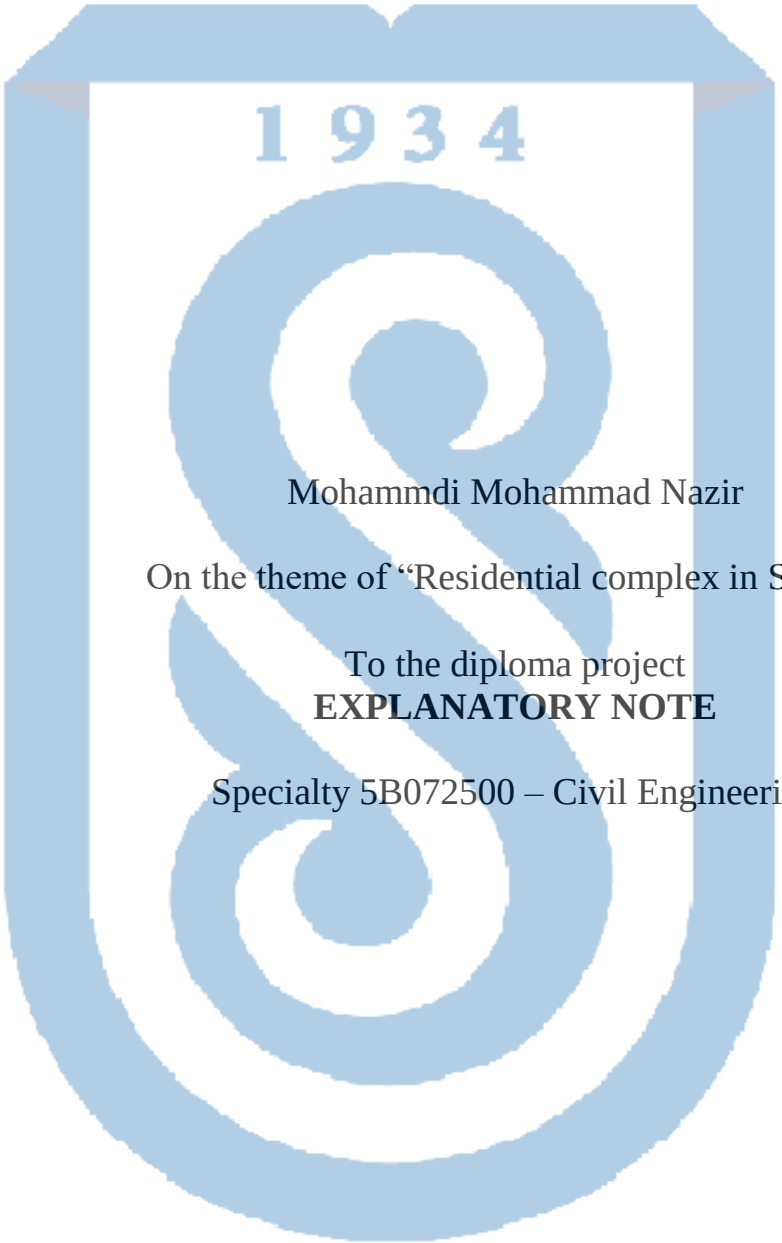
MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN
Kazakh National Research Technical University named after K.I. Satpayev
Institute of Architecture, Construction and Energy named after T. Basenov
Department of «Construction and Building Materials»



Mohammdi Mohammad Nazir

On the theme of “Residential complex in Semey"

To the diploma project
EXPLANATORY NOTE

Specialty 5B072500 – Civil Engineering

Almaty 2020

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ALLOWED TO PROTECT

Head of Department

_ __K.Akmalayuli

« 25 » __05__2020 y.

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To the diploma project

On the theme of "Residential complex in Semey"

Specialty 5B072500 – Civil Engineering

Prepared by M.N.Mohammdi

Supervisor M.Paktin

« 25 »_ 05 _2020 y.

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APPROVED

Head of Department _____K.Akmalayuli

«25» 05 2020 y.

ASSIGNMENT

Complete a diploma project

Student __ M.N.Mohammdi _____

Topic " Residential complex in Semey"

№ _1222 b - endorsed by the request.

Approved by the Order of the Rector of the University No. 762-b of January 27, 2020.

The deadline for completion is May 18, 2020.

Beginning entries of the certificate venture: construction locale – Petropavlovsk.

Rundown of issues to be considered in the recognition venture:

Architectural and development division: qualities of the development region; three-dimensional arranging choices; structural and plan arrangements; external divider warm designing bookkeeping; building hardware of the structure;

Computational and valuable segment: count of burdens and making of the computation conspire, figuring of the board and its estimation of fortified solid components dependent on the outcomes and their motivation Technology and association of development creation and work security: land assurance of the volume of underground and surface works; assurance of the quantity of solid trucks; surface strengthened cement of the structure development of innovative guide of structures establishment; object plan of development end-all strategy; Schedule. 4. Division of Construction Economics: neighborhood and article planning of assessments, List of drawing materials (compulsory drawings must be indicated):

Facade of the structure, segments, joints, determinations, plans - 4 sheets;

Drawing, detail of the section - 2 sheets; Calendar arrangement of development creation, general development plan, 2 Sheets 11 slides of the presentation of work are provided.

Recommended basic literature: SP RK 2.04-01-2017 Construction Climatology, SN RK 2.04-04-2013 Construction Heat Engineering, SN RK 2.03-30-2017 Construction in Seismic Zones.

SCHEDULE

preparation of thesis (project)

№	Sections	33%	66%	100%	Примечание
1	Predesign analysis Architectural and construction	18.02.2019г.-01.03.2019г.			
2	Settlement constructive		18.03.2019г.-29.03.2019г.		
3	Technology and organization of construction production and labor protection Economic			03.04.2020г.-19.04.2020г.	
4	Anti-plagiarism, norm control, pre-defense	18.05.2020y.-22.05.2020y.			
5	Defence	01.06.2020-05.06.2020y.			

Signatures

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

Name of sections	Consultants, I.O.F. (academic degree, rank)	date of signing	Signature
Architectural building	M.Paktin , master of technical science	25.05.2020	
Settlement and constructive	A.P.Turganbaev, master of technical science	25.05.2020	
Technology and organization of construction production	I.Z. Kashkinbaev, doctor of technical science	25.05.2020	
Economic part	M.Paktin, master of technical science	25.05.2020	
Norm controller	N.V. Kozyukova, master of technical science	25.05.2020	

Supervisor M.Paktin

The student accepted

The task M.N.Mohammdi

Date «_ » _2020

АҢДАТПА

Дипломдық жұмыстың тақырыбы: «Семей қаласындағы тұрғын үй кешені ». Дипломдық жұмыс келесі бөлімдерден тұрады:

1. Сәулет және құрылыс бөлімі - көлемді жобалау, сәулет-конструктивті шешімдері және қоршау конструкцияларының есебі,

2. Есептік-конструктивті бөлім – «lira» бағдарламасы бойынша темірбетонды біртұтас қанқалы ғимаратының есебі,

3. Құрылыс өндірісінің технологиясы мен ұйымдастырылуы – негізгі техника – жер жасау механизмдері таңдалуы, кесте жасалып есептелді,

4. Құрылыс экономикасы – СМЕТА AVS

АННОТАЦИЯ

Тема данной дипломной работы «Жилой комплекс в г.Семей». Дипломная работа включает в себя разделы:

1.Архитектурно-строительный - состоит из объемно- планировочных архитектурно-конструктивных решений и теплотехнические расчеты ограждающих конструкций,

2.Расчётное– конструктивный - расчет железобетонного монолитного каркаса здания в программе lira,

3.Технология и организация строительного производства –подобраны основные машины- механизмы для выполнения подземных работ составленкалендарный план и вычислены калькуляций затрат труда.

4.Экономика строительства - СМЕТА AVS.

ANNOTATION

The topic of this thesis is “Residential complex in Semey.

Thesis includes the following sections:

Architectural and construction - consists of space-planning, architectural and design solutions and heat engineering calculations of enclosing structures,

Design-constructive – monolithic Frame of the building in the program lira.

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

Economy of construction - the calculation of the cost of construction work in the ‘Estimation avs ‘program

CONTENT

INTRODUCTION

The variety of spheres of life in our country determines a significant number of administrative and office buildings, as well as management buildings of various levels: national, republican, regional, local. Such buildings include buildings of ministries, state committees, administrative and economic institutions (associations, trusts, offices, agencies, etc.), legal institutions, communication institutions, editorial offices and publishers, etc. Very often, various institutions

Communication institutions, editorial offices and publishers, etc. Very often, various institutions are located in the same building. These can be cooperative buildings of management, administration, design offices of various profiles, etc. Often, such buildings also include offices of various companies or firms.

The aim of the thesis is the construction of a competitively capable building and its development.

The objective of this thesis project is the construction taking into account all the requirements for residential complexes and offices.

Social progress and the development of public life put forward new challenges in developing functional problems and finding the best solutions for organizing various processes taking place in public buildings. The development of new types of buildings is based on the study of social needs and the search for forms and organization of the environment that meet these needs at every stage of the development of society. This is especially true for the historical development of large cities, where in the conditions of reconstruction different conditions for living and servicing the population are required.

1. Architectural part

1.1. Basic information about the construction site

The graduation project was developed for the construction of "residential complex" located at: semey, at the intersection of streets with design names E10, E305, E306, is located on the allotted territory of 0.896 hectares.

Building characteristic:

Responsibility level - the designed residential complex refers to facilities of the II (normal) level of responsibility that are not technically complex, according to Order No. 517 of December 20, 2016 "On Amending Order No. 165 of the Minister of National Economy of the Republic of Kazakhstan dated February 28, 2015" On approval of the Rules for determining the general procedure for classifying buildings and structures as technically and (or) technologically complex objects. "The degree of fire resistance of a building is II in accordance with SN RK 2.02-01-2014"Fire safety of buildings and structures "The degree of durability of the building - II.

The graduation project is designed for the following construction conditions:

Humidity zone - normal;

Climatic region - IB : temperate continental climate;

Snow zone - II I , regulatory zone chine weight snow cover 1.0 0kPa; wind region - I II , normative value of wind pressure - 0.72 kPa;

Climatic parameters of the cold season: air temperature of the coldest day:

-20 ˚C; air temperature on the coldest five-day period:

-15 ˚C; the construction area is not seismic hazard, magnitude is 4-5 points;

The construction site is located in the residential and administrative buildings zone, the land plot Relief is calm.

1.2 Natural and climatic and engineering-geological conditions

Characteristic features of the climate of this territory are: abundance of sunlight and heat, continentally, hot, long summers, relatively cold with alternating thaws and cold snap winters, large annual and daily amplitudes of fluctuations in air temperature, air dryness and changes in climatic characteristics with the height of the terrain.

The wind regime of the study area is quite heterogeneous and changes with distance from the mountains. The average annual wind speed is 2.3 m / s. Wind breakthrough reaches 28 m / s. The lowest monthly average wind speeds throughout the territory are observed in the winter period (in December, January), and the highest - in the summer.

Table 1.1 - Repeatability of wind and calm directions

Weather station	Direction								Calm
	С	СВ	В	ЮВ	Ю	ЮЗ	З	СЗ	
semey	10	10	10	10	13	20	15	10	29,5

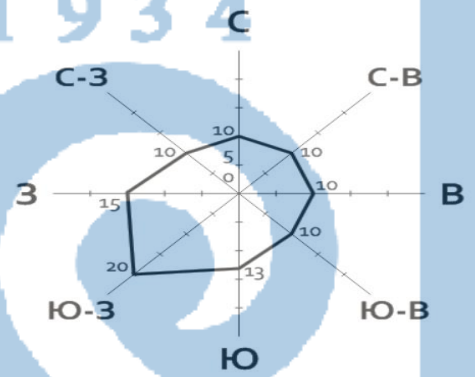


Figure 1 - Wind rose according to the weather station of city A of the camp

1.3 General plan. Landscaping

The general plan was developed in accordance with the urban planning situation and the required orientation of the premises, the master plan for the development of industrial areas, taking into account the landscaping and landscaping in accordance with the requirements of SN RK 3.02-07.2014 "

Public buildings and structures" and SP RK 3.01-101-2013 "Urban planning. Improvement and greening of the site envisaged by the project reduces the general dust content and eliminates local foci of dust

Table 1.2 - Technical and economic indicators for the master plan

Name	Indicator
Land area	0.33 ha
Built-up area	2 924.8 m
Building factor	0.277
Landscaping area	2 21.40 m
Gardening rate	0.006

Hard surface	2 2385.40 m
The utilization of the territory	0.99

The area around the building is landscaped and landscaped. There are paved access roads to the building.

1.4 Space-planning solution

Projected object " residential complex " located at: semey , at the intersection of streets with design names E10, E305, E306, is located on the allotted territory of 0.896 hectares.

The following types of engineering equipment are provided for in the building: centralized heating from a thermal power station, hot water supply, water supply, sewerage, electric lighting, telephone installation, radio communication.

The level of a clean floor of the 1st floor, corresponding to the absolute mark of 345.60 on a vertical layout, is accepted as a mark of 0,000.

An office building with dimensions in axes of 34.5x21.9 m. For vertical communication of floors, one staircase of type L1 and a fire escape of type P2 are provided. The workplace for MGN are located on the ground floor of the Office building.

Evacuation exits are provided directly through stairwells with a vestibule with a direct exit to the outside.

The height of the 1st floor is 4.0 m (cleanliness - 3.5 m),

The height of the 2-3rd floor is 3.5 m (cleanliness - 3.0 m).

1.5 Constructive solutions of the object

Office building: reinforced concrete monolithic frame with a bezel-less system.

Dimensions of columns 400x400 mm, diaphragms of rigidity 200 mm, thickness of floor slabs 220 mm.

Foundations - pile with a monolithic grillage Walls:

the external walls should be made of a gas block 200 mm thick / D 500 / ;

internal partitions of aerated concrete blocks with a thickness of 100, 200 mm;

in bathrooms made of ceramic, ceramic, full-body brick, M75 GOST 530-2012 with M100 solution, thickness 120, 250 mm.

Ceilings and coatings - monolithic;

Stairs - monolithic;

Protections - aluminum;

Platforms - monolithic reinforced concrete;

Lintels - prefabricated reinforced concrete in brick walls and partitions; metal in partitions from a gas block;

The construction of the mine is reinforced concrete.

The insulation is adopted according to the heat engineering calculation; the roof is flat, rolled; gutter - internal organized with heating. Outside lining:

Basement walls - granite tiles;

Walls - fiber-cement slabs;

Decorative lamellas - aluminum;

Porch - heat-treated granite;

The blind area of the building is paving stones.

Doors: metal entrance doors; entrance groups on the 1st floor - a glazed door, an aluminum frame; doors in technical rooms - metal, fire;

Windows: Stained-glass windows - triple glazing, profile - aluminum, color - white;

Stained-glass windows: Stained-glass windows - triple glazing, profile - aluminum, color - white.

1.6 Corrosion protection

Coat all embedded parts and connecting elements located indoors and not concreted with GF820 enamel on GF 024 primer. Paintwork is applied in 2 coats of 120 microns thick paint 2 times, zinc - 120 microns thick. The total thickness of the coating is 55 microns - in the factory.

Zinc or paint coatings damaged during electric welding should be reinstated. Before performing work on restoration of the anticorrosion coating, the damaged surface must be brushed and dusted.

1.7. Thermo technical calculation of the outer wall

According to the joint venture of the Republic of Kazakhstan 2.04-01-2017 “Construction Climatology” [p. 7-10] and the joint venture of the Republic of Kazakhstan 2.04-107-2013 “Construction Heat Engineering”. [p.14-16] "Construction heat engineering" it is necessary to determine the thickness of the insulation for the outer wall.

We determine the value of the degree days of the heating period:

$$GSOP = (t_{in} - t) * z \qquad (1.1)$$

Where t_{in} = 21 ℃ - temperature of internal air, ℃;

t = 1.7 ℃ - average temperature of the heating period;

z = 171 days. -the duration of the heating period;

GSOP = (21-1.7) * 160 = 3088 ° C * day

The required heat transfer resistance of enclosing structures that meet sanitary-hygienic and comfortable conditions is:

$R_0^{тр} = 2{,}45 * ℃/Вт$

Table 1.3- the composition of the outer wall [11]

Material name	Υ_0 ,кг/м^3	λ, Вт/м^2*℃	δ,м	R_n=δ/λ , м^2 * ℃/Вт
Plaster on a cement-sandmortar	1800	0,76	0,03	0,039
Extrudedpolystyrene	40	0,03	0,1	2
Aerated concrete	600	0,26	0,30	1,15
Cement-sand mortar plaster	1800	0,76	0,03	0,039

The heat transfer resistance of the building envelope should be determined by the formula

$$R_0 = \frac{1}{\alpha_в} + \frac{\delta_1}{\gamma_1} + \frac{\delta_2}{\gamma_2} + \frac{\delta_3}{\gamma_3} + \frac{\delta_4}{\gamma_4} + \frac{1}{\alpha_н} \quad (1.2)$$

$$R_0 = 3{,}38\ м^2 * ° \frac{C}{Вт} \geq R_0^{тр} = 2{,}45\ м^2 * ℃/Вт$$

2. Structural part

2.1 collection of load

Table 2.1 - the collection of loads on the 1st floor (floor)

name	Units rev	Normative	γ_f	Estimated
Ceramic plate $\delta = 8mm, \rho = 1800$ Kg $/m^2$	Kg/m^2	14,4	1,1	15,84
Tsem. Sand screed $\delta = 40mm, \rho = 1800$ Kg/m^2	Kg/m^2	72	1,3	93,6
Extrud. Pen. $\delta = 60mm, \rho = 400$ Kg/m^2	Kg/m^2	2,4	1,3	3,12
Waterproofing + Geo-style $\Delta = 10$ Kg/m^2	Kg/m^2	10	1,3	13
Reinforced concrete slab$\delta = 200\ mm, \rho = 2500$ Kg/m^2	Kg/m^2	500	1,1	550
Total	Kg/m^2	598,8		675,56

Table 2.2 - Collection of loads on typical floors (floor)

Name	Units rev	Normative	γ_f	Estimated
Parquet $\delta = 15mm, \rho = 700$ Kg/м^2	Kg/m^2	10,5	1,2	12,6
Continuation of table				

Tsem. Sand screed (in Armenian) $\delta = 50mm, \rho =$ 1800 Kg/м^2	Kg/m^2	90	1,3	117

Table 2.3

Technolast Acoustic Δ= 4 Kg/м^2	Kg/m^2	4	1,3	5,2
Equal. c / p solution $\delta = 10mm, \rho =$ 1800 Kg/м^2	Kg/m^2	18	1,3	23,4
Reinforced concrete slab $\delta =$ 200 $mm, \rho =$ 2500 Kg/м^2	Kg/m^2	500	1,1	550
total	Kg/m^2	622,5		708,2

Table 2.4 - the collection of loads on the roof

Name	Units rev.	Normative	γ_f	Estimated
Tekhnolast EKP Δ= 5,25 Kg/m^2	Kg/m^2	5,25	1,2	6,825
Uniflex Vent EPV Δ= 4,3 Kg/m^2	Kg/m^2	90	1,3	117
Tsem. Sand screed (in Armenian) $\delta = 40mm, \rho =$ 1800 Kg/m^2	Kg/m^2	72	1,3	93,6
Expanded clay (prone.) $\delta = 40mm, \rho =$ 600 Kg/m^2	Kg/m^2	24	1,3	31,2
Extrud. Pen. $\delta = 60mm, \rho =$ 40 Kg/m^2	Kg/m^2	2,4	1,3	3,12

Reinforced concrete slab $\delta = 200\ mm, \rho = 2500$ Kg/m^2	Kg/m^2	500	1,1	550
total	Kg/m^2	607,95		690,3

Table 2.5 - Collection of wall loads

Name	Units rev.	Normative	γ_f	Estimated
Plaster $\delta = 40$ мм, $\rho = 1800$ кг /м^3 H=3.0м (3,7 м)	Kg/m^2	216 (266,4)	1,3	280,8 (346,32)
Equal. c / p solution $\delta =$ 10 мм, $\rho =$ 1800 кг/м^3 H=3.0м (3,7 м)	Kg/m^2	54 (66,6)	1,3	70,2 (86,58)
Extrud. foam. $\delta =$ 60 мм, $\rho =$ 40 кг/м^3 H=3.0м (3,7 м	Kg/m^2	7,2 (8,88)	1,3	9,36 (11,54)
Heat block $\delta =$ 300мм, $\rho =$ 600 кг/м^3 H=3.0м (3,7 м	Kg/m^2	540 (666)	1,2	648 (799,2)
total	Kg/m^2	817,2 (1007,88)		1008,36 (1243,64)

2. 2 Calculation of floor slabs [12]

For the calculation, a structural element was chosen - a plate at the level of +4.340 along the 1-2 / A-B axis.

