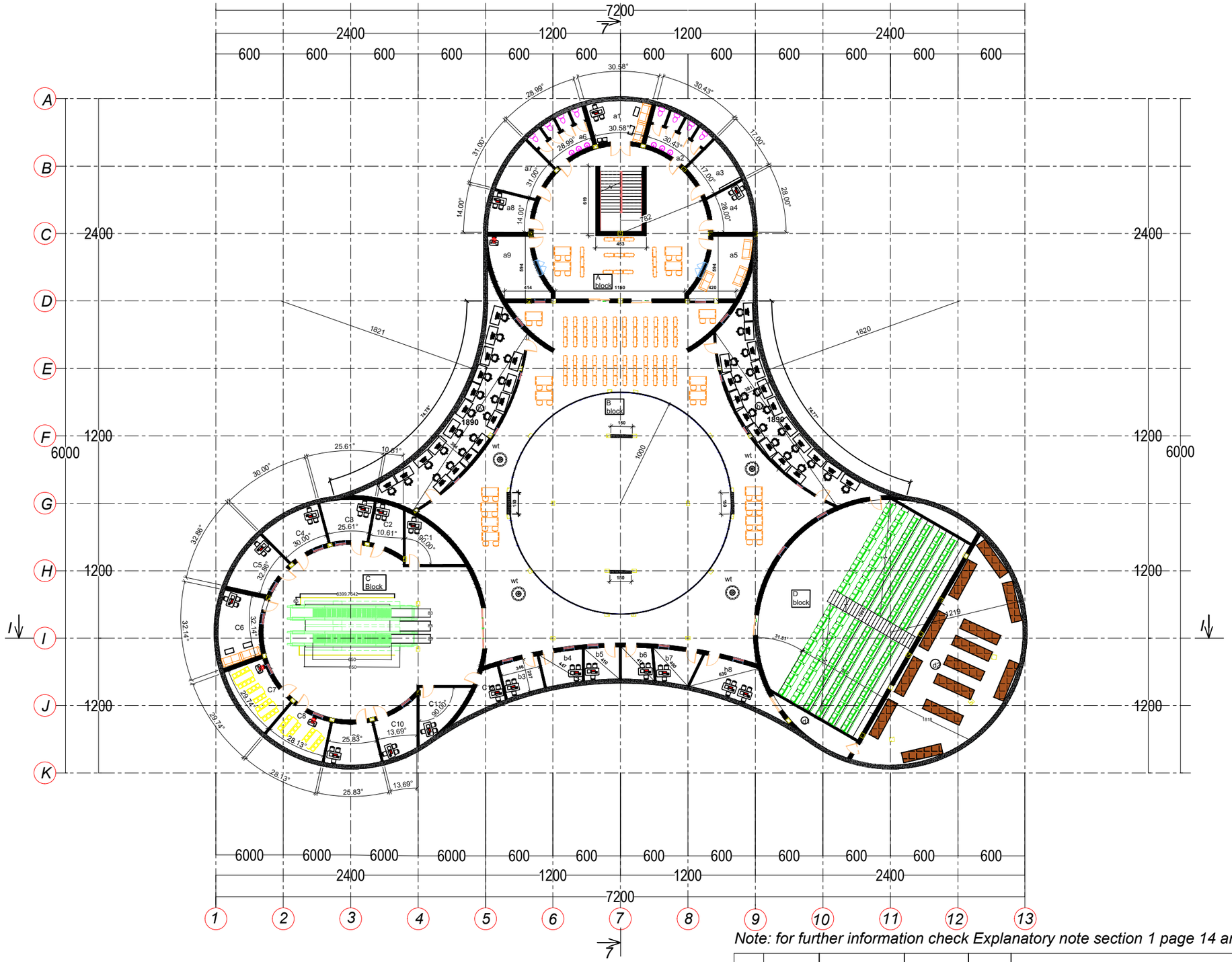
Note: For further information check Explanatory note 1.6 space planing solution and Appendix A Table A.1,A.2,A.3 and A.4

					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	Nedoc	Sign	Date	
Head of Dep		Kozyukova .N.V			Architecture and Analytical part
Consultant		Kozyukova .N.V			
supervisor		Kozyukova .N.V			
Controller		Bek.A.A			1th floor scheme
Created		Shafi.M.A			