Initial data:

Plate of rectangular cross section with bottom reinforcement with dimensions b = 1000 mm, h = 200 mm; c_1 = 20 mm; Concrete has a normal class C25 / 30 (f_ck = 25 MPa, γ_c = 1.5, f_cd = 14.2 MPa, α_cc = 0.85). Valves of class S500 ($f_{ук}$= 500 MPa, fyd = 435 MPa, Es = 20 * ⟦10⟧ ^ 4 MPa, αcc = 0.85). The bending moment Med = 34.9 kN * m acts on the plate.

A) Determination of the cross-sectional area of the reinforcement

Bending moment acting in section:

Meds = Med-Ned * zs1 = 34.9 kN * m. (Ned = 0), d = h-c1 = 200 - 20 = 180 mm.

The required area of longitudinal reinforcement is determined according to:

$$k_d \frac{d}{\sqrt{M_{ed}/b}} \quad (3)$$

$$kd = 3.0$$

Determine k_s according to table B.3 for normal concrete ≤C 25/30 → ks = 2,4

As1 = ks1 * Meds / d + Ned / σ_s1d = 2.4 * 34.9 / 14 + 0/435 = 5.98 ⟦cm⟧ ^ 2

Accept: 5Ø16 (A_s1 = 10.05 ⟦cm⟧ ^ 2)

b) The selection of longitudinal reinforcement (see example 3) is carried out according to table B.1 of Appendix B to determine the bearing capacity of bent rectangular elements with a single reinforcement using dimensionless coefficients

We determine the value of the coefficient

$$\alpha_{eds} = \frac{M_{eds}}{f_{cd} * b * d^2} \quad (4)$$

$$\alpha eds = 0.075$$

$$\alpha eds \leq \alpha(eds, lim) = 0.372$$

$$0.075 \leq 0.372$$

Compressed fittings are required by design. We put it constructively.

5Ø16 (A_s2 = 10.05 ⟦cm⟧ ^ 2)

B) Calculation of checking the width of the opening of cracks normal to the longitudinal axis of the element [12]

Working section height

$$d = h - ccov - dsw - Ø16 / 2 = 200 - 20 - 16/2 = 172 \text{ mm.}$$

$$\rho = As1 / bd = 1005/1000 \cdot 172 = 0.0058 (0.57\%).$$

Check the width of the crack opening by a simplified method, using the data in table. 8.3 for rectangular sections reinforced with reinforcement of class St500 with $0.5\% \leq \rho \leq 1.0\%$, the shoulder of an internal force pair is determined:

$$z = 0.85\ d = 0.85 \cdot 172 = 147.05 \text{ mm.}$$

Stresses in tensile reinforcement are determined by the formula;

$$\sigma s = Med / As1 \cdot z \ (11)$$

$$\sigma s = 236.15 \text{ N / mm2}$$

According to the table 8.4 dmax = 20 mm at σs = 236.15 MPa and wk, lim = 0.4 mm.

The accepted diameter Ø = 16 mm ≤ Ømax = 20 mm, i.e. it is not necessary to check the crack opening width by calculation.

2.3 Calculation on Lira

Create 5 loadings, thereby applying a load on the skeleton of the building:
Net weight of the building;
-Floors;
-Walls;
-Long-term load on the joint venture;
Short-term load in the joint venture;
-Snow load;
The formation of mass matrices for loads No. 8, No. 9, No. 10.

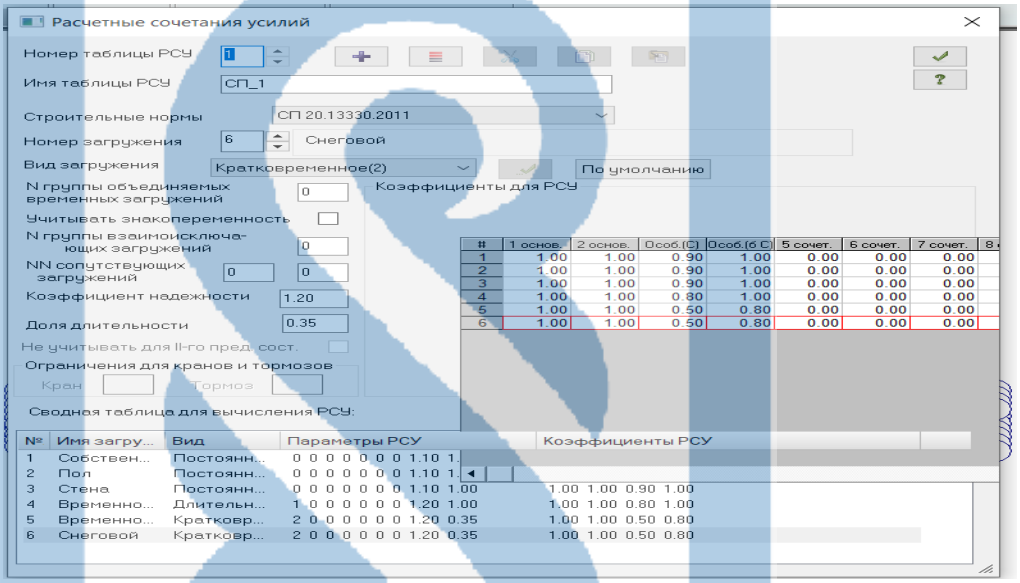


Figure 2.2 - Design combinations of efforts

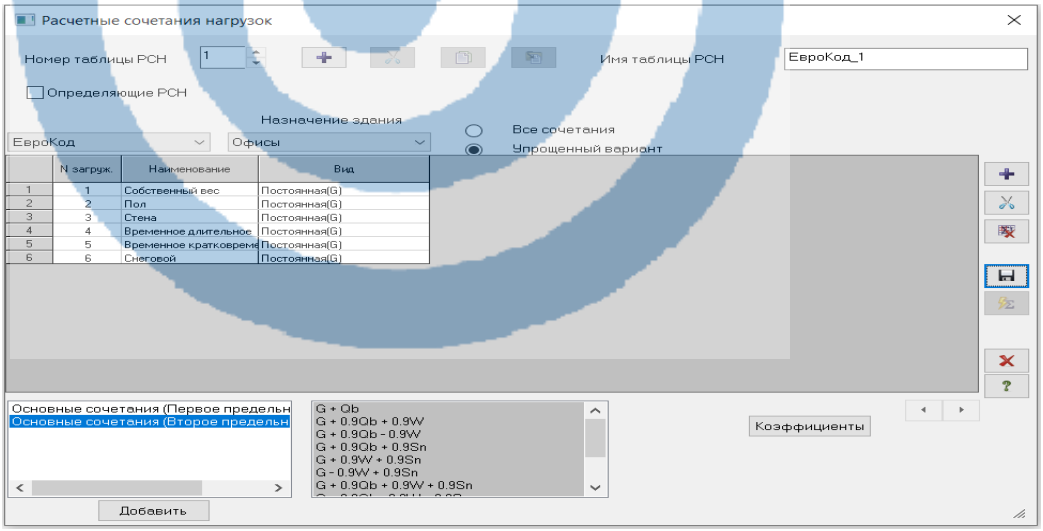


Figure 2.3 - Estimated combination of loads

This building model is designed in accordance with the design features of the designed building. The stiffness and overlap diaphragms were modeled by finite elements of a flat shell. The design model of the building is adopted in the form of a spatial multi- mass discrete system with masses concentrated in nodes. Each node has 6 degrees of freedom.

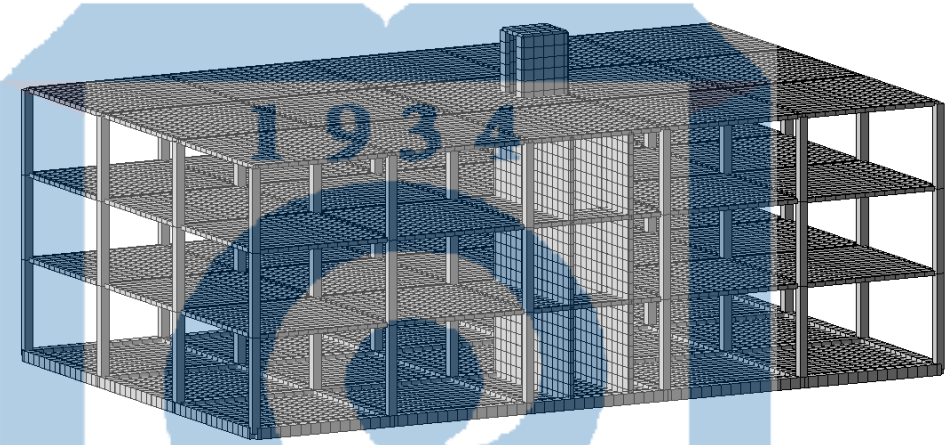


Figure 2.4 - The initial spatial model of the building

Various calculation files are created to meet the norms of SNiP and the design features of the designed building. We create 5 calculation files:

The main combination with the coefficient of bed (for statics).

The main combination with $E_{гор}=0,3*E_0$, $E_{вер}=0,6*E_0$

A special combination with the coefficient of bed C1 * 10 * 1.5.

A special combination with the coefficient of bed C1 * 10 * 0.667.

A special combination with $E_{гор} = 0.5 * E0$

The first calculation file is needed to detect sediment near the foundation slab. The second calculation file is needed to identify deflections in horizontal elements. The third, fourth and fifth calculation file is required to verify compliance with the conditions of SP 2.03-30-2017 “Construction in seismic regions of the Republic of Kazakhstan”. Since the city of Astana is not a seismically dangerous region, there is no need to rely on the fulfillment of the conditions of SP 2.03-30-2017. A complete calculation on the Lira CAD software is given in Appendix

3. Technological part

3.1 Characterization of soil development conditions

The survey site is located in semey, the intersection of streets number 10, E305, E306 ",. The surface of the survey area is characterized by fluctuations in absolute marks at the time of the work (at the mouths of the drilled wells) in the range of 343.97–344.95 m.

According to the results of off-site processing of drilling operations and according to laboratory studies, the soils composing the survey area were divided into engineering-geological elements according to their occurrence from top to bottom.

Modern deposits (tQIV,).

ИГЭ 1 – Bulk soil QIV

ИГЭ 2 - Silt aQ II-IV.

ИГЭ 3 - Loam aQ II-IV.

ИГЭ 4 - Large sands aQ II-IV.

ИГЭ 5 - Gravelly Sands aQ II-IV.

ИГЭ 6 - Gravel aQ II-IV.

ИГЭ 7 - Loam e (MZ)

ИГЭ 8 - Wood-crushed-stone soil e (MZ)

In the survey area, according to the drilling data, groundwater was uncovered at a depth of 2.80 - 3.50 m., The absolute marks of the established level were 341.10 - 341.88 m. Under natural conditions, the groundwater level is subject to seasonal fluctuations: the minimum standing is noted in March, the maximum falls at the beginning of May. The amplitude of level fluctuations in the studied area was 1.20-1.50 m. With a spring maximum, it is necessary to expect a rise in the groundwater level by 1.30 m, higher on the date of a one-time measurement of the groundwater level on 12/24/2017

3.2 Determination of the volume of earthwork

Earthworks usually have the following composition: site planning, development of pits or trenches by mechanisms, backfilling of pits (trenches) with soil, and in certain cases, soil loosening, drainage and lowering of water are carried out.

When determining the volume and nature of earthwork, they rely on the features of the buildings being built - space-planning and structural.

1. Since the building in the plan has a complex geometric shape, it was decided to make part of the calculations directly in the AutoCAD program, measuring the area, perimeter and volumes of parts of the building. The buildings were outlined with a polyline, and then using the command the offset was copied to visualize the upper edge

of the pit. According to these outlines, the dimensions of the pit were determined bottom and top.

The pit volume should be produced using the formula for a truncated prism. The volume of the truncated pyramid is equal to one third of the product of height h (OS) by the sum of the areas of the upper base S1, the lower base of the truncated pyramid S2 and the average proportional between them.

$$V = \frac{1}{3}h(S + S_1 + \sqrt{S \cdot S_1}) \quad (3.1)$$

$$V_{к1} = \frac{1}{3} \cdot 2(876 + 1001 + \sqrt{876 * 1001}) = 1875{,}6 \text{ м}^3$$

2. Backfill, volume:

$$V_{обр.з.} = \frac{V_к - V_ф}{1 + К_{о.р.}}, \text{ м}^3 \quad (3.2)$$

$$V_{обр.з} = \frac{1875{,}6 - 207{,}76}{1 + 0{,}06} = 1573{,}4 \text{ м}^3$$

where $V_ф$ is the volume of the foundation elements

$К_{о.р}$- the coefficient of residual loosening

3. The volume of excess soil:

$$V_{изл.г} = V_к - V_{обр.з}, \text{ м}^3 \quad (3.3)$$

$$V_{изл.г} = 1875{,}6 - 1573{,}4 = 302{,}2 \text{ м}^3$$

1. Determine the amount of under-excavation

$$V_{н.г} = a \cdot b \cdot h_{нед}, \text{м}^3 \quad (3.4)$$

$$h_{нед} = 0{,}1 \div 0{,}4 \text{ м}$$

$$V_{н.г} = 87{,}6 \text{м}^3$$

2. The area of cutting the plant layer

$$F_{срез} = (10 + c + 10)(10 + d + 10), \text{ м}^2 \quad (3.5)$$

$$F_{срез} = 1746 \text{ м}^2$$

3. The full volume of the cut rast. soil.

$$V = S * h_{рг} = 1746 * 0{,}2 = 349{,}2 \text{ м3} \quad (3.6)$$

7. Soil compaction area

$$F_{упл} = V_{о.з.} / h_y \quad (3.7)$$

where h_y - thickness of the sealing layer

$$F_{упл} = 1573.4 / 0.3 = 5244.6 \text{ m2}$$

8. The area of waterproofing the base plate

$$S = 56.5 \text{ m2}$$

Table 3.1 - Statement of volumes of earthwork

Name of works	unit of measurement	amount
Cut rast. layer	1000 м^2	1,746
Excavation of the soil.		
the dump	100 м^3	15,76
In transp. funds	100 м^3	3,02
Development of soil shortages.	1 м^3	87,6
Backfill soil.	100 м^3	15,76
Soil compaction.	100 м^2	52,44
Waterproofing device	1 м^2	56,5

3.3 The selection of a set of machines for earthworks

In modern times, 4 types of mechanisms are used for soil development. This is a mechanical method, hydro mechanical, explosive and combined.

The mechanical method affects about 90% of earthworks, i.e. using various machines. The technological method of excavation is to develop soil with unloading in transport mechanisms or on the edge of the excavation; soil movement; bottom layout; backfill and soil compaction.

Soil development, in accordance with the existing classification, is usually divided into 3 groups:

- Earth moving machinery
- Machines used for soil compaction
- Machines for auxiliary work

Bulldozer selection
Initial data:
Base tractor T-130, bulldozer DZ-28, soil - loam,
the length of the cutting path is 15 m, the length of the transport soil path is 45 m.
Cycle time:

$$T = t1 + t2 + t3 + t4 \text{ (3.8)} \quad (3.8)$$

where t1 - soil cutting time:

$$t1 = l1 / v1 = 3.6 * 15 / 3.2 = 16.9 \text{ s}$$

3.6 - conversion factor km / h to m / s;
I1 is the length of the cutting path, l1 = 15 m,
V1 is the speed of the moving bulldozer in 1st gear during soil cutting,
v1 = 3.2 km / h;
t2 - time displacement soil dump:

$$t2 = l2 / v2 = 3.6 * 45 / 3.8 = 42.6 \text{ s}$$

3.6 - conversion factor km / h to m / s;
L2 is the path length of the soil, l2 = 45 m;
V3 is the speed of the moving loaded bulldozer, v2 = 3.8 km / h;
t3 - time of the return (idle) stroke:

$$t3 = (l1 + l2) / v3 = 3.6 * (15 + 45) / 5.2 = 41.5 \text{ s}$$

V3 is the speed of movement in reverse, v3 = 5.2 km / h;
t4 - t4 = 25 s.

$$T = t1 + t2 + t3 + t4 = 16.9 + 42.6 + 41.5 + 25 = 126 \text{ s}$$

The technical performance of the bulldozer is determined by:

$$П_т = q_{пр} * n * k_н / k_р \quad (3.9)$$

where $q_{пр}$ - the volume of the prism of soil drawing, m;

$$q_{пр} = L * H2 / 2 * m = 3.97 * 0.818 / 2 * 0.7 = 1.93 \text{ m3}$$

L -blade length, L = 3.97 m,
H -blade height, H = 0.818 m,
m = 0.7 - coefficient dependent on H / L,
n is the number of cycles per hour of operation:

$$n = 3600 / T = 3600/126 = 28.6$$

$k_н$ = 1,1 - coefficient of filling the geometric volume of the prism with soil,
$k_р$ = 1.27 - coefficient of loosening of the soil,

$$П_т = q_{пр} * n * k_н / k_р = 1{,}93 * 28{,}6 * 1{,}1 / 1{,}27 = 47{,}8 \text{ м}^3/\text{ч}$$

Operational bulldozer production:

$$П_э=П_т*k_в=47,8*0,8=38,24\ м^3/ч \quad (3.10)$$

Where $k_в$ is the coefficient of operation of the bulldozer in time, $k_в$ = 0.8.

Interchangeable bulldozer production:

$$П_с=8*П_э=8*38,24=305,92\ м^3/ч,$$

Where 8 is the number of hours per shift.

Excavator selection

Excavation is carried out by an excavator equipped with a straight shovel with loading the soil into dump trucks and with a certain dumping into the dump.

We select 2 excavators with a straight shovel with a bucket with teeth with a bucket volume of 1m3 and 1.25 m3 and perform a comparison.

Table 3.2 - Specifications

	E-1252B	EO-4121A
Drive unit	hydraulic	hydraulic
Bucket capacity	1,25 $м^3$	1 $м^3$
The greatest digging depth	9,3 м	6,85 м
The largest cutting radius	9,9 м	7,25 м
Unloading height transport	6,6 м	4,7 м
Power	90 kW	59 kW
Weight	39,5 t	27,6 t
H_{br1}	1,64	2,2
H_{br2}	2,2	2,6
$С_{м.с.}$	41,2 y.e.	32 y.e.
$С_{и.р.}$	25,58 thousand. y.e.	23,47 thousand. y.e.

I. Excavator E-1252B

1. The calculation of the cost of developing one m of soil in the pit of the considered type of excavator (tg)

$$C = \frac{1,08 \cdot С_{маш.смен}}{П_{см.выр}} \quad (3.11)$$

$$С = \frac{1,08 \cdot 41200}{414,3} = 107,4\ тг \quad [6, стр. 43]$$

where 1,08 - coefficient taken to account for overhead costs

c - the cost of an excavator machine shift

2. Replace excavator excavation, taking into account the development of the soil will sweep, and with subsequent loading into transport mechanisms

$$П_{см.выр} = \frac{V_к}{\sum n_{маш.смен}} \quad (3.12)$$

$$П_{см.выр} = \frac{4143}{10} = 414{,}3\ м^3/смен\ [6, стр.\ 43]$$

3. The total number of machine tools of the excavator during operation will be piled and followed by loading into the transport mechanism

$$\sum n_{маш.смен} = \frac{V_{обр.з} \cdot Н^1_{вр} + V_{изл} \cdot Н^2_{вр}}{8{,}2 \cdot 100} \quad (3.13)$$

$$\sum n_{маш.смен} = \frac{2542 \cdot 1{,}64 + 1601 * 2{,}2}{820} = 9{,}38 = 10$$

where H1вр = 1.64 - the time norm of the mechanism during operation will sweep (mash-hour). (ENiR 2, vol. 1, pp. 40-41).

H2вр = 2.2 - the time norm of a machine when loading soil into vehicles. (ENIR 2, Issue 1, pp. 40-41).

4. Definition of capital specific. Investments in the development of 1 m3 of soil (tg / m3)

$$К_{уд} = \frac{1{,}07 \cdot С_{ир}}{П_{см.выр} \cdot t_{год}} \quad (3.14)$$

$$К_{уд} = \frac{1{,}07 \cdot 25580}{414{,}3 \cdot 300} = 0{,}22\ тг/м^3\ [6, стр.\ 43]$$

5. Determination of reduced costs for the development of 1 m3 of soil for this type of excavator

$$П_д = С + Е_н \cdot К_{уд} \quad (3.15)$$

$$П_д = 107{,}4 + 0{,}15 \cdot 0{,}22 = 107{,}433 тг/м3$$

where $Е_н$ is normal. coefficient of capital efficiency. attachment

II. Excavator EO-4121A

1. The calculation of the cost of developing one m of soil in the pit of the considered type of excavator (tg)

$$\mathbf{С = \frac{1{,}08 \cdot С_{маш.смен}}{П_{см.выр}} = \frac{1{,}08 \cdot 32000}{345{,}25} = 100{,}1\ тг\ [6, стр.\ 43].}$$

1,08 - coefficient taken to account for overhead costs $С_{маш.смен}$- cost of a machine shift of an excavator

2. Replace excavator excavation, taking into account the development of the soil will sweep, and with subsequent loading into transport mechanisms

$$П_{см.выр} = \frac{V_к}{\sum n_{маш.смен}} = \frac{4143}{12} = 345{,}25\ м^3/смен\ [6, стр.\ 43]$$

3. The total number of machine tools of the excavator during operation will be piled and followed by loading into the transport mechanism

$$\sum n_{\text{маш.смен}} = \frac{V_{\text{обр.з}} \cdot \text{Н}^1_{\text{вр}} + V_{\text{изл}} \cdot \text{Н}^2_{\text{вр}}}{8{,}2 \cdot 100} = \frac{2542 \cdot 2{,}2 + 1601 * 2{,}6}{820} = 11{,}87 = 12$$

Н1вр = 2.2 - the rate of time of the mechanism during operation will sweep (mash-hour). (ENiR 2, vol. 1, pp. 40-41).

Н2вр = 2.6 - the rate of time of the mechanism when loading soil into vehicles. (ENIR 2, Issue 1, pp. 40-41).

4. Determination of capital specific investment for the development of 1 m3 of soil (tg / m3)

$$\text{К}_{\text{уд}} = \frac{1{,}07 \cdot \text{С}_{ир}}{\text{П}_{\text{см.выр}} \cdot t_{\text{год}}} = \frac{1{,}07 \cdot 23470}{345{,}25 \cdot 300} = 0{,}242 \text{ тг}/\text{м}^3 \quad [6, \text{стр. } 43]$$

5. Determination of reduced costs for the development of 1 m3 of soil for this type of excavator

$$\text{П}_{\text{д}} = \text{С} + \text{Е}_{\text{н}} \cdot \text{К}_{\text{уд}} = 100{,}1 + 0{,}15 \cdot 0{,}242 = 100{,}136 \text{ тг/м3} \ [6, \text{стр. } 43]$$

here $\text{Е}_{\text{н}}$– is normal. coefficient of capital efficiency. attachment-0.15

Choosing from two excavators, we rely on a lower present cost. Therefore, we take the excavator EO-4121A.

Determining the number of dump trucks

The role of completing machine mechanisms for the removal of excess soil and the provision of joint work with an excavator we take dump trucks. The carrying capacity and make of machines is assigned depending on the volume of the excavator and the distance of soil transportation.

We select the MAZ-525 dump truck

The volume of soil in a dense body in the bucket of an excavator

$$V_{\text{гр}} = \frac{V_{\text{ков}} \cdot \text{К}_{\text{нап}}}{\text{К}_{\text{пр}} + 1} \qquad (3.16)$$

$$V_{\text{гр}} = \frac{1 \cdot 1{,}2}{0{,}27 + 1} = \frac{1{,}2}{1{,}27} = 0{,}9449 \text{ м}^3$$

where $\text{V}_{\text{ков}}$- accepted bucket volume

$\text{К}_{\text{нап}}$- bucket filling ratio:

$\text{К}_{\text{пр}}$ - coefficient of primary loosening

$\text{К}_{\text{пр}}$=0,27

for a direct shovel - from 1-1.25

$$V_{\text{гр}} = \frac{V_{\text{ков}} \cdot \text{К}_{\text{нап}}}{\text{К}_{\text{пр}} + 1} \qquad (3.16$$

2. We calculate the mass of soil in the bucket of the excavator

$$Q=V_{гр} \cdot \rho_{гр} \quad (3.17)$$

$$Q = 0{,}9449 \cdot 1{,}85 = 1{,}75 \text{ т } [6, \text{стр. } 45]$$

$\rho_{гр}$=1,85 т/м^3- ср. soil density

3. Determination of the number of buckets of soil when loading. to the dump truck

$$n = \frac{П}{Q} \quad (3.18)$$

$$n = \frac{25}{1{,}75} = 14 \text{ шт } [6, \text{стр. } 45]$$

4. Disassemble the volume of soil for loading into a dump truck

$$V=V_{гр} \cdot n \quad (3.19)$$

$$V = 0{,}9449 \cdot 14 = 13{,}229 \text{ м}^3 \ [6, \text{стр. } 45]$$

1. Determine the duration of one cycle of the truck

$$T_ц = t_ц + \frac{60 \cdot L}{V_г} + t_р + \frac{60 \cdot L}{V_П} + t_m \quad (3.20)$$

$$T_ц = 17{,}44 + \frac{60 \cdot 7}{18} + 1{,}5 + \frac{60 \cdot 7}{30} + 2 = 63{,}77 \text{ мин } [6, \text{стр. } 45]$$

Where L is the distance of soil transportation

$T_ц$- continue loading the soil

tp - time of unloading of soil (1-2 min)

tm-time for maneuvering - from 2-3 min

$V_г$- Wed truck dump speed in load. status

$V_г$ = 18 km / h

$V_п$ -from 25-30 km / h

$$t_п = \frac{V \cdot H_{вр}^2 \cdot 60}{100} = \frac{13{,}23 \cdot 2{,}2 \cdot 60}{100} = 17{,}44 \text{ мин } [6, \text{стр. } 46]$$

2. Determine the need. number of dump trucks

$$N = \frac{T_ц}{t_п} \quad (3.21)$$

$$N = \frac{63{,}77}{17{,}44} = 3{,}65 \approx 4 \text{ шт } [6, \text{стр. } 46]$$

Selection of soil compaction machines

Loam refers to bound soils, therefore, as a method of compaction of the soil, we choose compaction by rolling. We choose the DU-31A skating rink - self-propelled, the width of the sealing strip is 2.2 m. The thickness of the rolled layer is 25 cm.

Calculation of operating parameters of sinking

For the excavator EO-4121 nab. Cutting radius is 7.25 m

For the pit, they took frontal driving with movement in a straight line, with one-sided loading of soil into the transport mechanism.

Excavator moving step lp = 4.8m

1. We determine naib. Width of 1st frontal penetration on top

Bn = 2 * b = 2√ (0.9 * Rmax) 2-Ln = 2√ (0.9 * 7.25) 2- 4.82 = 9.57 m (3.22)

2. We determine naib. width of the first penetration at the excavator parking level

Bn = 2 * b1 = 2 * 0.9 * 7.2 = 12.96 m (3.23)

We calculate the width of the 2nd side penetration

B = B1 + B = 4.3 + 6.48 = 10.78 m (3.24)

Table 3.3 - a sheet of the volume of work on the construction of foundations

Name	V works		Note or calculation formula
	Ед. изм	amount	
The device of monolithic structures			
For foundation			
Formwork	1 м^2	384	(a+b)*2* h
Reinforcing works	1 т	3,686	0,04*2.4*V_b
Concrete laying	1 м^3	38,4	(a*b*h)
Concrete Care	1 м^2	284	A*b
Stripping	1 м^2	384	

3.4 The aboveground part. Scoping

1) Formwork:

Large-panel formwork:

L * h-Sok-Sdv. (3.25)

Floor slabs:

S = L * B = 34.5 * 22 = 2277 m ^ 2 (3.26)

Small panel formwork:

⟦S = 0.8 * 2 * (34.5 + 22) = 90.4 m⟧ ^ 2

Columns:

⟦S = 24 * 0.4 * 4 * 12 = 460.8 m⟧ ^ 2

TOTAL: 551.2 m ^ 2

2) Reinforcing works Installation of reinforcing meshes of the framework of ceilings and coatings of 12A500C.

Size 1 grid 6 m ^ 2. Plates are reinforced above and below.

n = 2277 * 3 * 2/6 = 2277 pcs.

Installation of reinforcing bars.

$$\rho = m / V \rightarrow m = p * V$$

m = 0.14 * 197.9 = 27.7 t

m_ (arm.) = 27.7 t

First, we determine the mass of concrete, 3-5% is reinforcing bars.

3) Formwork:

Formwork dismantling:

Large-panel formwork 2277 m2

Small-panel formwork 551.2 m ^ 2

TOTAL: 2828.2 m ^ 2

That blitz and 3.4 - Bill of Quantities above-ground parts of the building

Type of work	Volume
Large-panel formwork м^2	2277
Small-panel formwork, м^2	551,2
Mesh reinforcement, pcs	2277
Reinforcement with rods, т	27,7
Concrete laying, м^3	653,28
Concrete maintenance, 100 м^2	22,77
Formwork, м^2	2828,2

3.5 Routing for the installation of vertical monolithic reinforced concrete structures

The technological map for the construction of horizontal monolithic reinforced concrete structures was developed in accordance with the requirements of current regulatory technical documents (NTD).

The routing is designed to provide construction with rational solutions for the organization, technology and mechanization of construction work.

In the technological map, the device of horizontal monolithic reinforced concrete structures is considered.The routing contains the following sections:

•application area;

•Normative references;

• Characteristics of the main materials used;

• Geodetic breakdown of structures;
• Organization and technology of work;
• need for material and technical resources;
• Requirements for the quality of work;
• Safety and labor protection.

This routing considers the construction of vertical monolithic reinforced concrete structures. Vertical monolithic reinforced concrete structures include:

• Columns;
• Monolithic walls;
• Stiffness diaphragms;
• Elevator shafts.

In the technological map (hereinafter referred to as the technical map) formwork, reinforcing work, concreting and concrete care are considered. The task list provides for the installation of monolithic reinforced concrete structures using large-panel combined formwork of the GAMMA KASKAD and GAMMA KASKAD 330 series.

The technical data sheet was developed for the construction project “Multifunctional residential complex with built-in, built-in attached buildings, social, cultural, domestic, recreational, shopping and entertainment, administrative facilities, a hotel, a kindergarten, business centers, parking and park areas, located in "semey, at the intersection of streets with the design names E-10, E-305 and E-306.

This task list considers the installation of vertical monolithic structures in compliance with the following conditions of work:

• The concrete mix to the place of laying is served by a crane in tubs;
• Installation of reinforcing frames is carried out by spatial frames previously assembled on the reinforcing section;
• Illumination of workplaces must comply with the requirements of GOST 12.1.046.

Organization and conduct of construction work, the sequence of work should be carried out in strict accordance with the requirements of the technical documentation, the project of works (PPR) and this flow chart.

Geodetic breakdown of structures

Concrete work begins with a preliminary breakdown of the structure being constructed. The breakdown includes the designation of the axes passing near the structure. The axes are broken down by the surveyor of the construction site using surveying instruments. The breakdown is carried out directly at the intersection of the axes or at a conditional mark from it by the following methods:

• driving a dowel onto the surface of a concrete structure;
• Application by paint, pencil or marker on concrete.

From the axes, a more detailed breakdown of the perimeter of concreting of the structures under construction is made. This is done by the following methods:

• tensioning the nylon cord around the perimeter of the structure;

• By directly drawing the edges of structures with paint or a pencil.

The accuracy of the work when creating the internal layout network of the building should be taken in accordance with GOST 21779, based on the required accuracy of the geometric parameters of its structures. The choice of methods and means of measurement should be carried out in accordance with GOST 26433.0.

Immediately before performing the alignment work, it is necessary to check the position of the signs of the alignment network of the building (structure) by repeated measurements of the network elements.

Center axes, mounting (approximate) risks should be applied from the signs of the external or internal center networks of the building (structure).

The correctness of the breakdown work should be checked by laying control geodetic moves (in directions that do not coincide with those taken during the breakdown) with an accuracy not lower than during the breakdown.

The transfer of the points of the planned internal layout network of the building from the source to the installation horizon should be performed by the methods of inclined or vertical design (projection), depending on the height of the building (structure) and its design features.

To transfer the coordinates of geodetic points to mounting horizons by vertical design, elevator shafts and technological or special holes in ceilings of at least 15x15 cm in size, provided for by the working drawings, should be used.

High-altitude breakdown of the position of structures, as well as transferring marks from the initial horizon to the mounting horizon, as a rule, should be performed by the method of geometric leveling or by another method that ensures the corresponding accuracy from the benchmarks of the building's grid network. The number of benchmarks from which marks are transferred must be at least two.

As a mark of the installation horizon, as a rule, the average value of the values of the transferred marks is taken.

When transferring individual parts of a building from one building and installation organization to another, the signs necessary for performing subsequent geodetic work that fix the axes, marks, landmarks and materials of executive surveys must be transferred according to the act in accordance with Appendix 8 of SNiP RK 1.03-26-2004.

Organization and technology of work

The organization of the production of works on the installation of vertical monolithic reinforced concrete structures must be carried out in accordance with the requirements of design documentation, SN RK 1.03-00-2011 *, PPR and this flow chart.

The location at the workplace of equipment and inventory is planned in such a way that there are no cramped working conditions, unnecessary time spent on walking and searching for tools and equipment.

The number of tools and fixtures at the workplace should be minimally necessary, ensuring uninterrupted operation during the shift with the least amount of time to obtain and replace them.

The structure of vertical monolithic structures (columns, stiffness diaphragms, walls) includes the following sequentially performed works:

- Geodetic breakdown;
- Assembly of reinforcing cages at the on-site reinforcing shop;
- Installation of assembled reinforcing cages;
- Installation of formwork;
- concreting of structures;
- Demolition;
- Concrete care.

Reinforcing technology

Upon receipt of packages with fittings to the object, tags are checked with an indication of the diameter, grade of steel, bar lengths for compliance with those specified in the project.

The reinforcing rods that arrived at the construction site should be stacked on shelves in closed warehouses or under a canopy sorted by grades, diameters, lengths, and the grids should be rolled up in vertical position. The construction of a makeshift canopy is allowed, with the permission of the BiOT engineer and the superintendent. On each stack of reinforcing bars, tags are indicated indicating the class and diameter of the reinforcement. Lightweight reinforcement comes in bays. Flat nets and frames should lie on pads and pads in stacks in the area of operation of the tower crane. The height of the stack should not exceed 1.5 m. Stacks with reinforcement must be stored under a canopy or covered with waterproof material.

Figure 3.1. - Reinforcement storage schemes are shown in

Selective trimming from each batch of reinforcement received at the facility is sent to the laboratory to implement the input quality of the material.

Prior to commencement of work, it is necessary to deliver vertical and horizontal clamps for fittings to the construction site Installation of reinforcement for vertical structures

Prior to the installation of the reinforcement of columns and walls, the following work must be done:

• risks of alignment axes are plotted;

• the fittings are cleaned of rust;

• tools, fixtures and equipment delivered to the workplace.

Wall reinforcement can be done before formwork is installed.

Reinforcement is made according to the working draft in the following order:

• production of reinforcing cages on the reinforcing section (workshop);

• slinging of reinforcing cages;

• installation of the frame in the design position, temporary fastening, installation of supports;

• fixing the frame to the outlets with knitting wire;

• cleaning the surface of the weld concrete of the floor slab with the future column with a wire brush;

• installation of clamps in the areas of docking of the working rods of the frame;

• installation with fixing embedded parts;

• installation of latches of a protective layer;

At the reinforcing section (reinforcing workshop), reinforcing frames and grids of vertical structures are manufactured according to the working drawings. The rebar workshop is located under a covered .