stage	Sheet	scale	Unit
DP	3	1/100	Cm

Civil engineering and building materials department

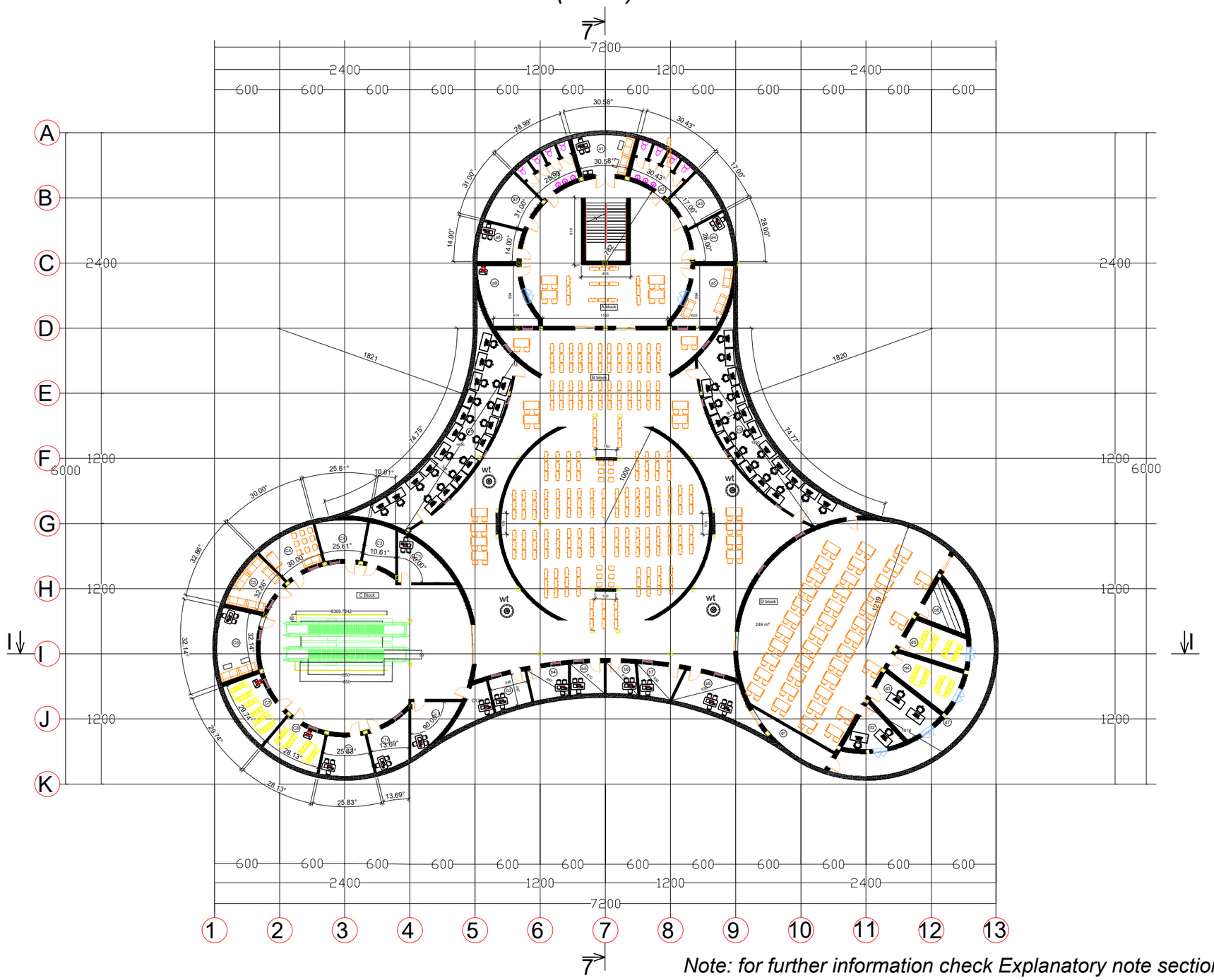
Ground 1th floor -5m 1/100



Note: for further information check Explanatory note section 1 page 14 and Appendix A Table A.1,A.2, A.3 and A.5

					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	Nedoc	Sign	Date				
Head of Dep		Kozyukova .N.V			Architectural and Analytical part	stage	list	scale	Unit
Consultant		Kozyukova .N.V				DP	4	1/100	cm
Supervisor		Kozyukova .N.V							
Controller		Bek.A.A			Ground 1th (-5m) floor scheme	Civil engineering and building materials department			
Created		Shafi.M.A							

Ground 2th (-10m) 1/100

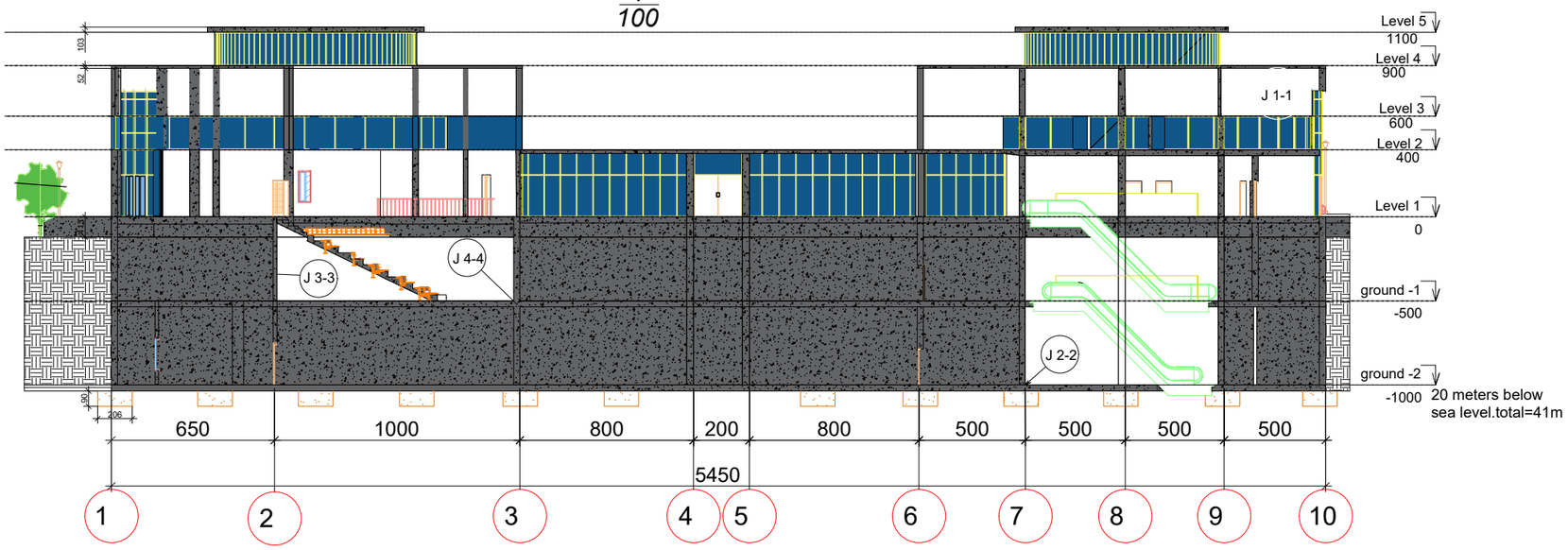


Note: for further information check Explanatory note section 1 page 14 and Appendix A Table A.1,A.2, A.3 and A.5

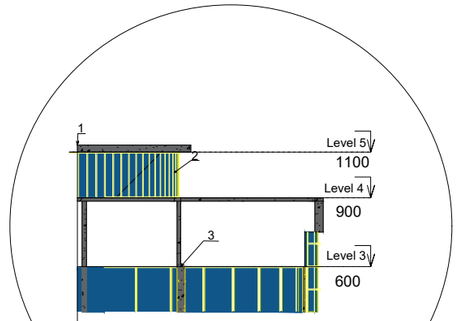
					KazNITU-5B072900-Civil Engeneering-08.03.02.2021-DP			
					On the them of 'Library with a recuperative ventilation system in - Atyrau City'.			
Chan	Num.par.List	Nedoc	Sign	Date				
Head of Dep		Kozyukova .N.V			Architecture and Analytical part	stage	Sheet	scale	Unit
Consultant		Kozyukova .N.V				DP	5	1/100	Cm
supervisor		Kozyukova .N.V							
Controller		Bek.A.A			Ground 2 floor scheme	Civil engineering and building materials department			
Created		Shafi.M.A							

section I-I

1/100

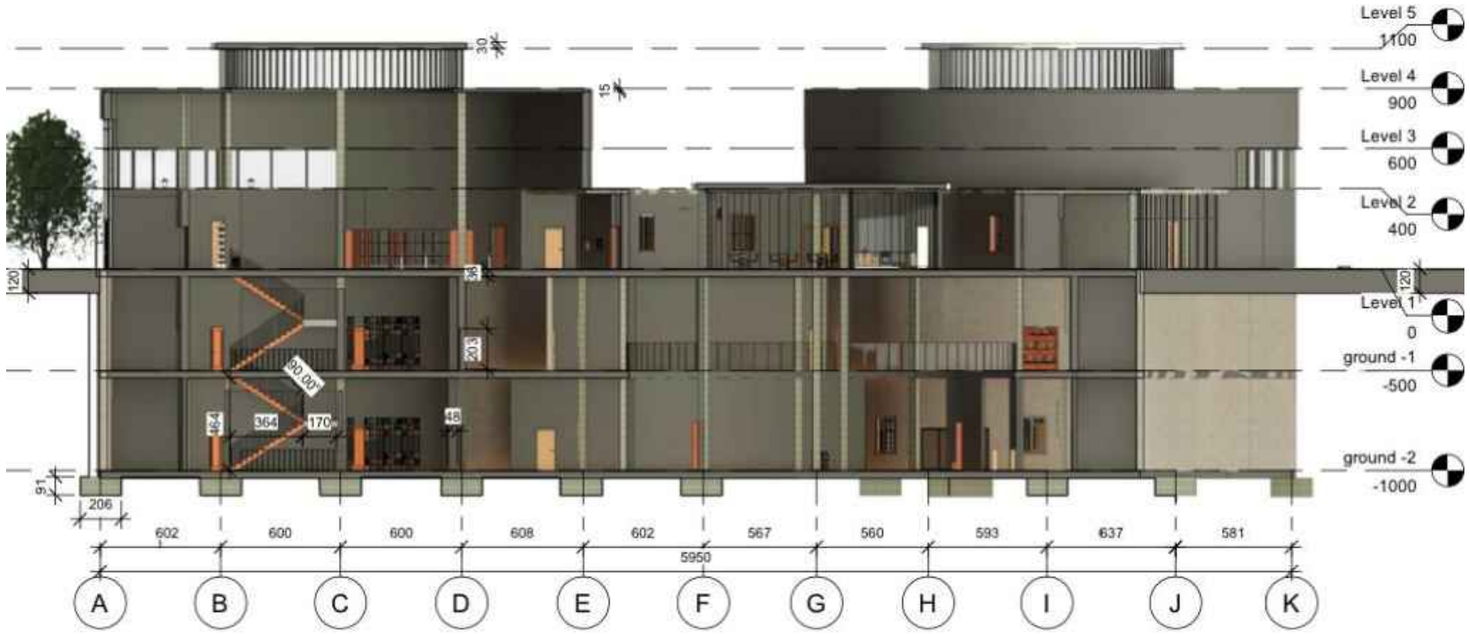


Junction 1-1

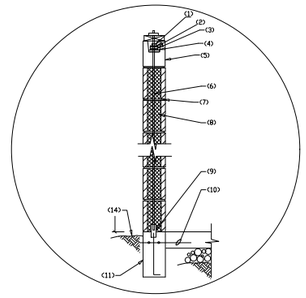


1. Rcc Concrete with roofing insulation materials
2. Double glassing system
3. Rcc Concrete column with Insulation

section 7-7 1/100

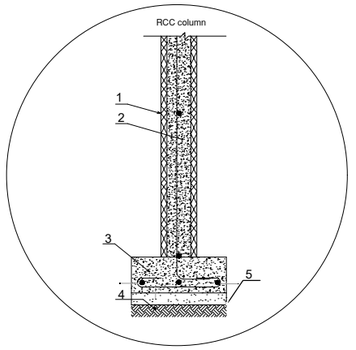


Junction 3-3 Shear wall



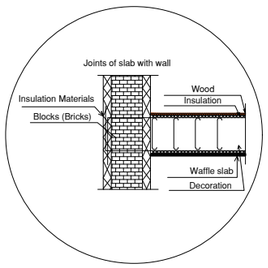
1. 1/2" ø NUT - TIGHTEN PER GENERAL STRUCTURAL NOTES.
2. HARDENED WASHER ABOVE & BELOW DIRECT TENSION INDICATOR WASHER.
3. LOAD INDICATOR WASHER- INSTALL WITH "BUMPS" UP.
4. 1/2" X 3" X 3" STEEL BEARING PLATE.
5. SPECIAL INTEGRA PLATE BEARING BLOCK AT RODS ONLY.
6. 7/16" ø SMOOTH RODS W/ 1/2" ROLL THREAD ENDS DESIGNATED AS POST-TENSION ROD.
7. HORIZ. JOINT REINF. WHERE SHOWN ON WALL PLAN AS MANUFACTURED OR SUPPLIED BY SUPERLITE BLOCK.
8. HATCHED AREA INDICATES FOAM.
9. 7/16" ø X 12" X 3" (LLV) ANCHOR BOLT (SAME MATERIAL AS TENSION ROD) COUPLER PER GSN AS MANUFACTURED OR SUPPLIED BY SUPERLITE BLOCK.
10. 2 #4 CONT. BARS W/ ANCHOR BOLT IN BETWEEN AS SHOWN FOR COMMERCIAL PROJECTS. FOR RESIDENTIAL IT IS AN ACCEPTABLE ALTERNATE TO STACK THE BARS ONE ABOVE THE OTHER.
11. CONCRETE STEM BY OTHERS.
12. DESIGN OF FOUNDATION TO STEM PER DESIGNER.
13. NOT USED.
14. FINISHED GRADE AS OCCURS.