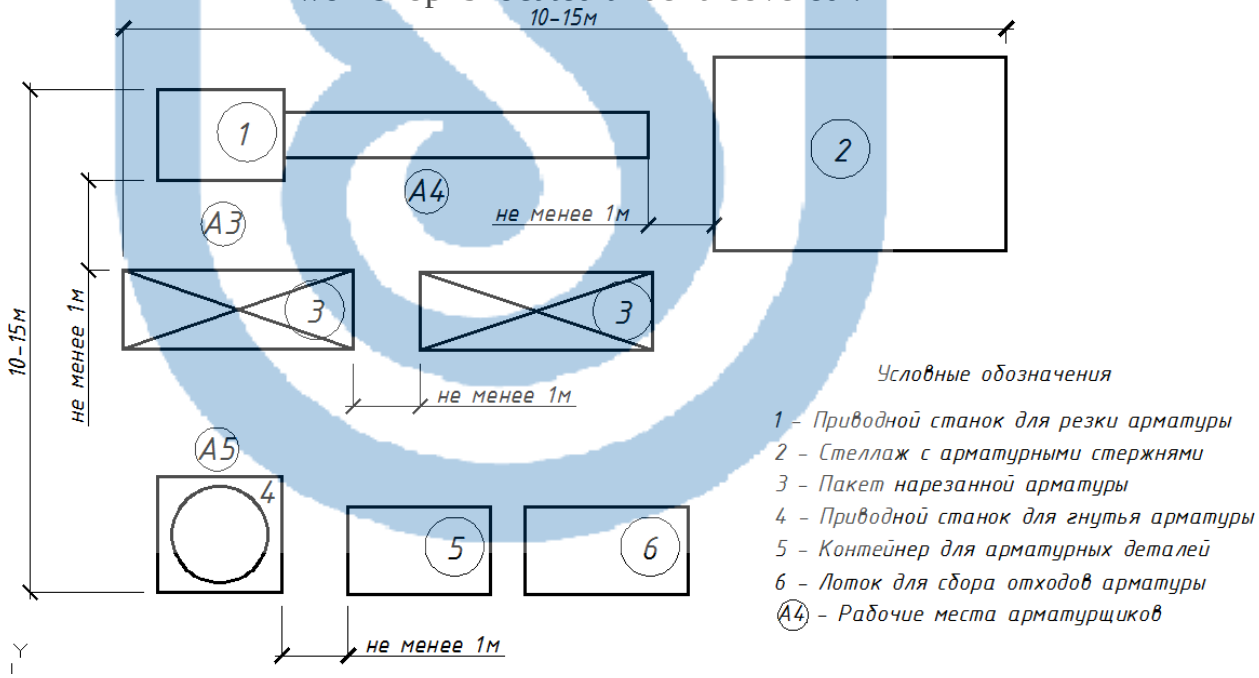


Figure 3.2 - the Scheme of the organization of jobs on the reinforcement section

The reinforcing frames and individual rods assembled in bags are sent to a temporary storage warehouse, from where they are supplied by a crane to the installation site.

The process of production of reinforcing products in reinforcing sections consists of procurement and assembly operations. Reinforcing sections should be located in the area of operation of the tower crane. Procurement of reinforcing products from heavy reinforcement consists of the following operations:

• editing of fittings;
• rust removal and cleaning of contact surfaces with a metal brush;
• cutting on rods of a given length;
• bending according to specification.

Assembly operations boil down to connecting grids and frames with a knitting wire, enlarging the assembly of flat frames into spatial blocks. Assembly operations are carried out at the stand for the assembly of reinforcement cages (Figure 6.3). The cutting of bar reinforcement is carried out using automatic machines for cutting reinforcement, the bending of reinforcing bars is performed on mechanical and manual bending machines.

Installation of reinforcing cages is carried out using a tower crane. To raise the reinforcing cage, use ring slings, traverses. Raise the frames only with the help of a traverse. The slinging schemes of reinforcing cages are given in Figure 6.4.

The joining of the frames vertically, as well as the spatial frames horizontally, is provided by knitting wire in a checkerboard pattern.

Annealed knitting wire with a diameter of 0.8 - 1.0 mm, cut into pieces with a length of 400 mm, is used for knitting reinforcement.

Concrete production technology

All concrete work is carried out in accordance with the working drawings in compliance with the requirements of SNiP RK 5.01-37-2005 "Bearing and enclosing structures", SN RK 1.03-00-2011 * "Construction production. Organization of construction of enterprises, buildings and structures. "

The flow chart shows the concrete production scheme, as well as technological schemes and processes.

Before laying concrete mix, the following work must be done:

• checked the presence of fixatives, providing the required thickness of the protective layer of concrete;
• formwork, reinforcement adopted according to the act;
• the releases of working reinforcement from adhered concrete are cleaned;
• prepared working seam concreting;
• An incoming quality control of the concrete mixture was performed.

Delivery to the facility of concrete mix is provided by concrete mixers. Concrete mixture is supplied to the place of concreting:

• tubs (bunkers) using tower or self-propelled cranes (in vertical structures);

• concrete pumps (in horizontal structures up to);

When the outdoor temperature is below -10 ° C, immediately before concreting densely reinforced structures with reinforcement of the frame with a diameter of more than 24 mm, it is necessary to heat the reinforcing frame in the formwork block.

Releases of reinforced concrete structures must be covered or insulated to a height (length) of at least 0.5 m.

The process of preparing a working seam in the contact zone of the "old" concrete of the floor slab and the "fresh" concrete of the concrete column is carried out by

cleaning the surface of old concrete slabs (before mounting the reinforcing cage) from the carbonate film with a metal brush, or with a high pressure compressor (7 bar);

At air temperatures below -15 ° C, it is recommended to heat the concrete of the working joint (immediately before the first portion of the concrete mixture is fed) through a special window in the lower part of the formwork using warm air from the air heater.

During the incoming quality control of the concrete mix, you should especially follow the concrete passport data (H / C compliance = 0.5, i.e. no more than 0.55) and the process of adding 0.2-0 superplasticizer to the site before unloading the mixture 4% by weight of cement.

When the concrete mixture is fed into the casing column block by a concrete pump equipped with a manipulator in winter conditions, it is necessary to perform additional maintenance operations on the mechanism and concrete pipelines.

General requirements for the installation of concrete pipelines:

• vertical or inclined sections of concrete should be located no closer than 7-8 m from a stationary or mobile concrete pump;

• avoid sharp turns, especially the use of elbows with an angle of 90 ° C.

Features of the operation of the concrete pump and concrete pipelines in winter conditions:

• at an outdoor temperature of -15 ° C, it is allowed to use a concrete pump and concrete pipelines in the usual (summer) version, but subject to the supply of hot concrete mix (30-35 ° C) or a mixture with antifrosty additives;

• at temperatures below -15 ° C, it is necessary to equip the receiving hopper of the concrete pump with a warmed lid, to insulate the concrete ducts with a roll insulation of thicknesses. 15 mm;

• before supplying the concrete mixture with a concrete pump, pour hot water into the washing tank of the concrete pump;

• start the hydraulic system of the concrete pump idling at minimum engine speed and, while maintaining this mode of operation of the hydraulic pump for 10-15 minutes, heat the oil in the hydraulic drive of the pump;

• warm up the hopper, transport cylinders and concrete pump of the concrete pump with hot water (+ 40-50 ° C);

• feed into the hopper a starting solution with a temperature of 30-40 ° C and carry out 3-4 cycles of pumping and suction with a working motive screw;

After the two-stage heating of the concrete pump of the concrete pipelines is completed, it is possible to start pumping the concrete mixture, the temperature of which should not be lower than + 20 ° C, in the absence of anti-frost additives in the mixture.

While waiting for the concrete mixer, close the concrete pump hopper with insulated lid.

In case of forced interruptions in the supply of concrete mixture, the mixture inside the concrete pipeline must circulate in a closed system (recirculating pumping mode), while constantly measuring the temperature of the mixture in the receiving hopper, which should not be lower than + 10 ° C. If the temperature of the concrete mixture drops below + 10 ° C, the mixture must be removed from the concrete pipe and the entire system should be washed and cleaned. Use hot water with a temperature of at least + 30 ° C to flush concrete pipelines, hopper and transport cylinders. The water remaining in the flushing and water tanks must be drained, and the accumulation of water in the transport cylinders, hopper and concrete conduit must be removed using compressed air supplied from the concrete pump compressor.

3.6 Health and safety

3.6.1 Safety measures

During the production of earthworks and other works, in which it is necessary to provide for the placement of jobs in excavations and trenches, it is necessary to take into account measures under the joint venture of the Republic of Kazakhstan 1.03-106-2012 48 in order to avoid the effects of dangerous and harmful production factors on workers. These include:

- rock caving;
- falling objects;
- movements of machines and their working mechanisms, as well as objects rearranged by them;
- finding a workplace near a vertical drop of 1.3 m or more;
- high voltage in the electric circuit, the closure of which is possible when current flows through the human body.

If the abovementioned negative factors take place, then the safety of earthworks should be ensured, providing for the implementation of labor protection decisions that are contained in the organizational and technological documentation (PIC, PPR, etc.)

- taking into account the impact of machinery and soil, to ensure the safe steepness of the slopes of the pits, if they are not fixed;
- choose, using which design, the walls of pits and trenches should be fixed;

- Choose the types of machines used for earthworks and their location;

- taking into account seasonal changes, provide for additional measures that contribute to control and ensure the stability of slopes;

- Provide the location of the stairs for the descent of workers to workplaces, as well as select the type and location of the fences of trenches and pits.

In cases where the soil is developed by a single-bucket excavator, the formation of "peaks" from the soil must be prevented. To do this, properly determine the height of the face.

During operation, the excavator is not allowed to find workers near the excavator in a radius of plus five meters, as well as perform other work near the face.

When storing cement, the following rules should be followed:

- Cement should be stored in closed containers, such as silos, bins, etc. At the same time, measures must be taken to prevent spraying during loading and unloading. The loading holes must be kept closed with protective grilles with locked hatches.

Based on the requirements of GOST 23120 and GOST 12.2.062, appropriate ladders, transitional bridges and ladders should be used when moving workers between workstations

Prefabricated formwork intended for walls and crossbars should be provided with a width of 80 cm or more, using fences.

The formwork used for floors should be fenced around the perimeter. In this case, you must ensure that all openings in the working floor are closed. If, according to the technology, the holes should remain open, then they must be tightened with a wire mesh.

Moving between workstations is allowed only on decks with a width of 60 cm or more. They, in turn, are stacked on a reinforcing frame.

During the execution of finishing work, it is necessary to provide measures to prevent the exposure of workers to hazardous and harmful production factors, which include:

- a high degree of dust or gas contamination in the working area;

- finding a workplace near a vertical drop of 1.3 m or more;

- pointed edges of structures and materials for decoration, as well as burrs on these surfaces;

- poor lighting of the working area.

If the above-mentioned negative factors take place, then it is necessary to ensure the safety of finishing work, providing for the implementation of labor protection decisions that are contained in the organizational and technological documentation (PIC, PPR, etc.):

- methods and means of supplying materials to the area of the working area;

- the organization of working areas, providing them with the necessary devices of pre-conditioning and other means of mechanization required for the performance of work;

- when using compositions that include harmful and flammable substances, measures must be taken to organize ventilation and fire safety.

3.6.2 Labor protection

The process of erection and installation of both load-bearing and enclosing structures should occur subject to the availability of a project for the organization of work and the application of the required safety rules specified in SP RK 1.03-106, GOST 26887.

For coordinated control of the ascent and descent of workers during the installation of load-bearing structures, they must be provided with special devices for this.

During some operations, a large amount of dust particles is emitted into the atmosphere. To reduce this factor, dust collection and dust cleaning plants should be used.

Organization of wastewater treatment to reduce soil pollution is a prerequisite during the construction and installation of structures In order to maintain environmental protection, measures must be taken to maximize the use of industrial waste in circulation

The use of an automated system during concrete work is an essential condition for saving natural resources. This contributes to the management of material costs, which in turn affects the accuracy of the dosage and loss of raw materials are minimized.

During the performance of work related to the installation of load-bearing and enclosing structures, quality control should be organized for the raw materials used, ready-made structures in order to minimize resource consumption while maintaining the necessary properties and quality indicators of products and structures

4 Economic part

Estimated cost - the sum of all cash costs necessary for the implementation of construction on project materials.

The estimated cost is the basis for the dimensional determination of capital investments, financing the construction process, creating contract prices for construction products, settlements for contract work (construction and others).

In the thesis reflects the following types of documentation estimates:

- Local estimate - the primary document in the estimate, which is compiled on the basis of the volumes and costs of the projected building. The local estimate of the diploma project is given in Appendix 3.
- A summary of the volume of construction and the cost of work, reflecting the cash costs for the sections of the estimated calculation. Given below.
- Resource estimates. It is given in Appendix 3.
- Bill of quantities

Estimation was made using the resource method of determining the value.

Table 4.1 - the cost of construction

Сметный расчет стоимости строительства

Зеленый квартал, Фаза 2

(наименование стройки)

Составлен в текущих ценах по состоянию на 2020г.

№ п/п	№ смет и расчетов, иные документы	Наименование глав, объектов, работ и затрат	Сметная стоимость, тысячи тенге			Всего, тысячи тенге
			строительно-монтажных работ	оборудования, мебели и инвентаря	прочих затрат	
1	2	3	4	5	6	7
		Глава 2. Основные объекты строительства				
1	02-001	Школа особенных детей	300 190,580			300 190,580
		Итого по главе 2	300 190,580			300 190,580
		Итого по главам 1 - 7	300 190,580			300 190,580
		Итого по главам 1 - 9	300 190,580			300 190,580
2	Кодекс РК от 10.12.2008 № 99-IV, ст.268	**Итого сметная стоимость** Налог на добавленную стоимость (НДС) - 12 %	300 190,580		36 022,870	300 190,580 36 022,870
		Всего по сметному расчёту	300 190,580		36 022,870	336 213,450

Local and Resource estimates are given in Appendix D and G

CONCLUSION

Based on the given assignment, a graduation project was carried out on the topic of a multifunctional residential complex with built-in premises, social, cultural, domestic, recreational, shopping and entertainment, administrative facilities, a hotel, a kindergarten, business centers, parking and park areas, located at: ‘semey

In the architectural and constructive part of the diploma, space-planning as well as structural solutions were considered, geological and climatic conditions were presented and reviewed, the compositions and methods of work, and also the materials necessary for the construction and decoration of the complex were clarified. The heat engineering calculation was carried out in accordance with the applicable standards and conditions of the building construction site.

In the Structural part , work was performed in the Lira SAPR 2016R1 program where sections and materials were selected, as well as the efforts in the building were shown. Then, based on these data, the slab was calculated. The calculation of the slab is made according to modern norms and rules. The design of these elements using the fittings selected according to the results of calculations was carried out, its required quantity was calculated.

In the section of technology and organization of construction production, work related to the underground part of the building was calculated - earthworks and concrete, appropriate and cost-effective machine mechanisms were selected, a calculation was made, based on which a schedule was developed.

The economic performance of the building was calculated using the RK Estimate software package, which greatly simplifies this process. The economic side of construction was reflected in local, resource and summary estimates.

In the section of life safety and labor protection, the necessary conditions and rules for conducting construction work, as well as ways to reduce the negative impact of work on the environment are considered

LIST OF USED LITERATURE

1 SP RK 2.04-01-2017 “Construction climatology”.

2 SP RK 2.04-107-2013 "Construction heat engineering".

3 NTP RK 02-01-1.1-2011 “Design of concrete and reinforced concrete structures made of heavy concrete without prestressing reinforcement”.

4 NTP RK 02-01-1.4-2011 “Designing of prefabricated, precast-monolithic and monolithic reinforced concrete structures”.

5 Lyashenko T.A. Guidelines for the implementation of the course project - Tikhoretsk: FSBEI HPE RSUPS, 2016 - 52 p.

6 Dzhumagaliev T.K., Kalpenova Z.D. The technology of construction of the underground part of buildings and structures. The task and guidelines for the implementation of the course project in the discipline "Technology of building production-1" for full-time and part-time students of specialties 5B072900 - "Construction" and 5B042000 - "Architecture". - Almaty: KazGASA, 2013 - 45 p.

7 ENiR E2-1 "Earthworks".

8 ENiR E4-1 “Installation of prefabricated and installation of monolithic reinforced concrete structures”.

9 Technology of construction production: a manual for students of specialties 1-70 02 01 "Industrial and civil construction", 1-70 02 02 "Expertise and property management" specialties 1-27 01 01-17 "Economics and organization of production (construction)" / S.N. Leonovich, V.N. Chernoivan. - Minks: BNTU, 2015 .-- 505 s.

10 NTP RK 01-01-3.1 (4.1) -2012 “Loads and impacts on buildings. Snow load. Wind impacts. "

11 CH RK 1.03-05-2011 "Labor protection and safety in construction."

12 CH RK 3.02-07.2014 "Public buildings and structures."

13 SP RK 3.01-101-2013 "Urban planning. Planning and development of urban and rural settlements. ”

14 SN RK 2.02-01-2014 "Fire safety of buildings and structures."

15 SN RK 2.04-02-2011 “Protection against noise”.

16 CH RK 2.04-01-2011 "Natural and artificial lighting."

17 SP RK 5.01-102-2013 “Foundations of buildings and structures”.

18 SN RK 3.01-01-2013 "Urban planning. Planning and development of urban and rural settlements. ”

19 SP RK 2.03-30-2017 "Construction in seismic zones."

20 NTP RK 08-01.1-2012 “Design of earthquake-resistant buildings and structures. Part. General Provisions Seismic effects.

Appendix A

The calculation was performed by the LIRA-SAPR 2016 R5 (non-commercial) software package.

The calculation is based on the finite element method

in movements. The main unknowns are taken

the following node movements:

X linear along the x axis

Y linear along the y axis

Z linear along the Z axis

UX angular around the X axis

UY angular around the y axis

UZ angular around the Z axis

In the PC "LIRA-SAPR 2016 R5 (non-profit)" the provisions are implemented

the following regulatory and regulatory documents:

SP 14.13330 2011. Construction in seismic areas. Updated

edition of SNiP II-7-81 *.

SP 16.13330 2011. Steel structures. Updated

edition of SNiP II-23-81 *.

SP 20.13330 2011. Loads and impacts. Updated

edition of SNiP 2.01.07-85 *.

SP 22.13330 2011. Foundations of buildings and structures. Updated

edition of SNiP 2.02.01-83 *.

SP 24.13330 2011. Pile foundations. Updated

edition of SNiP 2.02.03-85.

SP 35.13330 2011. Bridges and pipes. Updated

edition of SNiP 2.05.03–84.

SP 63.13330.2012. Concrete and reinforced concrete structures. The main provisions. Updated edition of SNiP 52-01-2003.

SNiP 2.01.07–85 *. Loads and impacts.

SNiP 2.03.01–84 *. Concrete and reinforced concrete structures.

SNiP II – 7–81 *. Construction in seismic areas.

SNiP II – 23–81 *. Steel structures.

SNiP 2.02.01–83 *. Foundations of buildings and structures.

SNiP II – 21–75. Concrete and reinforced concrete structures.

SNiP 2.05.03–84 *. Bridges and pipes.

SP 50-101-2004. Code of rules for design and construction. Design and arrangement of foundations and foundations of buildings and structures.

MGSN 4.19-05. Moscow city building codes. Multifunctional high-rise buildings and complexes.

SNiP 52–01–2003. Concrete and reinforced concrete structures.

NP-031-01. Design standards for earthquake-resistant nuclear power plants. Gosatomnadzor of Russia.

DBN B.2.3-14: 2006. Transport facilities. Bridges and pipes. Design Standards.

DBN B.1.2-2: 2006. Loads and impacts. Design Standards.

DBN B.1.1-12: 2006. Construction in seismic regions of Ukraine.

DBN B.2.2-24: 2009. Design of high-rise residential and civil structures.

DBN B.2.1-10: 2009. Foundations and foundations of structures.

DBN B.2.6-98: 2009. Concrete and reinforced concrete structures.

DSTU B.V.2.6-156: 2010. Concrete and reinforced concrete structures made of heavy concrete.

DSTU 3760: 2006. Reinforcing steel for reinforced concrete structures.

SNRA II-2.02-94. Earthquake-resistant construction. Armenia.

KMK 2.01.03-96 *. Construction in seismic areas. Uzbekistan

SNT 2.01.08-99 *. Construction in seismic areas. Turkmenistan.

PN 01.0.1-09. Construction in seismic areas. Georgia.

AzDTN 2.3-1-2010. Construction in seismic areas. Azerbaijan.

SNiP RK 2.03-30-2006. Construction in seismic areas. Kazakhstan.

ISS Thu 07/22/2007. Earthquake-resistant construction. Tajikistan.

The types of finite elements used are indicated in document 1.

In this document, except for the node numbers related to

to the existing element, stiffness type numbers are also indicated.

The following types of elements are included in the design scheme:

Type 10. Universal spatial core FE.

Type 41. Universal rectangular CE shell.

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:

load 1 - static load

load 2 - static load

load 3 - static load

boot 4 - static boot

load 5 - static load

load 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 taking into account the direction of the main sites.

When choosing design combinations of efforts,

The following download characteristics

load 1 - static load

This load is considered as a constant load.

load 2 - static load

This load is considered as a constant load.

load 3 - static load

This load is considered as a constant load.

boot 4 - static boot

This load is considered as a long-term load.

load 5 - static load

This load is considered as short-term load.

load 6 - static load

This load is considered as short-termload 5 - static load

load 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

taking into account the direction of the main sites.

When choosing design combinations of efforts,

The following download characteristics:

load 1 - static load

This load is considered as a constant load.

load 2 - static load

This load is considered as a constant load.

load 3 - static load

This load is considered as a constant load.

boot 4 - static boot

This load is counted as a long-term load.

load 5 - static load

This load is considered as short-term load.

load 6 - static load

This load is considered as short-term load.

Account results are divided into the following sections:

Section 1. The protocol of the processor.

Section 2. Initial data.

Section 3. Diagnostic messages.

Section 5. Movement of nodes.

Section 6. Forces (stresses) in the elements.

Section 7. Reactions in nodes.

Section 8. Design Combinations of Force (DCS).

Section 5 prints the tabulations in tabular form

nodes of the calculated task. Dimension of movements indicated

in the header of the table.

The first column contains the load number and indexing displacements.

In the remaining columns, the numbers of nodes in ascending order and values of displacements corresponding to them.

Linear displacements are considered positive if they directed along the coordinate axes. Positive angular movements correspond to counterclockwise rotation when viewed from the end of the corresponding axis.

Displacements have the following indexation:

X linear along the x axis

Y linear along the y axis

Z linear along the Z axis

UX angular around the X axis

UY angular around the y axis

UZ angular around the Z axis

Section 6 prints out the table in tabular form.

elements of the calculated task. Dimension of efforts indicated

in the header of the table.

The first column indicates the type of CE from the library finite elements, load number and indexing efforts.

The following columns indicate:

in the first line of the header - the number of the element and the number of the section in this element, for which efforts are printed;

The second line contains the numbers of the first two nodes.

In section 8, the calculatedbcombination of efforts (DCS) in the elements for each section and additional information on combinations of efforts.

The following DCS groups are calculated:

Group A1 - includes only those downloads that have a duration

actions; this group includes permanent, long-term and short-term

downloads; types of downloads - 0, 1, 2.

Group B1 - includes all specified downloads, regardless of duration

except seismic and other special.

Group C1 - includes group B1 plus seismic loading.

Group D1 - includes group B1 plus special (non-seismic) loading.

Group A2 - includes only constant and long loads;

types of downloads - 0, 1.

Group B2 - includes permanent, long and short-term downloads (except instant); types of downloads - 0, 1, 2.

Group C2 - includes all specified downloads, regardless of the duration of the action

except seismic and other special.

Group D2 - includes group C2 plus seismic loading.

The calculated combinations form 4 result tables:

Table 1 - DCS calculated, calculated by the calculated values of efforts.

Table 2 - DCS estimated long-term obtained by multiplying the calculated

effort on appropriate duration factors.

Table 3 - regulatory DCS, obtained by dividing the estimated effort by

relevant load safety factors.

Table 4 - DCS regulatory long-term obtained by multiplication

regulatory efforts at appropriate duration factors.

The headings of the DCS tables contain the following indices:

ELM - element number in the circuit;

NS - number of the calculated cross-section in the element (all FE except the rod have

one design section);

CRT - the number of criteria by which this combination of efforts

in accordance with the type of FE;

ST - column number of the combination coefficients from the DCS source data table;

KS - a sign of the presence in the combinations of crane (K) and / or seismic (C) downloads;

G is the index of the internal group - A1, B1, C1, D1, A2, B2, C2, D2.

The following are the identifiers of forces / stresses in accordance with the type of FE, and then a list of the download numbers that made up the current combination.

Alternating loading, included in the DCS with the opposite sign marked with a '-'.

Tables of results for unified DCSs are formed for each design options with the option number.

The headings of the unified DCS tables contain the following indices:

PE - sign of membership of the element;

ELM - serial number of an element in a circuit or in a superelement;

NS - number of the calculated cross-section in the element (all FE except the rod have one design section);

KPT - criterion number in accordance with the type of FE;

ST - column number of the combination coefficients from the DCS source data table;

KS - a sign of the presence in the combinations of crane (K) and / or seismic (C) Downloads ;

G is the index of the internal group - A1, B1, C1, D1, A2, B2, C2, D2.

Indexing and rules of signs of efforts in finite elements

Type 10. Universal spatial core FE.

The finite element perceives the following types of efforts:

N axial force; positive sign resists stretching.

MK torque about the axis X1, a positive sign corresponds to the action of the moment counterclockwise when viewed from the end of the axis

X1, to a section belonging to the end of the rod.MY bending moment about axis Y1 positive sign corresponds to action torque counterclockwise when viewed from the end of the axis Y1, to the section belonging to the end of the reaping.

MZ bending moment about the axis Z1; a positive sign corresponds to the action of counterclockwise when viewed from tsa axis Z1, to a section belonging to the end of the rod.

QY cutting force along the Y1 axis; put- The solid sign matches the direction

forces with the Y1 axis for a section belonging to the end the rod.

QZ cutting force along the Z1 axis; put- The solid sign matches the direction forces with the Z1 axis for a section belonging to the end the rod.

Type 41. Universal rectangular CE shell.

The finite element perceives the following types of efforts, stresses and reactions: NX normal stress along the X1 axis; a positive sign corresponds to a stretch.

NY normal stress along the Y1 axis; a positive sign corresponds to a stretch.

NZ normal stress along the Z1 axis (for the case flat deformation); positive sign resists stretching.

TXY shear stress, parallel to the X1 axis and lying in the plane,

parallel X10Z1; accepted as positive direction coinciding with the direction of the X1 axis,

if NY is aligned with the Y1 axis.

MX moment in force on a section orthogonal to the axis X1; positive sign corresponds to the stretching of the lower fiber (relative axis Z1).

MY moment in force on a section orthogonal to the axis Y1; positive sign corresponds to the stretching of the lower fiber (relative axis Z1).

MXY torque; a positive sign corresponds to the curvature of the diagonal -

whether 1-4 directed downward bulge (relatively axis Z1).

QX shear force in a section orthogonal to the axis X1;

a positive sign matches direction of force with the direction of the axis Z1 on that part element in which node 1 is missing.

QY cutting force in a section orthogonal to the axis Y1; positive sign matches direction forces with the direction of the Z1 axis on that part of the element,

in which node 1 is missing.

RZ soil response (when calculating shells

on an elastic base); positive effort

acts in the direction of the Z1 axis (soil is stretched).

Calculation Protocol

Date: 04/05/2020

GenuineIntel Intel (R) Core (TM) i5-8250U CPU @ 1.60GHz 8 threads

Microsoft Windows 10 RUS 64-bit. Build 17763

Available Physical Memory Size = 3921878528

15:44 Control of the source data of the main circuit

Number of nodes = 16107 (of which the number of undeleted = 16107)

Number of elements = 16334 (of which the number of undeleted = 16334)

BASIC DIAGRAM

15:44 Optimization of the order of the unknown

Number of unknowns = 62321

STATIC LOADING CALCULATION

15:44 Formation of the stiffness matrix

15:44 Formation of load vectors

15:44 Decomposition of the stiffness matrix

15:44 Calculation of the unknown

15:44 Decision control

Results Formation

15:44 Formation of the topology

15:44 Formation of displacements

15:44 Calculation and formation of efforts in the elements

15:44 Calculation and formation of reactions in elements

15:44 Calculation and formation of diagrams of efforts in the rods

15:44 Calculation and formation of plots of deflections in the rods

Total nodal loads on the main circuit:

Load 1 PX = 0 PY = 0 PZ = 2129.35 PUX = 2.79829e-014 PUY = -4.47826e-014 PUZ = 0

Load 2 PX = 0 PY = 0 PZ = 2073.08 PUX = 1.83731e-014 PUY = -7.1287e-014 PUZ = 0

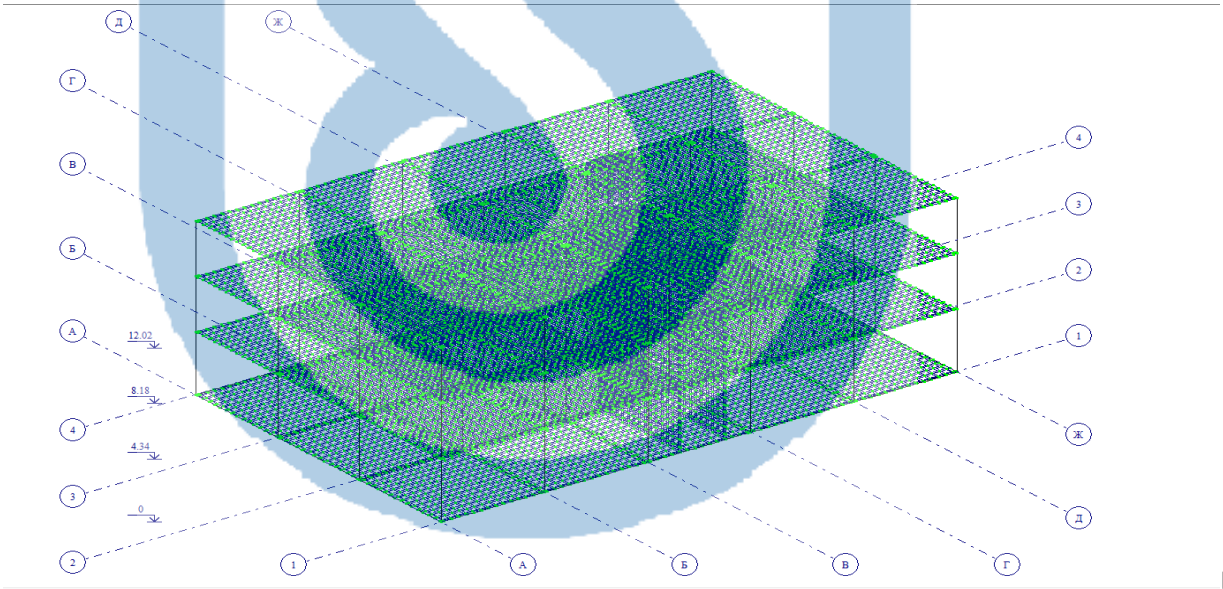
Load 3 PX = 0 PY = 0 PZ = 68.364 PUX = 3.5307e-016 PUY = -1.82699e-015 PUZ = 0