Junction 2-2 column&foundation



1- Insulation Materials
2- RCC Concrete
3- RCC concrete for foundation
4- Earth under foundation
5- 20 meters below sea level.total=41m

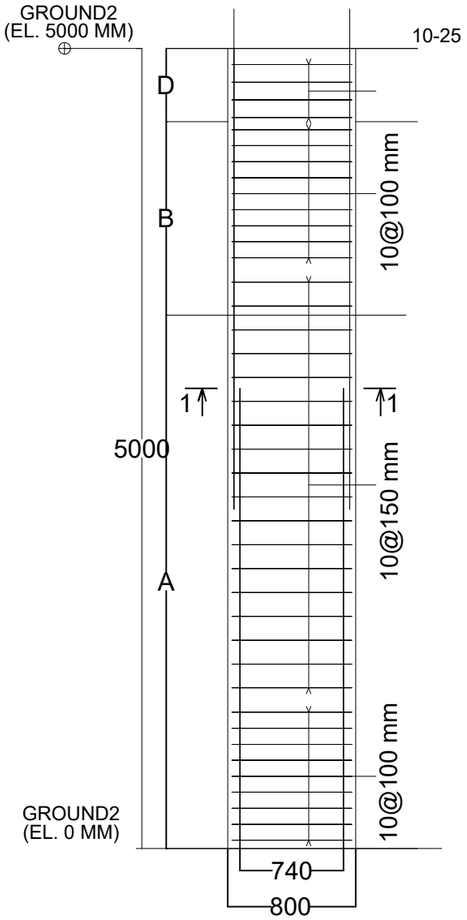
Junction 4-4column&slab

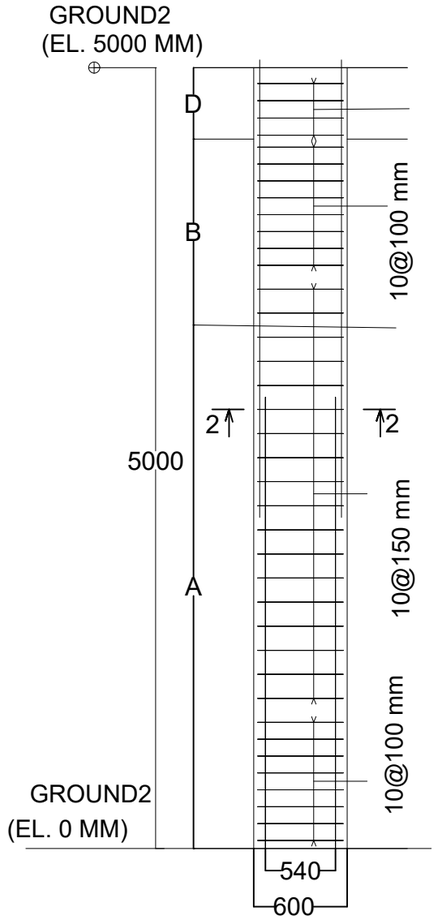


Note: Explanatory Note Section-1 (Architectural and Analytical part) page- 14 and Appendix A Table A.1,A.2 and A.3

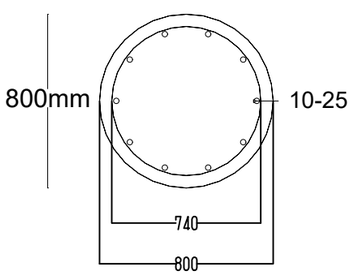
Chan	Num.par.List	№doc	Sign	Date	KazNITU-5B072900-Civil Engineering-08.03.02.2021-DP				
					On the them of 'Library with a recuperative ventilation system in - Atyrau City'.				
Head of Dep		Kozyukova .N.V			Architectural and Analytical part	stage	list	scale	Unit
Consultant		Kozyukova .N.V				DP	6	1/100	cm
Supervisor		Kozyukova .N.V							
Controller		Bek.A.A			Sections and with Junction	Civil engineering and building materials department			
Created		Shafi.M.A							

CC62:Elevation-1
(Scale 1:24)

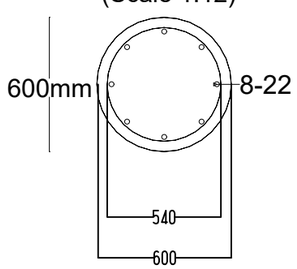




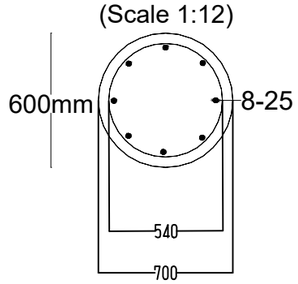
Section 1-1
(Scale 1:12)



Section 2-2
(Scale 1:12)



:Section 2-2
(Scale 1:12)



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

Specification of Reinforcement From Etabs.19

Name	Detail	Reinforcement Dais
C59	COLUMN SIZE	600 MM DIA
	SECTION	A
	REINFORCING	8-25 (4,180.64)
	TIES ZONE-A	10@100 MM
	TIES ZONE-B	10@150 MM
	TIES ZONE-C	10@150 MM
C62	COLUMN SIZE	800 MM DIA
	SECTION	B
	REINFORCING	10-25 (5,025.80); 10-25 (5,025.80)
	TIES ZONE-A	10@100 MM
	TIES ZONE-B	10@150 MM; 10@150 MM
	TIES ZONE-C	10@150 MM; 10@150 MM

Rebar Quantitives

SR. NO.	BAR SIZE	LENGTH (M)	WEIGHT (KG)
1	10	372.3	229
2	25	210.0	809

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	8Ø40 S800	5000	8	14.13	113.04
	2	EN 10134-3	8Ø40 S800	5000	8	14.13	113.04
	3	EN 10134-3	Ø10Bp-I	150	33	0,1	3.3
C59-2	4	EN 10134-4	8Ø25 S400	5000	8	5.49	43.93
	5	EN 10134-4	8Ø25 S400	5000	8	5.49	43.93
	6	EN 10134-4	Ø10Bp-I	150	33	0.1	3.3