Load 4 PX = 0 PY = 0 PZ = 1786.86 PUX = 1.84579e-014 PUY = -5.21239e-014 PUZ = 0

Load 5 PX = 0 PY = 0 PZ = 2382.48 PUX = 4.36682e-014 PUY = -8.85493e-014 PUZ = 0

Load 6 PX = 0 PY = 0 PZ = 755.55 PUX = 6.90859e-015 PUY = -2.96797e-014 PUZ = 0

Calculation completed successfully



n

Figure A.1 - Design scheme

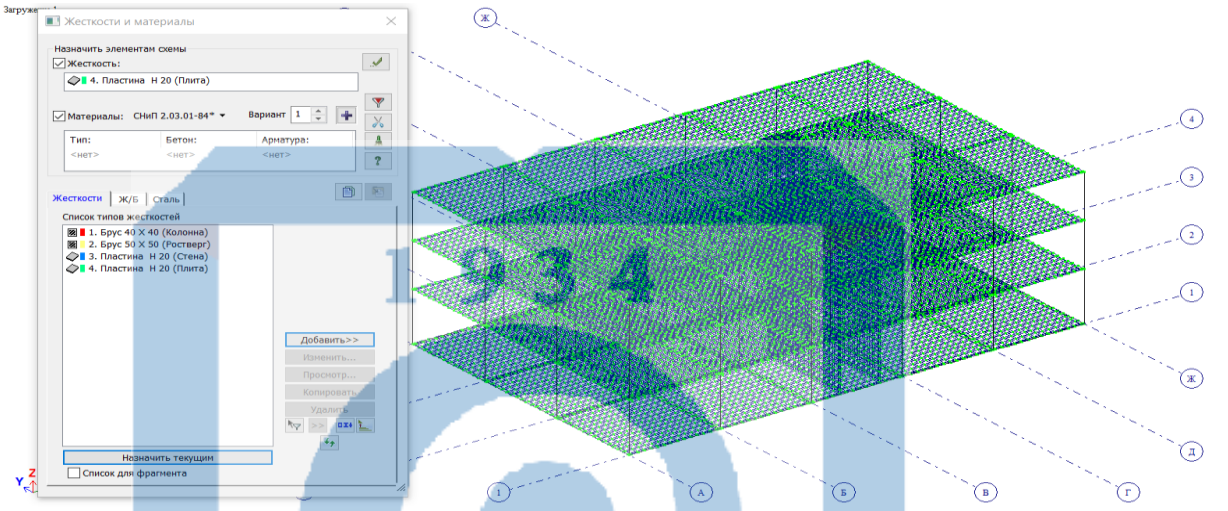


Figure A.2 – Stiffnesses

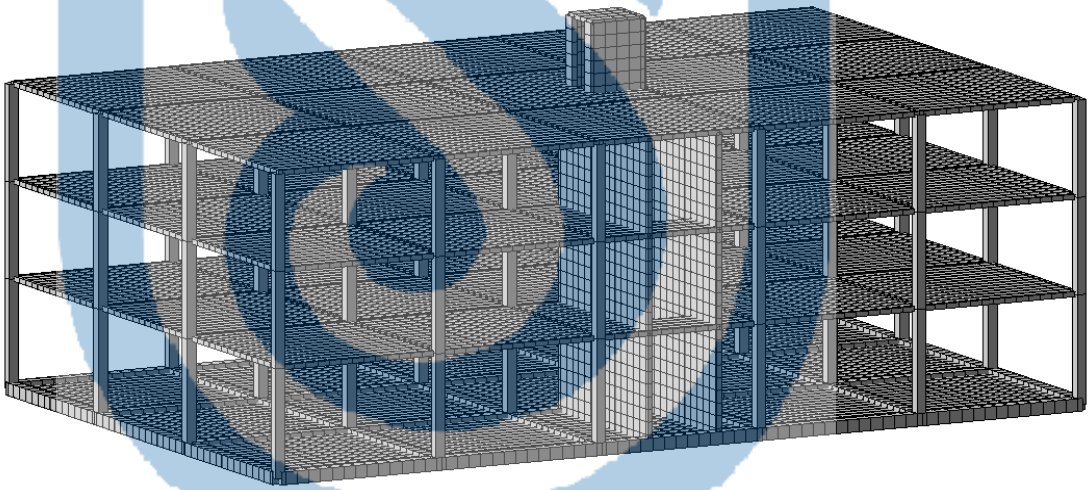


Figure A.3 - Spatial model

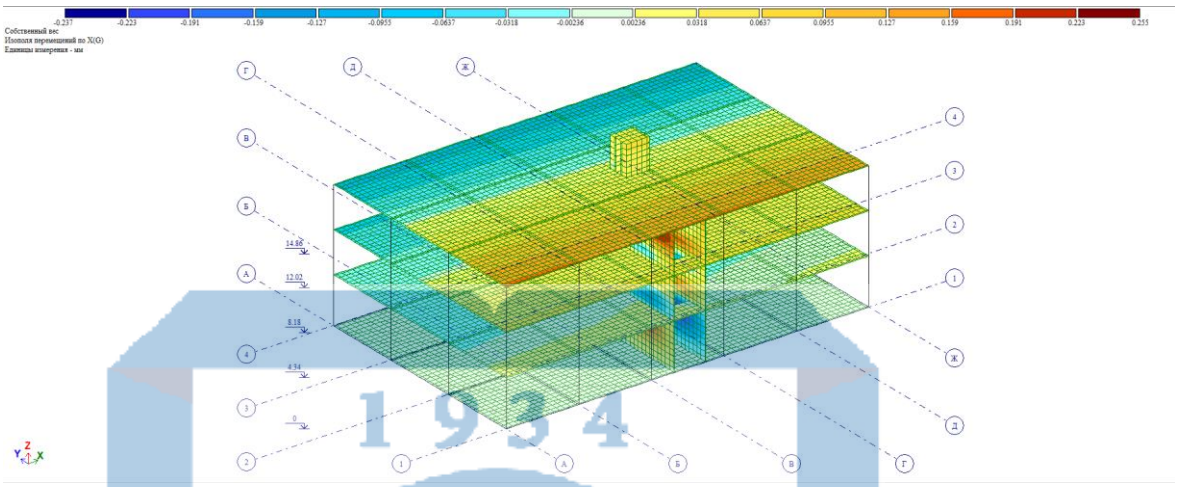


Figure A.4 - Mosaic of movement along the X axis

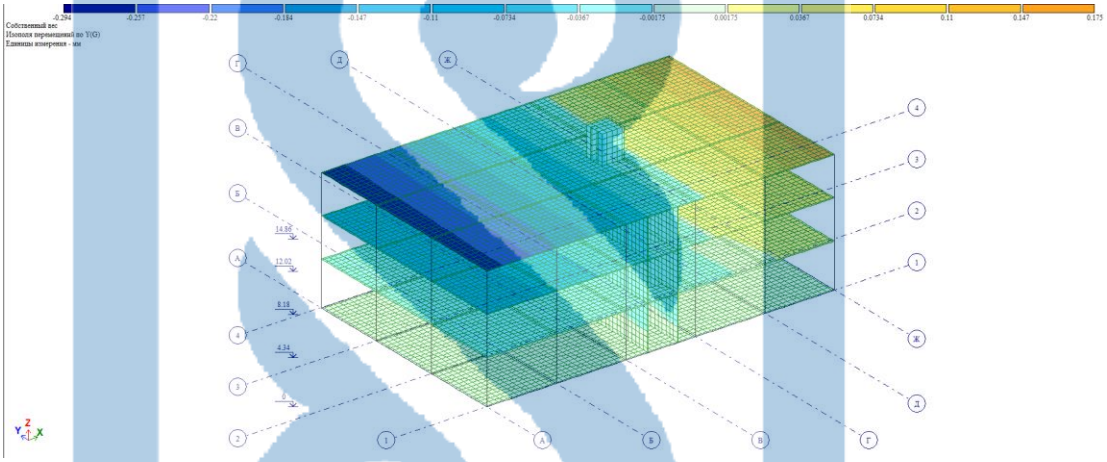


Figure A.5 - Mosaic of displacement along the Y axis

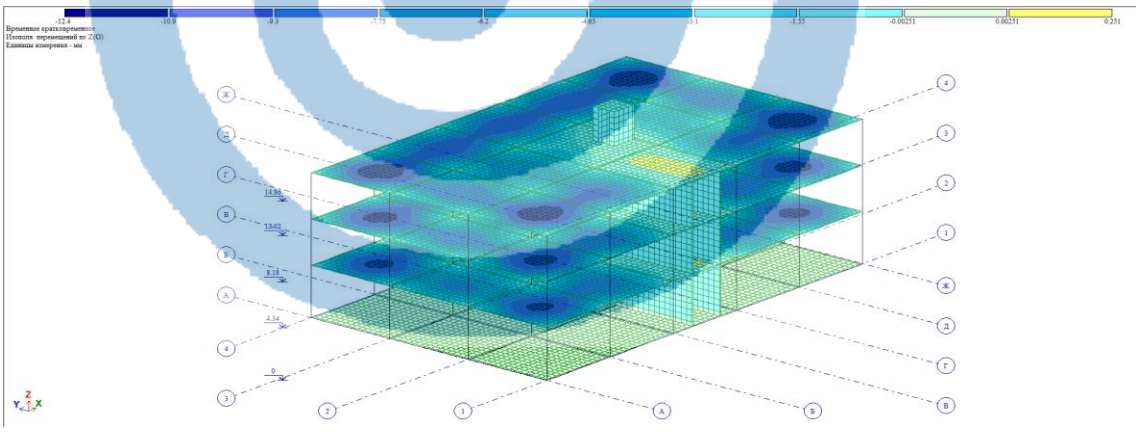


Figure A.6 - Mosaic of movement along the Z axis

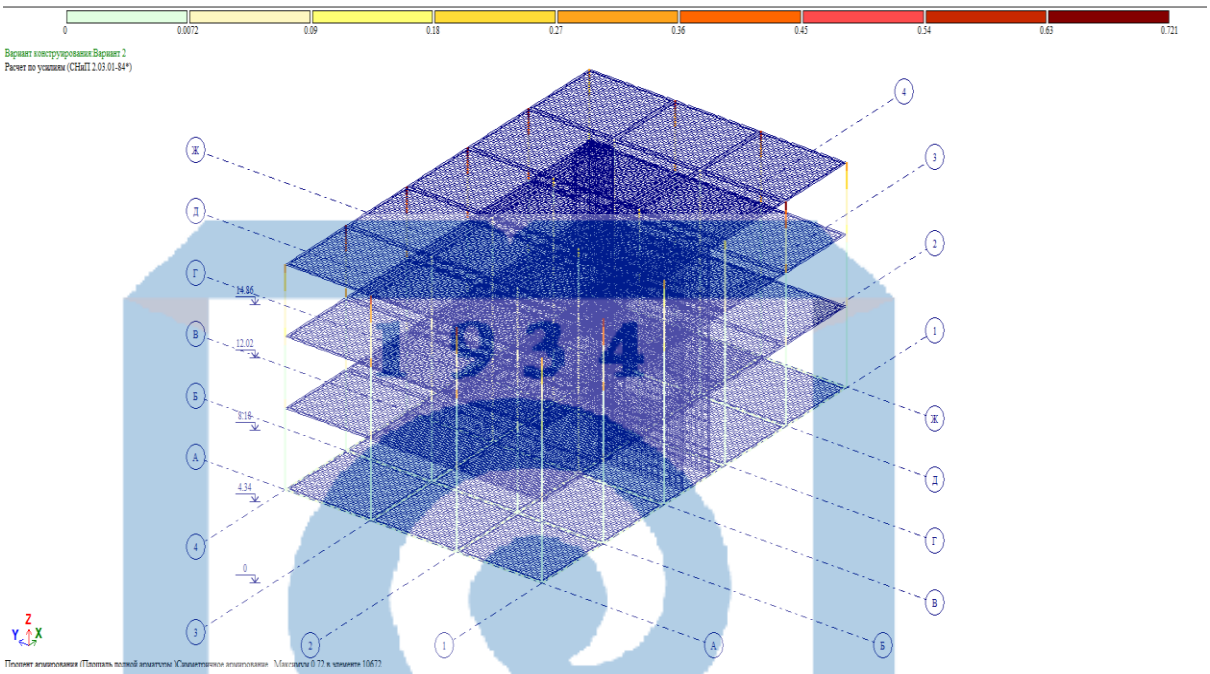


Figure A.7 - Design. Percentage of reinforcing columns

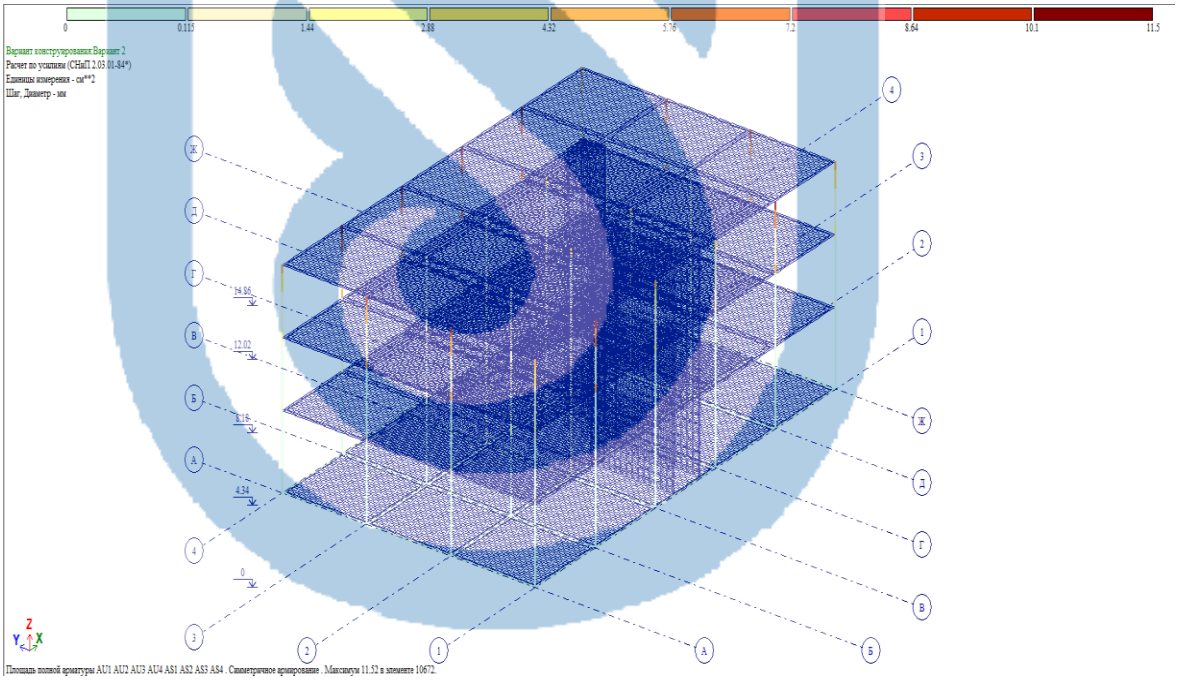


Figure A.12 - Design. Column

Appendix B

Name of works	ENiR	Unit of Measure .	amount	Rate of time Mechanism, m / hour	Cost mash. time		Link composition			Norm of time of workers, h / hour	Labor costs		Rate y.e.		Salary y.e.	
					Маш/час	Mash / shift	Profession	category	amount		Days	Days	Cars.	Working	Cars.	Working
2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Device temporary ogre.	9-2-33	м	420	-	-	-	carpenter	3	1	0,25	105	13,125	-	0,175	-	73,5
Cut Rast. layer	2-1-5	1000 $м^2$	1.746	1,4	2,44	0,3	Driver	6	1	-	-	-	-	1,48		2,58
Excavation																
With loading in t.s.	2-1-8	100 $м^3$	3,02	2,6	7,852	0,98	Driver	Days	Days	-	-	-	-	2,55	7,701	-
To the dump	2-1-8	100 $м^3$	15,76	2,2	34,672	4,334	Driver	Days	Days	-	-	-	-	2,17	34,2	-
Manual cleaning of the bottom of the pit	2-1-47	1 $м^3$	87,6	-	-	-	Digger	Days	Days	1,3	113,88	14,235	-	0,83	-	72,7
The device is equal. layer	2-1-57	1 $м^3$	87,6	-	-	-	Digger	Days	Days	0,09	7,884	0,98	-	0,053		4,64
Monolithic device (foundation)								Days	Days							

Formwork device	4-1-37	1 м^2	384	-	-	-	fitter	43	11	0,39	149,76	18,72	-	0,29	-	111,36
Reinforcement work	4-1-46	1 т	3,686	-	-	-	Reinforcer	42	11	5,6	20,64	2,58	-	4	-	14,744
Concrete laying	4-1-49	1 м^3	38,4	-	-	-	Concrete worker	42	11	0,22	8,448	1,056	-	0,157	-	6,028
Curing	4-1-54	100 м^2	2,84	-	-	-	Concrete worker	2	1	0,14	0,3976	0,049	-	0,09	-	0,2556
Formwork	4-1-37	1 м^2	384	-	-	-	fitter	32	11	0,21	80,64	10,08	-	0,141	-	54,144
Foundation waterproofing	4-3-185	1 м^2	56,5	-	-	-	Insulator	432	111	0,41	23,165	2,8956	-	0,291	-	16,44
backfilling	2-1-34	100 м^3	15,76	0,62	9,77	1,22	Driver	6	1	-	-	-	0,657	-	10,35	-
Soil compaction	2-1-31	100 м^3	52,44	0,41	21,5	2,68	Driver	6	1	-	-	-	0,435	-	22,8	-
Aboveground part																
Formwork	4-1-37	1 м^2	2828,2	-	-	-	fitter	43	12	0,24	678,76	84,846	-	0,175	-	494,935
Reinforcement work																
Grid	4-1-44	1 шт.	2277	-	-	-	Concrete worker	42	13	0,42	956,34	119,54	-	0,285	-	648,945
Rods	4-1-46	1 т	27,7	-	-	-	Concrete worker	52	11	10	277	34,625	-	7,75	-	214,675
Concrete slave.																
Stacking	4-1-49	1 м3	653,28	-	-	-	Concrete worker	42	11	1,1	718,6	89,826	-	0,787	-	514,13
Care	4-1-54	100 м2	22,7	-	-	-	Concrete worker	2	1	0,14	3,178	0,397	-	0,09	-	2,043

Formwork dismantling	4-1-37	1 м2	2828,2	-	-	-	fitter	32	12	0,14	395,948	49,49	-	0,092	-	260,2

Appendix 4
to the normative document for
the determination of the
estimated cost of construction in
the Republic of Kazakhstan

Custo KazNITU
(name of compan

Approved. / Agreed

Estimated construction cost in the amount 336213.450 thousand
including:
36022.870 thousand tenge

(reference to the agreement / approval documen

"____"_____

Estimated cost of construction

(name of construction site)

Compiled at current prices as of 2020.

№ p / p	No. of estimates and calculations	ame of chapters objects, work and costs	Сметная стоимость, тысячи тенге			Total, thousand tenge
			construction assembly	equipment furniture and	other cost	
1	2	3	4	5	6	7
		Chapter 2. The main objects of construction				
1	02-001	Special Children School	300190.58			300190.58
		Total Chapter 2	300190.58			300190.58
		Total chapters 1 - 7	300190.58			300190.58
		Total chapters 1 - 9	300190.58			300190.58
		Total estimated cost	300190.58			300190.58
2	Code of the Republic of Kazakhstan	Value Added Tax (VAT) - 12%			36022.870	36022.870
		Total Estimated	300190.58		36022.87	336213.45

Project Manager
signature (initials, surname)

Chief Project Engineer
signature (initials, surname)

chief department
(name) signature (initials, surname)

Appendix 2
to the normative document for the determination of the estimated cost of construction in the Republic of Kazakhstan

Construction Name Green Quarter, semey

Local budget number 02-001-001
(Local cost estimate)
General construction work
(name of work and costs)

Base:

Estimated cost 30019058 tenge
Estimated salary 39343363 tenge
Normative labor input 34208.75 man-h / 164=208.59 h / month
Machines and mechanisms 11546882 tenge
Materials and equipment 19547594 tenge

Compiled at current prices as of 2020.

№ п/п	Code of norms resource code	Name work and costs	Unit measuring	amount	Unit cost, tenge		Total cost, tenge			Overhead, tenge	Total cost with NR and SP, tenge	Labor costs of construction workers, Labor costs of drivers,
					total	exploitation	total	machine operation	materials			
					he salary working builders	including the salary drivers	the salary working builders	including the salary drivers	equipment, furniture, inventory	Estimated profit, tenge		
1	2	3	4	5	6	7	8	9	10	11	12	13
		Coef. to take into account the influence of the conditions of construction and special construction works: 1.15 - Construction of engineering networks and structures, as well as housing and civil facilities in the cramped										
		Section No. 1 Earthwork										
1	1110-0113-0101	Fences are deaf. Pole Mounting Device	м2 the fence	840.0	5749.87 2611.88	324.51 132.61	482988 2193979	272590 111393	2363318 -	207483 552378	7457100	1642.20 54.58

1	2	3	4	5	6	7	8	9	10	11	12	13
2	1101-0207-1301	Shrubs and dense forests are dense. Cutting in soil of natural occurrence with brush cutters on a	га	0.17	24456.2 -	24456.2 7828.95	4158 -	4158 1331	- -	958 409	5525	- 0.74
3	1101-0102-0320	Soils of 2 groups. Development with loading on dump trucks by excavators of the type " HITACHI " with a	м3 soil	302.0	204.32 5.01	199.04 28.85	61707 1512	60111 8713	84 -	7362 5526	74595	1.73 8.62
4	1101-0101-0320	Soils of 2 groups. Development into a dump with HITACHI excavators with a bucket	м3 soil	1576.0	155.98 4.29	151.69 18.45	245827 6764	239063 29084	- -	25811 21731	293369	7.74 32.62
5	1101-0205-0202т. 11. п.3.17 9К=1.2	Soils of 2 groups. Manual development with fastenings in trenches more than 2 m wide and pits with a cross-sectional area of up to 5 m2, depth up to 2 m [Manual refinement,	м3 soil	87.6	3244.34 3244.34	- -	284204 284204	- -	- -	204627 39106	527937	281.67 -
6	1101-0201-1001	Ground pillows on subsiding soils. Layered device	м3 dirt pillows.	87.6	515.79 1.64	513.81 155.82	45184 143	45011 13650	30 -	9931 4409	59524	0.18 8.54
7	1101-0104-0405	Trenches and pits. Filling with bulldozers with a capacity of 79 kW (108 l.s) when moving	м3 soil	1576.0	20.57 -	20.57 7.79	32418 -	32418 12280	- -	8842 3301	44561	- 6.89
8	1101-0201-0102	Priming. Sealing with trailed rollers on a pneumatic wheel 25 tons. First pass along one	м3 compacted soil	5244.0	76.42 -	76.42 28.27	400731 -	400731 148235	- -	106729 40597	548057	- 84.37
		Total section. № 1					590411 2486602	105408 324686	2363432 -	243909 667457	9010668	1933.52 196.36

1	2	3	4	5	6	7	8	9	10	11	12	13
		Section No. 2 Foundations.										
9	1108-0101-0307	Walls, foundations. Waterproofing lateral coating bitumen in 2 layers on the leveled	м2 surface	56.5	895.51 299.63	22.94 2.87	50595 16929	1296 162	32370 -	15895 5319	71809	13.77 0.13
10	2105-0301-3202	Hot-rolled reinforcing steel of a periodic profile of class A-III (A400) with a diameter of 14 to 32 mm ST RK 2591-2014	т	3.686	210429. -	- -	775641	- -	775641 -	- 62051	837692	- -
11	1137-0104-0204	Stationary wooden stationary simple massive blocks. Installation and disassembly during the supply of tower cranes concrete pavers 10-25 tons	м2 sealed surface	384.0	3648.10 1567.68	249.90 73.53	140087 601989	95963 28234	702920 -	573503 157950	213232 5	565.25 18.33
12	1106-0101-0115	Reinforced concrete foundation slabs flat. Device.	м3	38.4	21508.7 2151.13	1906.13 419.08	825935 82603	73195 16093	670137 -	89813 73260	989008	79.05 12.71
13	1106-0101-0101	Concrete preparation. Device	м3	3.84	15994.0 1356.88	1241.59 260.20	61418 5210	4768 999	51440 -	5650 5365	72433	5.96 0.80
		Total section. № 2					311446 706731	175222 45488	2232508 -	684861 303945	410326 7	664.03 31.97
		Section No. 3 Frame										
14	1106-0501-0201	Columns of civil buildings in metal	м3	184.32	66542.9 16395.79	31647.4 6693.82	122651 302207 2	583325 123380 5	3409869 -	387284 129104 3	174290 83	2634.76 985.99
15	2105-	Hot-rolled reinforcing	t	27.7	210429.	-	582888		5828883	-	629519	

	0301-3202	steel of a periodic profile of class A-III (A400) with a diameter of 14 to 32 mm ST RK 2591-2014.			-	-	3	-	-	466311	4	-
16	1137-0104-0601	Metal mesh formwork. Installation and disassembly during the supply of tower cranes concrete pavers 10-25 tons	м2 sealed surface	460.8	7644.45 2349.55	226.67 36.07	352256 1082674	104449 16619	2335438 -	100035 361833	488475 1	1001.55 11.08

1	2	3	4	5	6	7	8	9	10	11	12	13
		Total section № 3					216166	593770	1157419	487320	2860902	3636.31
							410474	125042	-	211918	8	997.07
		Section No. 4 Overlap										
17	1106-0801-0101	Bezel-less overlappings up to 200 mm thick. The device at a height of from the reference area to 6 m	м3	1366.2	36752.49871.48	2067.30453.14	502112134864 23	282434619073	3390044-	128360504377 7	6809098 9	12663.3489.72
18	2107-0510-1003	The formwork is collapsible and permutable panel board, марка ЩД 1,5х0,4, size 1500х400х417 mm GOST 23477-79	м2	6832.0	15707.0-	--	107310224	-	1073102-	-858481 8	115895042	-
19	2105-0301-3202	Hot-rolled reinforcing steel of a periodic profile of class A-III (A400) with a diameter of 14 to 32 mm ST RK 2591-2014.	t	163.944	210429.-	--	344985 72	-	3449857-	-275988 6	372584 58	-
		Total section № 4					192020	282434	1757092	128360	2212444	12663.3
							134864	619073	-	163884	89	489.72
		Section 5 Walls										
20	1108-0701-0101	Outdoor inventory woods up to 16 m high, tubular for masonry and cladding. Installation and disassemb	м2 vertical projection	1200.0	736.39531.54	2.121.00	883673637850	25431206	243280-	594322118240	1596235	598.920.97

21	1108-0301-0101	Walls of light concrete stones. Masonry without cladding with a floor height of up to 4 m	м3 masonry	396.0	9050.69 4556.07	3005.13 631.49	358407 1804204	119003 250069	589836 -	191047 439564	5934111	1694.09 200.38
		Total section № 5					446774 244205	119257 251275	833116 -	250479 557804	7530346	2293.01 201.35
22	1112-0101-0201	Section No. 6 Roofing, Four-layer flat roofs of rolled roofing materials on bitumen mastic with a protective layer of gravel on antiseptic bitumen mastic. Device	м2 the roof	625.0	3339.91 365.66	150.58 18.47	208744 228539	94113 11546	1764792 -	220878 184666	2492988	189.03 8.48

1	2	3	4	5	6	7	8	9	10	11	12	13
		Total section № 6					208744	94113	1764792	220878	249298	189.03
							228539	11546	-	184666	8	8.48
		Section No. 7 Exterior Finishing										
23	1115-0109-0101	Facades ventilated on a metal frame. Fiber cement cladding device with cradles	м2 cladding surfaces	1200.0	9491.06	52.43	113892	62916	316070	881859	218244	8822.34
					9175.23	10.81	110102 80	12967	-	161662 9	93	8.56
24	2103-0499-	Straight stone facing	м2	576.0	-	-	-		-	-	-	
		Total section № 7					113892	62916	316070	881859	218244	8822.34
							110102	12967	-	161662	93	8.56
		Section No. 8 Interior										
25	1115-0203-0201	Walls inside buildings. Plastering with cement-lime or cement mortar on stone and concrete is simple.	м2 plastered surface	2564.3	1203.88	80.31	308710	205932	682590	189002	537530	1916.81
					857.38	63.93	219858 6	163943	-	398170	1	156.88
		Total section № 8					308710	205932	682590	189002	537530	1916.81
							219858	163943	-	398170	1	156.88
		Total estimate					243686	115468	1954759	342674	300190	32118.3
							366639	267940	-	222363	580	2090.39
		Total estimate:	tenge				300190 580					
		including:										
		- salary of construction workers	tenge				366639 61					
		- the cost of operating the machines	tenge				115468 82					

		- including the salary of drivers	tenge				2679402					
		- materials, products and structures	tenge				195475941					
		- overhead	tenge				34267457					

1	2	3	4	5	6	7	8	9	10	11	12	13
		- estimated profit	tenge				22236339					

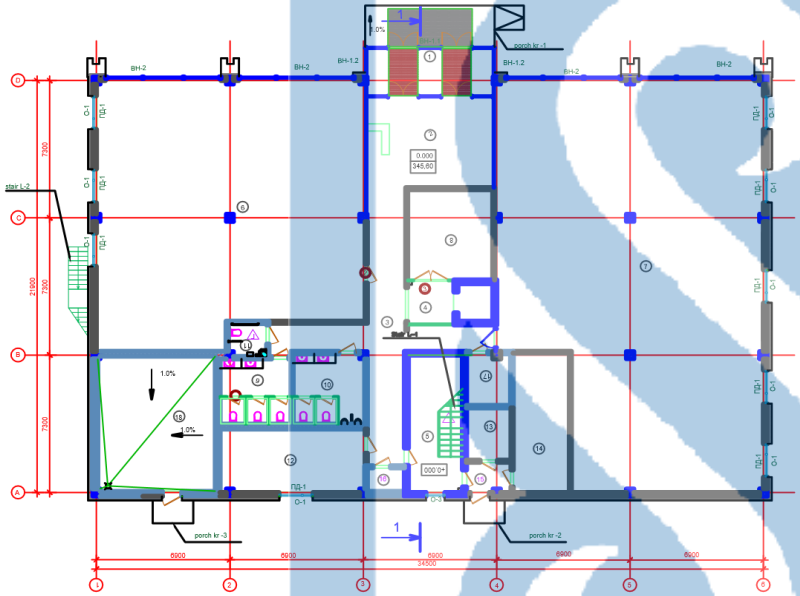
Compiled _____

position, signature (initials, last name)

Checked _____

position, signature (initials, last

finishing plan of the 1st floor at level +0.000 +0.000



explication of the rooms

№	name of the permises	m²
1	tambour	16.2
2	lobby	34.7
3	carridor	38.9
4	elevator hall	5.2
5	staircase	20.3
6	office	187.3
7	office	272.5
8	conference hall	20.7
9	s.u	11.7
10	s.u	12.9
11	ls.u for MGN	3.2
12	Buffet	24.6
13	swichboard	6.3
14	server	21.1
15	tambour	3.46
16	P.U.I	2.2
17	P.U.I	6
18	Thermal point	43.3
	total	730.6

LEGEND

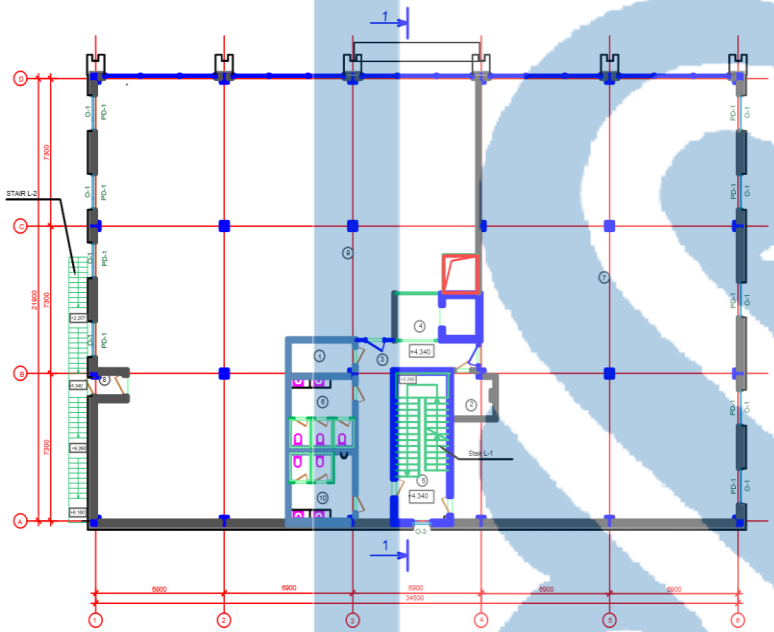
- Monolith
- Gas block 200 (100) mm
- Brick 120 (250) mm
- GKL 80 (60) mm
- Insulation 150 mm
- +5.100 Floor level mark
- - Marking window sills
- ОК-1 - Marking window sills
- ПД-1 - Marking window sills
- ВН-2 - Marking window sills
- - Marking window sills

					KAZNITU-5B072900-construction (TPGS)-16-1p
					office building in astana
ChanNum.par.	List	№doc	Sign	date	
Dean of kaf	K.A. Akmalayuli				level 1
N. controller	Kozyukova N.V.				
Supervisor	Kozyukova N.V.				
Consultant	Kozyukova N.V.				
Created	M.Mohammdi				

stage	List	Lists
CW		

department of construction and construction materials

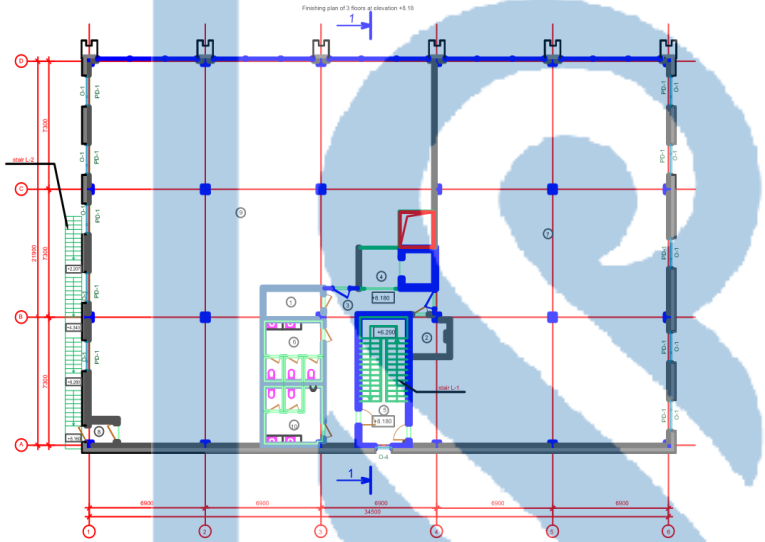
Finishing plan of 2 floors at elevation +4.340



explication of the rooms

№	the name of a room	м2
1	P.U.I.	5.5
2	Swichboard	4.8
3	corridor.	22.9
4	elevator hall.	5.2
5	staircase	5.8
6	office	338.9
7	office	307.3
8	tambour	1.6
9	S.u	10.9
10	S.u	10.6
	total	713.5

					KAZNITU-5B072900-construction (TPGS)-16-1p		
					Office building in astana		
ChanNum.par.	List	Nedoc	Sign	date			
Dean of kaf	K.A. Akmalayuli				level 2	stage	List	Lists
N. controller	paaktin					CW		
Supervisor	paaktin							
Consultant	Kozyukova N.V.					department of construction and construction materials		
Created	M.mohammdi							



explication of the rooms

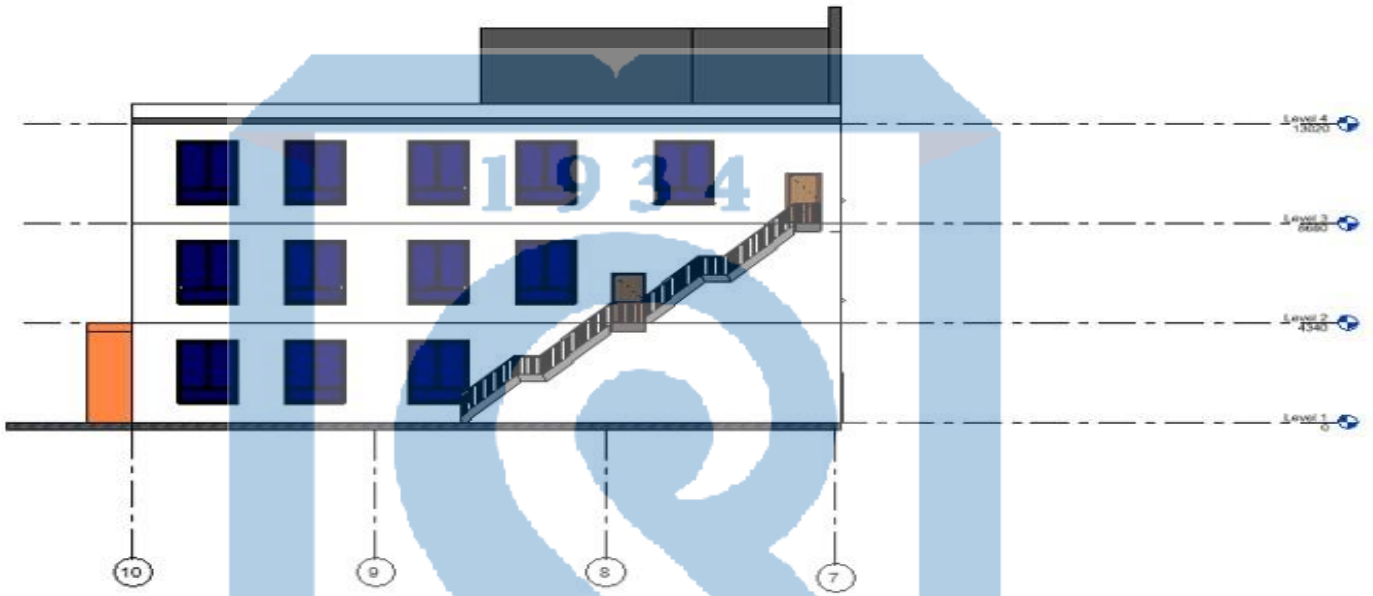
№	the name of a room	
1	P.U.I.	5.5
2	Swichboard	4.8
3	corridor.	22.9
4	elevator hall.	5.2
5	staircase	5.8
6	office	338.9
7	office	307.3
8	tambour	1.6
9	S.u	10.9
10	S.u	10.6
	total	713.5

LEGEND

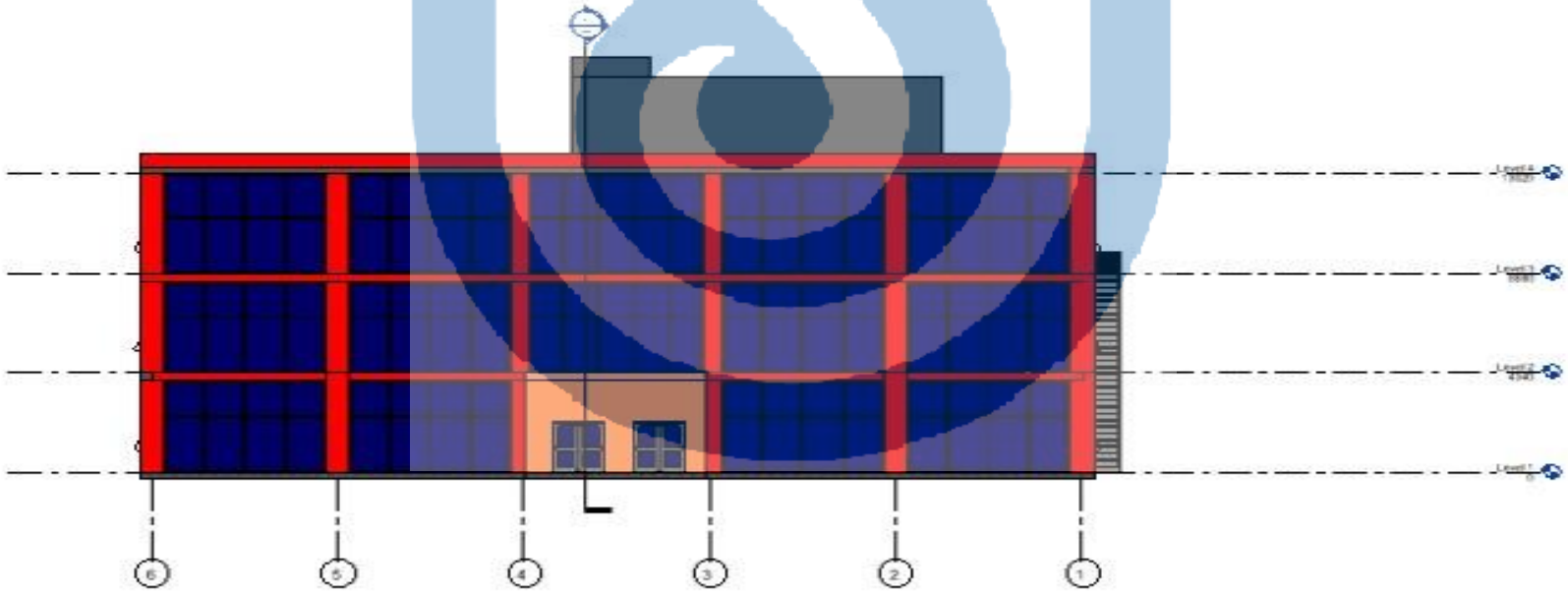
- **Monolith**
- **Gas block 200 (100) mm**
- **Brick 120 (250) mm**
- **GKL 80 (60) mm**
- **Insulation 150 mm**
- +5.100 **Floor level mark**
- - Marking window sills
- O-1 - Marking window sills
- PD-1 - Marking window sills
- (1) - Marking window sills

					KAZNITU-5B072900-construction (TPGS)-16-1p	
					office building	
ChanNum.par.	List	Nedoc	Sign	date		
Dean of kaf	K.A. Akmalayuli				level 3	stage: CW; List: ; Lists:
N. controller	Paaktin					
Supervison	Paaktin					
Consultant	Kozyukova N.V.					
Created	M.Mohammdi					department of construction and construction materials

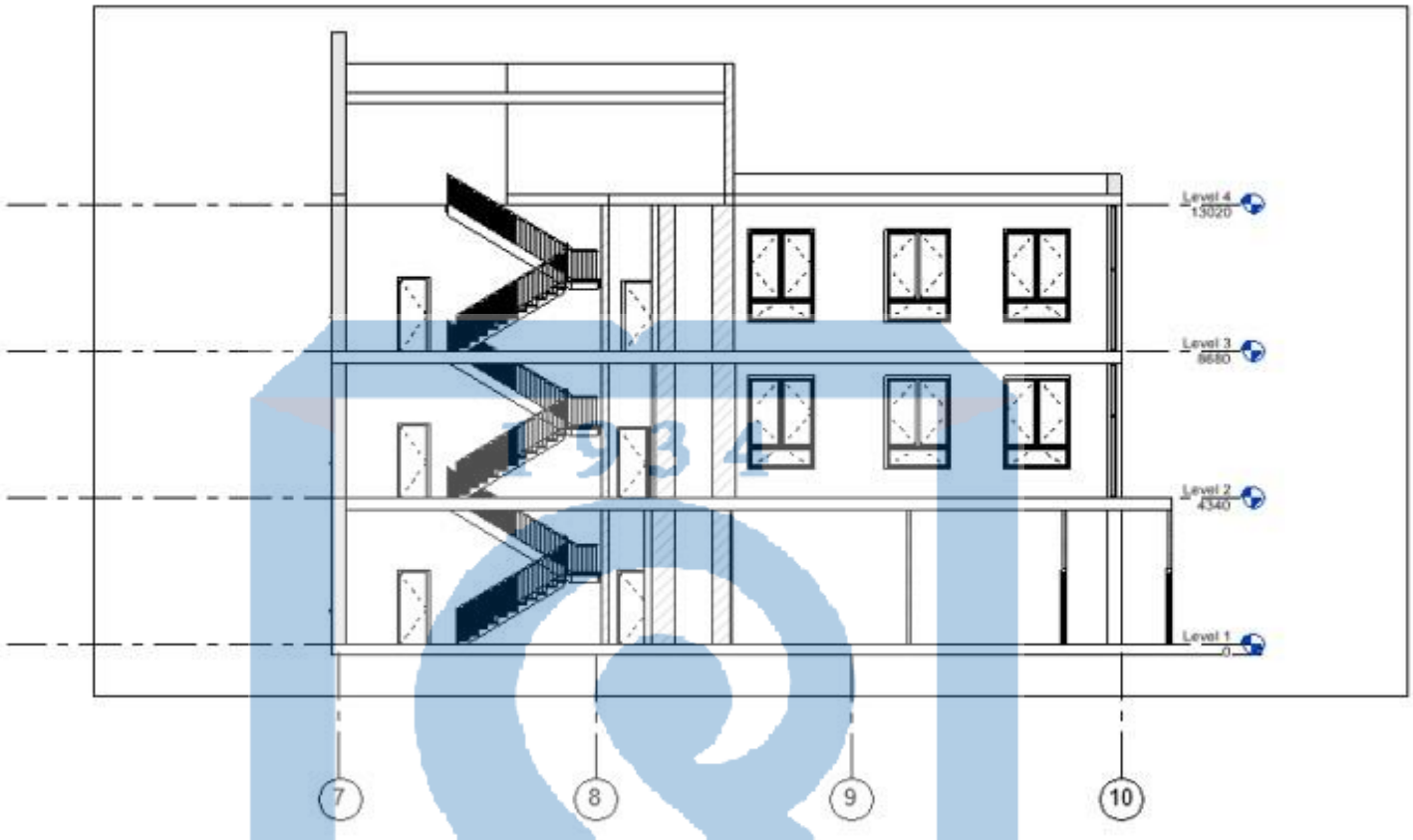
WEST elevation



NORTH ELEVATION



SECTION



section 1-1

Ø12AIII

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ш.150

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ш.150

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0,000

min 180

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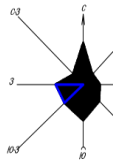
reinforcement

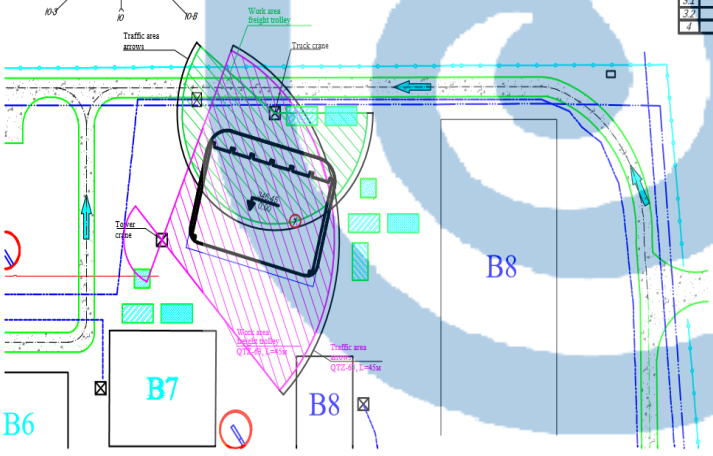
Concrete

Concrete C. B7.5

The average annual wind rose,



Construction master plan "Green Quarter", Phase 2



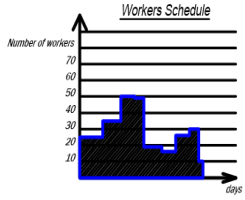
Schedule of work on the aboveground part.