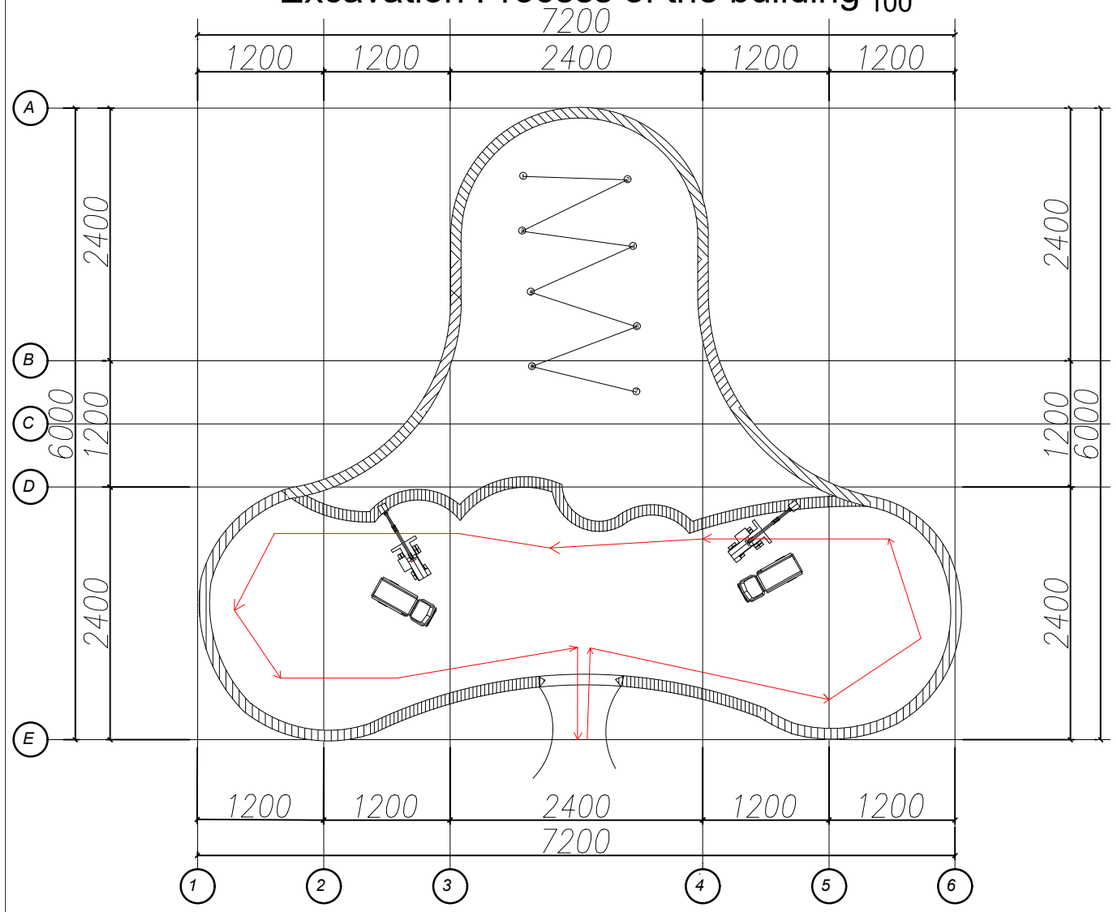
Note: for further information check Appendix B Table B.1 to Table B,6 and Explanatory note page 24.

					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	Nedoc	Sign	Date	
Head of Dep		Kozyukova .N.V			Calculation and design part
Checked		Kozyukova .N.V			
supervisor		Kozyukova .N.V			
Controller		Kozyukova .N.V			
Created		Shafi.M.A			CC62 and CC59 Columns Design

stage	Sheet	scale	Unit
DP	7	1/100	Cm

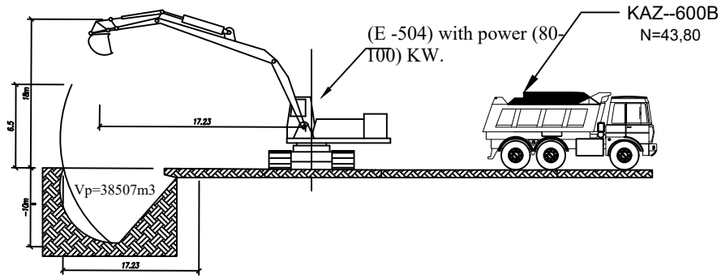
Civil engineering and building materials department

Excavation Process of the building 1/100



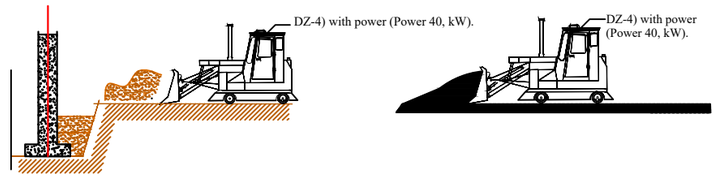
Excavator in working site

M1:25

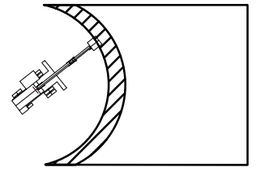


bulldozer in working site

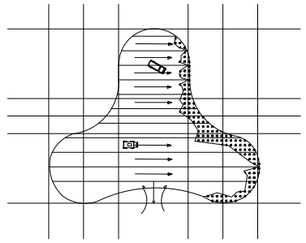
M1:25



Excavation with single side



Preparation of the construction site 1/1000

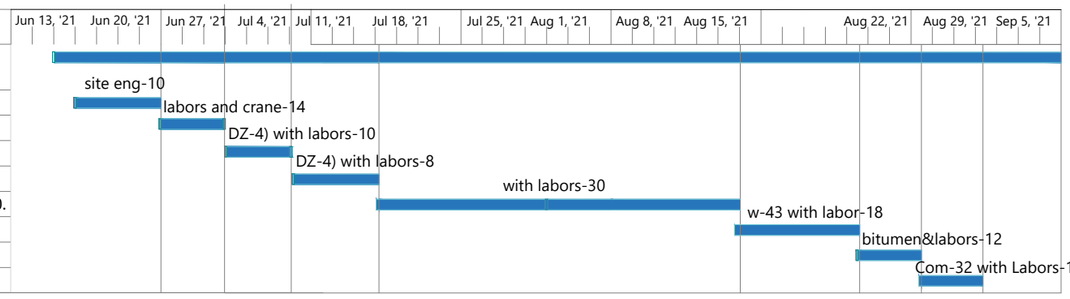


Required machines for earth work

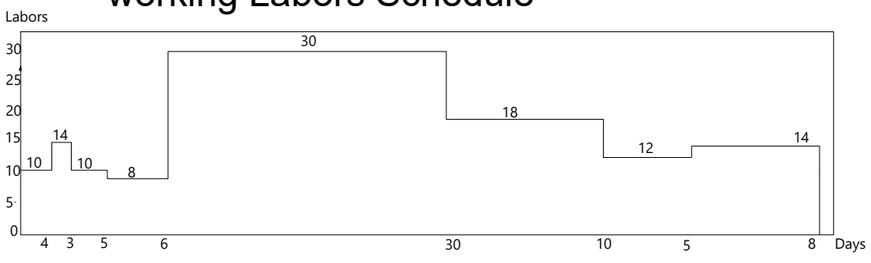
№	Name
1	(E -504) with power (80- 100) KW.
2	(KAZ-600 B) with N=43.8
3	(Dz-4)with power 40kw
4	Water compaction machines
5	Water drainage machines

Working Schedule

ID Task	Mode	Task Name	Duration	Start	Finish	Resource Names	volume of work	Cost
1		construction of library Atyrau 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



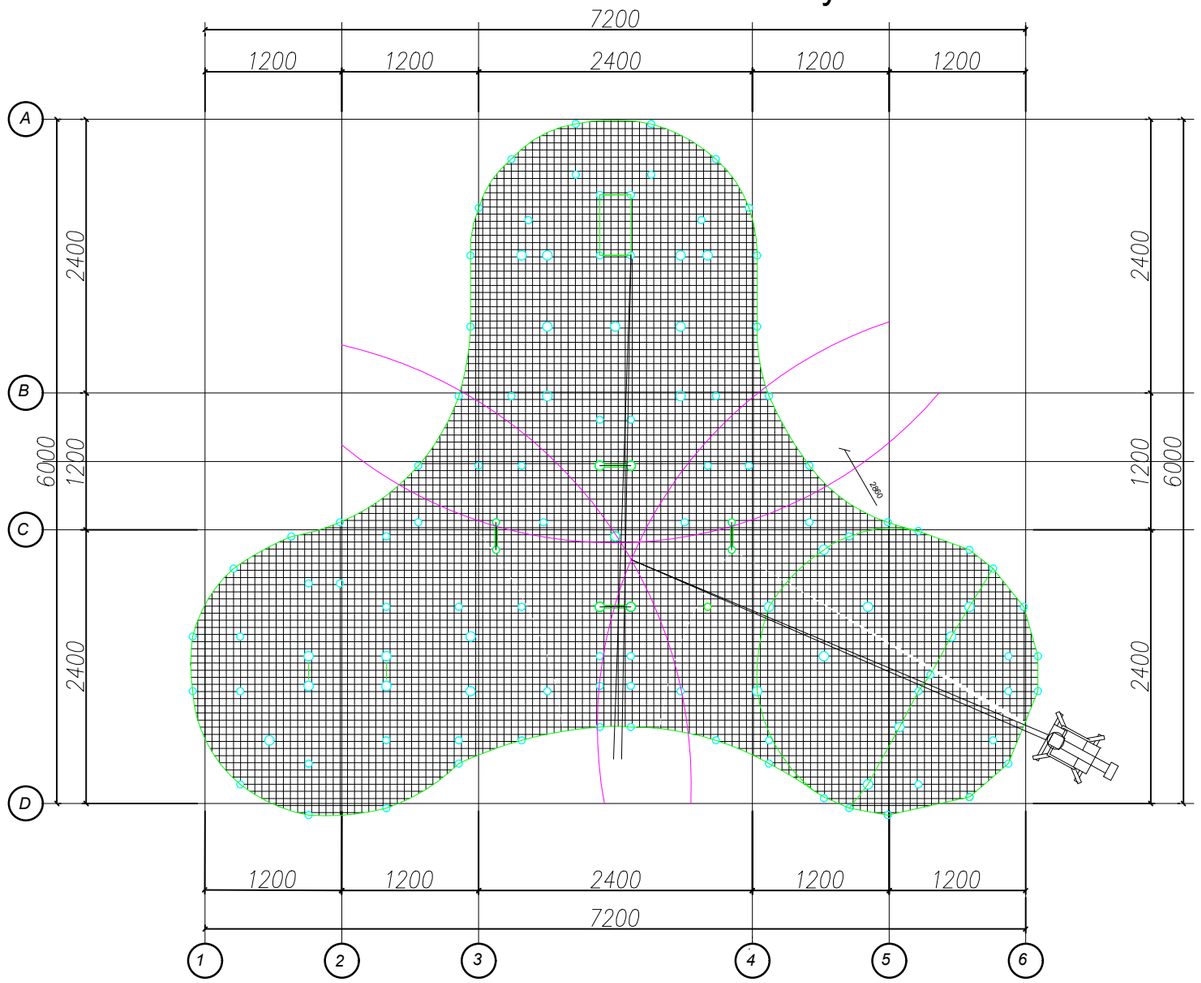
working Labors Schedule



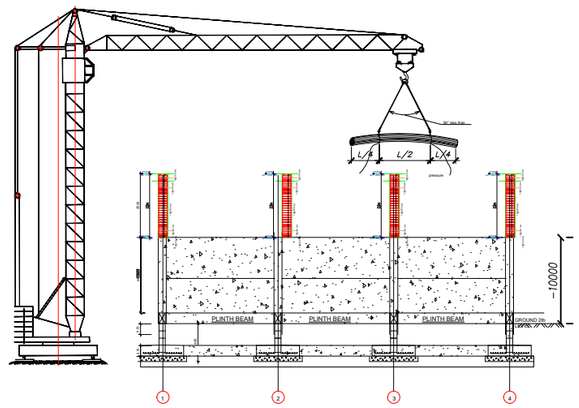
Note:For further information see Explanatory note page 39 and Appendix C Table c.1 and C2

Chan	Num.par.List	Nedoc	Sign	Date	KazNITU-5B072900-Civil Engineering-08.03.02.2021-DP			
					On the them of 'Library with a recuperative ventilation system in - Atyrau City'.			
Head of Dep		Kozyukova .N.V			Organizational and Technological part	stage	list	scale
Consultant		Kozyukova .N.V				DP	8	1/100
Supervisor		Kozyukova .N.V						
Controller		Bek.A.A			Earth work	Civil engineering and building materials department		
Created		Shafi.M.A						

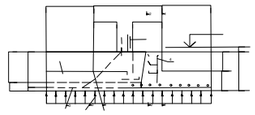
Reinforcement work scheme by crane 1/200



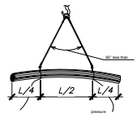
Installation of RCC by KB - 403 (KBK 160.2 (boom length 30 m))
M 1:1000



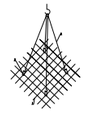
Foundation Reinforcement



Reinforcement looping scheme

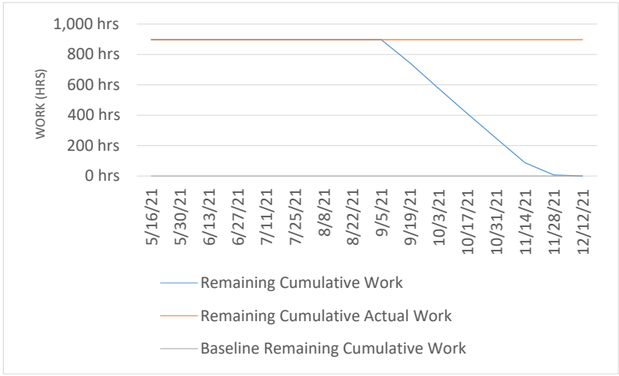


Reinforcement in base scheme



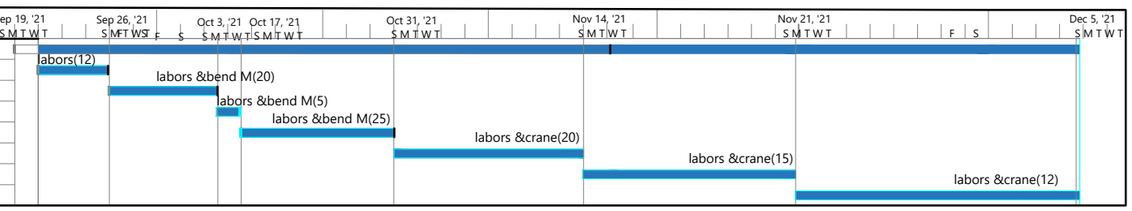
WORK BURNDOWN

Shows how much work you have completed and how much you have left. If the remaining cumulative work line is steeper, then the project may be late.

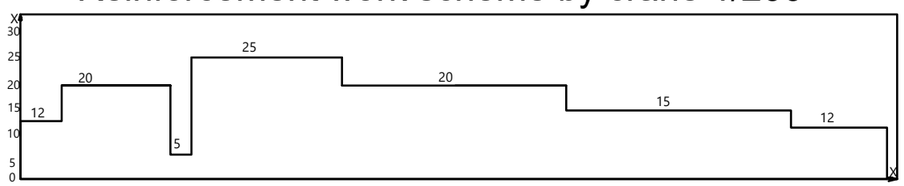


Working Schedule

ID	Task Name	Duration	Start	Finish	Resource Names	volume	Actual Cost
1	RCC work	50 days	Mon 9/20/21	Fri 11/26/21	OASIS		$35150
2	preparation for rcc	5 days	Tue 9/21/21	Mon 9/27/21	labors	4320m2	$500.00
3	single net	10 days	Tue 9/28/21	Mon 10/11/21	labors &bend M	14400	$4000.00
4	chair in net	1 day	Mon 10/11/21	Mon 10/11/21	labors &bend M	2215	$1400.00
5	2nd Net	14 days	Tue 10/12/21	Fri 10/29/21	labors &bend M	14400	$4000.00
6	shear wall	10 days	Sat 10/30/21	Thu 11/11/21	labors &crane	86m2	$11000
7	columns	14 days	Fri 11/12/21	Wed 12/1/21	labors &crane	1180m2	$14000
8	slab single net	8 days	Thu 12/2/21	Mon 12/13/21	labors &crane	4320m2	$2500



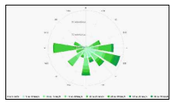
Reinforcement work scheme by crane 1/200



Note:For further information see Explanatory note page 39 and Appendix C Table c.1 and C2

					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	Nedoc	Sign	Date	
Head of Dep		Kozyukova .N.V			Organizational and Technological Part
Consultant		Kozyukova .N.V			stage: DP; Sheet: 9; scale: 1/100
supervisor		Kozyukova .N.V			
Controller		Bek.A.A			RCC work
Created		Shafi.M.A			Civil engineering and building materials department

General plan of working site1/100



Site premises

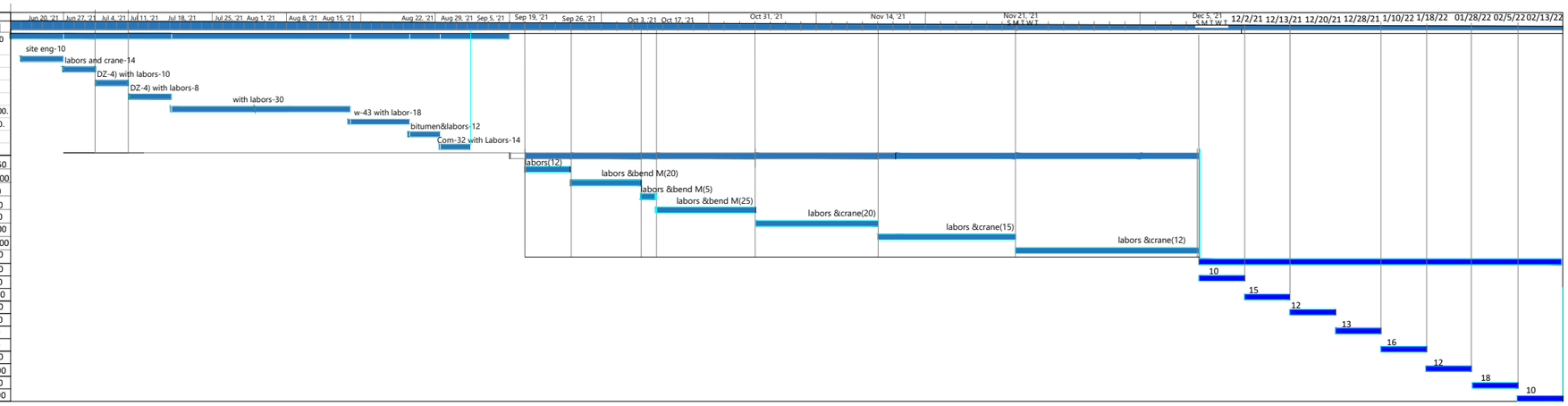
NO	Name of construction	Area
1	Main construction	2000m2
2	Temporary Inside road for Transportation	645m2
3	Temporary houses for Labors	55m2
4	Car parking only for 5 Cars	30m2
5	gate of construction	Site parking
6	Temporary house for materials	730m2
7	Tower crane controller room	7m2
8	Area for organizing of a construction materials	300m2
9	Engineering 4 Offices	6m2
10	Parking Area for large cars	1500m2
11	Electricity Room	6m2
12	Water Tang	17m2
13	Security room	12m2

Note:For further information see Explanatory note page 39 and Appendix C Table C.1,C.2 and C.3

					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	Nedoc	Sign	Date			
Head of Dep		Kozyukova .N.V			Organizational and Technological Part	stage: DP	Sheet: 10 / scale: 1/100
Consultant		Kozyukova .N.V					
supervisor		Kozyukova .N.V					
Controller		Bek.A.A			General plan of site	Civil engineering and building materials department	
Created		Shafi.M.A					

Gaunt Chart of the Project

ID	Task Name	Duration	Start	Finish	Resource Names	volume of work	Cost
	construction of library	193 days	Tue 6/20/21	Fri 02/13/22	OASIS		
1	Earth work	69 days	Tue 6/15/21	Fri 9/17/21	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	66 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



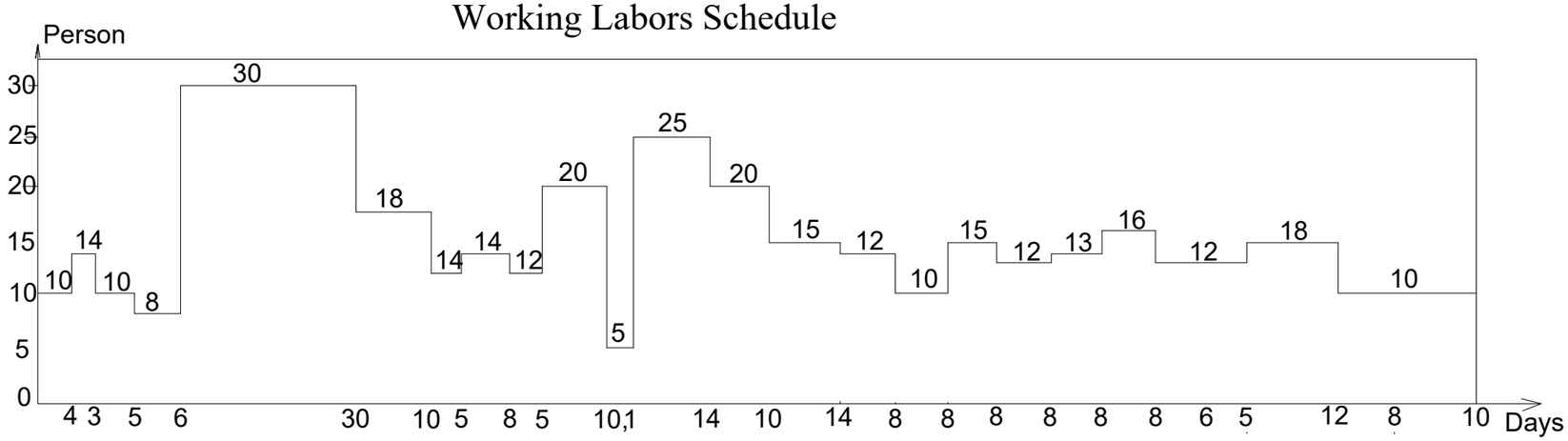
Required machines work

№	Name	Work
1	(E -504) with power (80- 100) KW.	38507M3
2	(KAZ-600 B) with N=43.8	12400M2
3	(Dz-4)with power 40kw	4320M2
4	compaction machines C-78	4647M2
5	Water drainage machines	1449m3

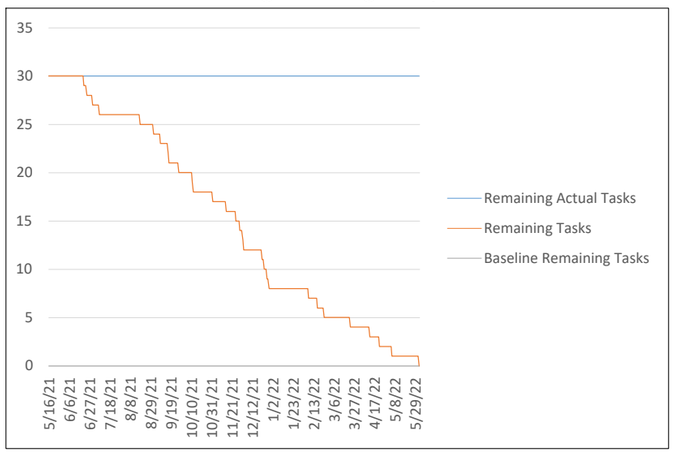
Workers

№	Name	Value
1	G.S,MS and SE	7
2	working Specialists	10
3	Drivers	16
4	Labors	30
5	Guards	3

Working Labors Schedule



Working Starting Graph



Note: for further information check Explanatory note page 39 and Appendix C Table C.1,C.2 and C3

					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
Consultant		Kozyukova .N.V			
supervisor		Kozyukova .N.V			
Controller		Bek.A.A			Gaunt Chart
Created		Shafi.M.A			

stage	Sheet	scale
DP	11	1/100

Civil engineering and building materials department

RESPONSE
OF THE SUPERVISOR
For the graduation project
Shafi Mohammad Ashrafullah

5B072900-Civil Engineering

Topic: “Library with regenerative ventilation system in Atyrau ”

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, and a construction plan were developed, and the cost of construction was also calculated. The student successfully completed all the tasks. Shafi Mohammad Ashrafullah 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.

In the process, the student showed responsibility, creative and analytical thinking, independence and showed well 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
_____ Kozyukova N.V.

«_01» ___06_____ 2021 yr.

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: Шафи Мохаммад Ашрафуллах

Название: Library with regenerative ventilation system in Atyrau

Координатор:Надежда Козюкова

Коэффициент подобия 1:0

Коэффициент подобия 2:0

Замена букв:27

Интервалы:0

Микропробелы:3

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: Шафи Мохаммад Ашрафуллах

Название: Library with regenerative ventilation system in Atyrau

Координатор: Надежда Козюкова

Коэффициент подобия 1:0

Коэффициент подобия 2:0

Замена букв:27

Интервалы:0

Микропробелы:3

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:

……
……
……
……
……

……
……

Дата *Подпись заведующего кафедрой /*

начальника структурного подразделения