№	Name	Scope of work		Labor cost per / day	Required Machine		Start construc. date	Number of workers	Number of shifts	months / days
		uni.meas	Кол-во		Name	Number				
1	2	3	4	5	6	7	8	9	10	
1	Formwork	1 м2	2828.2	84.84	Кб-309	1	14	9	2	
1.1	The woods	100 м	8.8	6.1	Кб-309	1	9	3	1	
2	Reinforcement work									
2.1	Grid	1 шт.	2277	119.54	Кб-309	1	15	10	2	
2.2	Rods	1 т	27.1	34.02	Кб-309	1	8.5	4	2	
3	Concrete works									
3.1	Concrete laying	1 м3	658.3	89.82	Кб-309	1	9	10	2	
3.2	Concrete Care	100 м2	22.7	1			3	1	1	
4	Formwork dismantling	1 м2	2828.2	49.49	Кб-309	1	8	9	2	

ТЭП

name	uni. measu	Indicators
Total length works	day	81
The total complexity of work	p/day	1156,23

Workers Schedule



General safety requirements.

An order from the administration at the construction site at each shift should appoint a person from among the engineers responsible for the safe operation of the tower cranes. Tower crane operators must have at least the second safety qualification group. Slingers must be at least 18 years old from trained and certified workers. All hoisting mechanisms must be equipped with sound and light alarms.

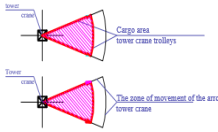
Workplaces, walkways, thoroughfares in the dark should be lit in accordance with construction standards. Unauthorized access to the construction site is strictly prohibited. In a zone of work and installation cranes in a conspicuous place to establish stands with sling schemes and a table of masses of goods. When assembling a building, building materials and structures and materials must not be carried through the workplace of installers. When unloading vehicles, it is forbidden to carry the load over the driver's cab. When mounting, the workers are prohibited from being under the lowering load and climb the mounted element until it is secured. Riggers can touch the mounted element and manually install it only when the element (any load) is smoothly and without swinging served by a crane to the installation site (laying) at a height of more than 30 cm. Brick, shell rock and small piece elements must be lifted using gripping cases having | enclosing walls. Pallets without fencing may only be used when loading and unloading (onto the ground) materials from machines.

It is forbidden to carry out lifting work in fog, thunderstorms with strong winds (with wind speeds exceeding 15 m / s). The facility must have control weights corresponding to the carrying capacity indicated in the crane passports. Work areas for cranes are indicated on the plan and timesax. The rotation of the arrows of the cranes is indicated by the arrows on the plan. When carrying out construction and installation works, it is necessary to be guided by: - CH PK 1.03-14-2011 "Occupational health and safety in construction"; - "Rules for the construction and safe operation of cranes"; "Fire safety rules in the construction and installation works."

Conditional notations

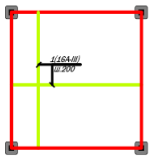
Designed building	Gate entry to the site	Transformer substation
Existing buildings	Wheel wash point	Temporary power line
Temporary construction site fencing	КПП (Door CS)	(The lamp (searchlight) on the mast poles)

Reinforcing range . with a canopy	Fire shield	Temporary on-site roads
Warehousing sites.	Entrance to the site.	tower crane power cable
Concrete receiving area	The direction of the entrance to the construction sites	

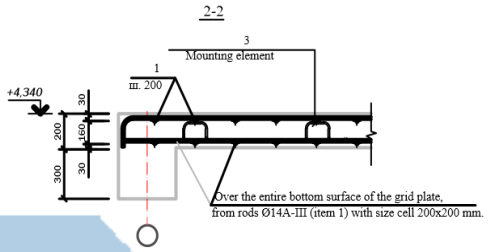


					KazNTU-5B072900-Construction (TPGS)	
					Green Quarter	
Изм.	Кол.	Лист	N док.	Подп.	Дата	
Зав. каф.					Construction master plan	stage / Sheet / Sheets

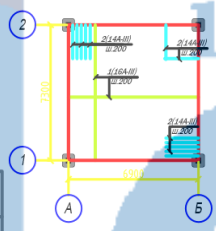
Scheme of reinforcement of floor slab at elev. + 4,340 on the lower edge



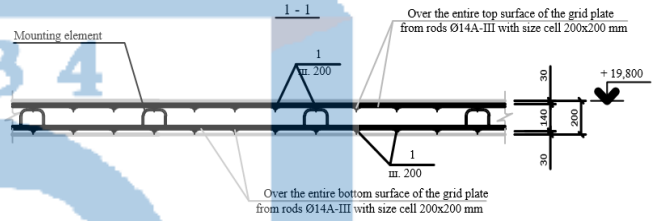
2-2



Scheme of reinforcement of floor slab at elev. + 4,340 on the upper edge



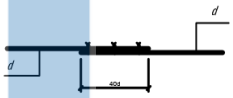
1 - 1



Parts List

pos.	Sketch
3	120 120 120 120 120

Reinforcement joint detail.



The specification of the floor slab at around +3.340.

Pos.	Designation	Name			Кол.	Масса kg	Note	
		Plate on elev. +4,340				1634.4		кг
1	GOST R 5781-82*	Ø 16	A-III	L= 910.8	пм	1.578	1437.24	кг
2	GOST R 5781-82*	Ø 14	A-III	L= 113.85	пм	1.208	137.5	кг
3	GOST R 5781-82*	Ø 8	A-I	L= 600	252	0.237	59.7	кг
		Бетон В25			7.2	м3		

1. To install the upper mesh, provide "frogs" (pos. 3) with a pitch of 400x400 mm.
2. The joints of the rods to carry out an overlap of length (40d) at a distance of 1500 mm from the axis.
3. Fittings knit with wire at the intersections,

Statement of steel consumption, kg

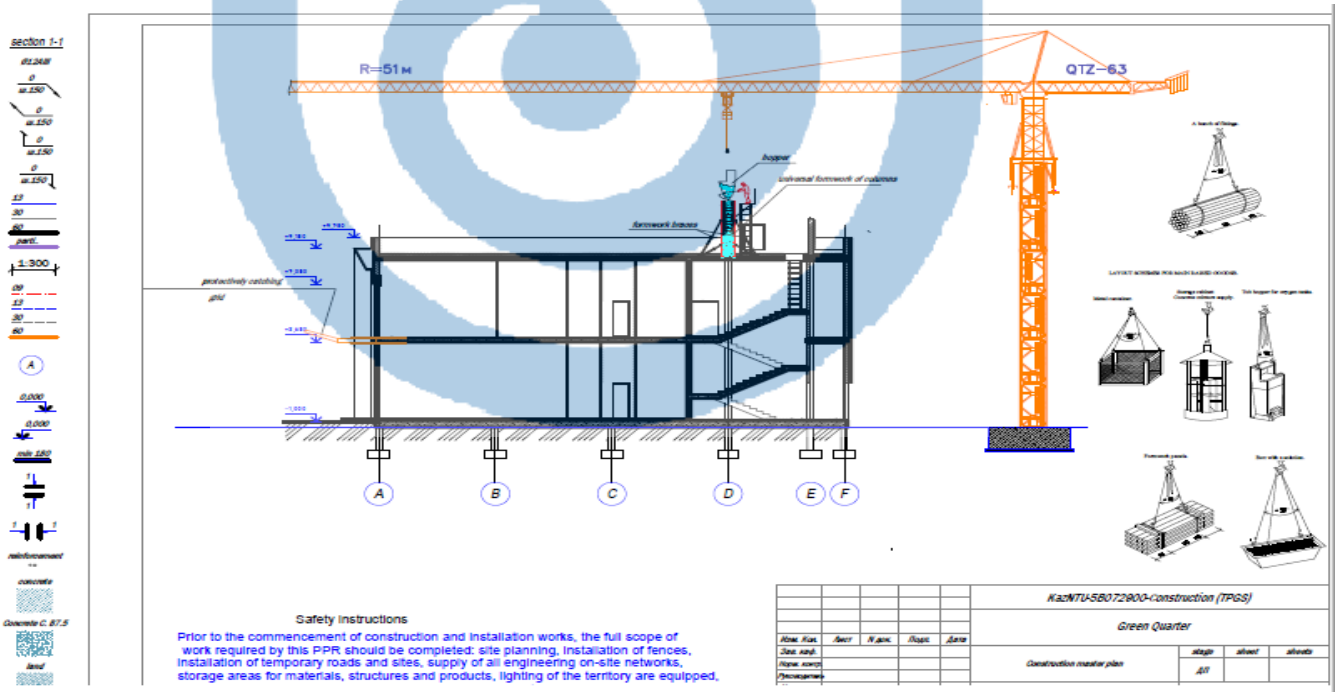
mark of item	Reinforcing products										
	Reinforcement class.										
	A-I			A-III							
	GOST 5781-82*			GOST 5781-82*							
	Ø6	Ø8	Ø10	total	Ø12	Ø14	Ø16	Ø20	Ø22	Ø25	Ø32	Total	Total

					KazNTU-5B072900-Construction (TPGS) -2016-
					Title of thesis
ИзмКол.	Лист	N док.	Подп.	Дата	
Зав. каф.					Plate on the mark. +4,340,
Н. контр					
Руковод.					
Консул.					

Stage.	Sheet	Sheets
ДП		

Reinforcement. Explication

Department "Construction and

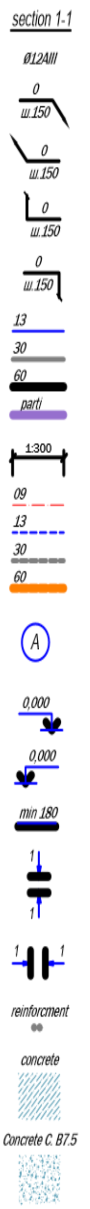


Safety instructions

Prior to the commencement of construction and installation works, the full scope of work required by this PPR should be completed: site planning, installation of fences, installation of temporary roads and sites, supply of all engineering on-site networks, storage areas for materials, structures and products, lighting of the territory are equipped.

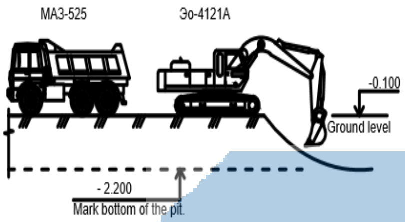
					KazNTU-5B072900-Construction (TPGS)
					Green Quarter
Изм. Кол.	Лист	N док.	Подп.	Дата	
Зав. каф.					Construction master plan
Норм. контр.					
Руководитель					

stage	sheet	sheets
ДП		



name	uni meass	Indicators
Total length works:	day	20
Total length works:	p/day	74,85

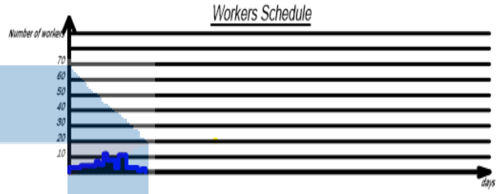
Excavator work scheme



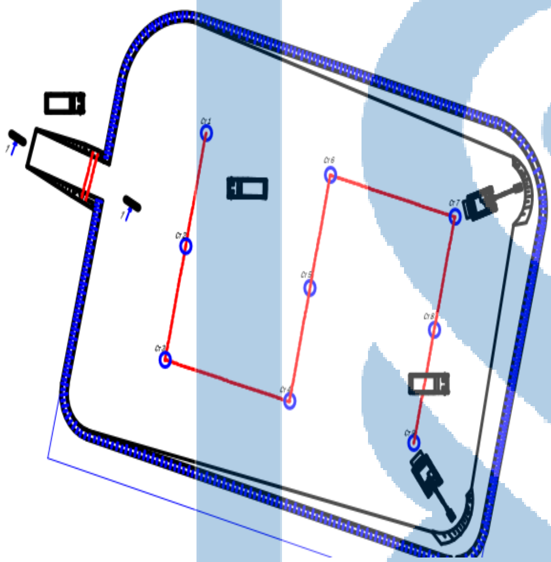
Календарный план производства работ

№	name	Scope of work: Ед. изм	Scope of work: Кол-во	Затрт. труд чел-дн.	Required Mach: name.	Required Mach: Number	Work continuance, days	Number of workers	Number of shifts
1	2	3	4	5	6	7	8	9	10
1	Device time. fencing	м	420	15.12	-	-	4	3	1
2	Cut Rast. layer	1000 м2	1.746		ДЗ-28	1	1	1	1
3	Excavation of the soil.								
3.1	With loading in t.s.	100 м3	3.02		ЭО-4121	2	3	2	1
3.2	To the dump.	100 м3	15.76		ЭО-4121	1	4	2	1
4	Manual bottom cleaning	1 м3	87.6	14.25	-	-	3	5	1
5	The device is equal. layer	1 м3	87.6		ДЗ-28	1	1	1	1
6	The device is a monolithic con-con foundation								
6.1	Formwork device	1 м2	384	18.72	-	-	3	6	2
6.2	Reinforcement work	1 т	3.686	2.58	-	-	2	2	2
6.3	Concrete laying	1 м3	39.4	1.056	-	-	1	2	1
6.4	Curing	100 м2	2.84	1	-	-	1	1	1
6.5	Formwork	1 м2	384	10.08	-	-	2	10	1
10	Waterproofing	1 м2	56.5	2.89	-	-	3	3	1
11	Backfilling	100 м3	15.76	1.22	-	-	1	1	1
12	Soil compaction	100 м2	52.44		ДУ-31А	1	1	2	1

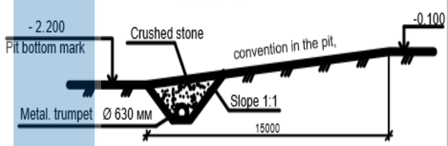
Workers Schedule



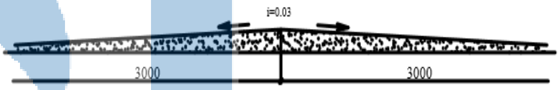
Excavation pit development scheme



section 1 - 1



Profile of a temporary road
Gravel-sand mixture.



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Зав. каф.	Кызылбаев Н.				

KazNTU-5B072900-Construction (TPGS)

Green Quarter

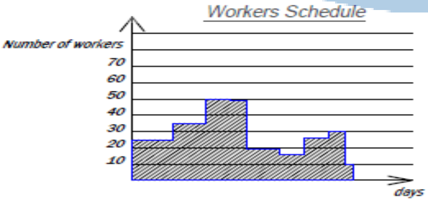
stage	sheet	sheets

Underground work

Schedule of work on the aboveground part.

№	Name	Scope of work: uni.meas	Scope of work: Кол-во	Labor cos per / day	Required Machine: Name	Required Machine: Number	8	9	10
1	2	3	4	5	6	7	8	9	10
1	Formwork	1 м2	2828,2	84,84	КБ-309	1	14	9	2
1.1	The woods	100 м	8.8	6.1	КБ-309	1	9	3	1
2	Reinforcement work								
2.1	Grid	1 шт.	2277	119,54	КБ-309	1	15	16	2
2.2	Rods	1 т	27,7	34,62	КБ-309	1	8,5	4	2
3	Concrete works								
3.1	Concrete laying	1 м3	658,3	89,82	КБ-309	1	9	10	2
3.2	Concrete Care	100 м2	22,7	1			3	1	1
4	Formwork dismantling	1 м2	2828,2	49,49	КБ-309	1	8	9	2

Workers Schedule



Изм.	Кол.	Лист	N док.	Подп.	Дата

KazNTU-5B072900-Construction (TPGS)

Green Quarter

Construction map

stage	Sheet	Sheets
ДП		

Department "Construction and building materials"

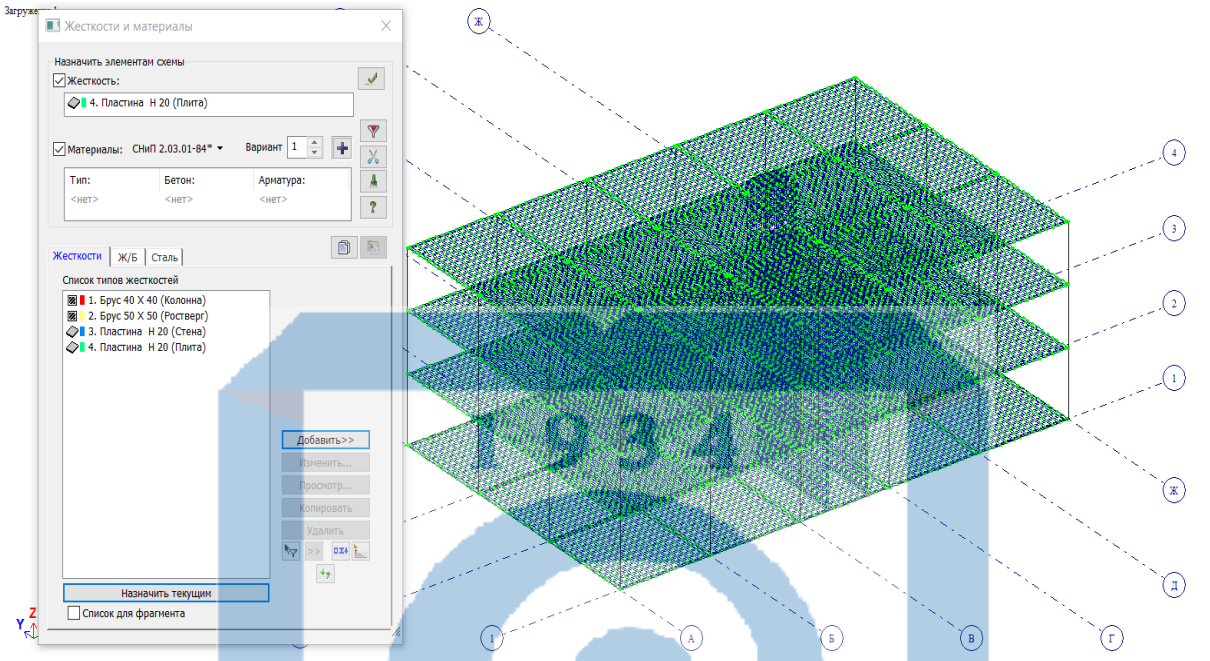


Figure A.2 - Stiffnesses

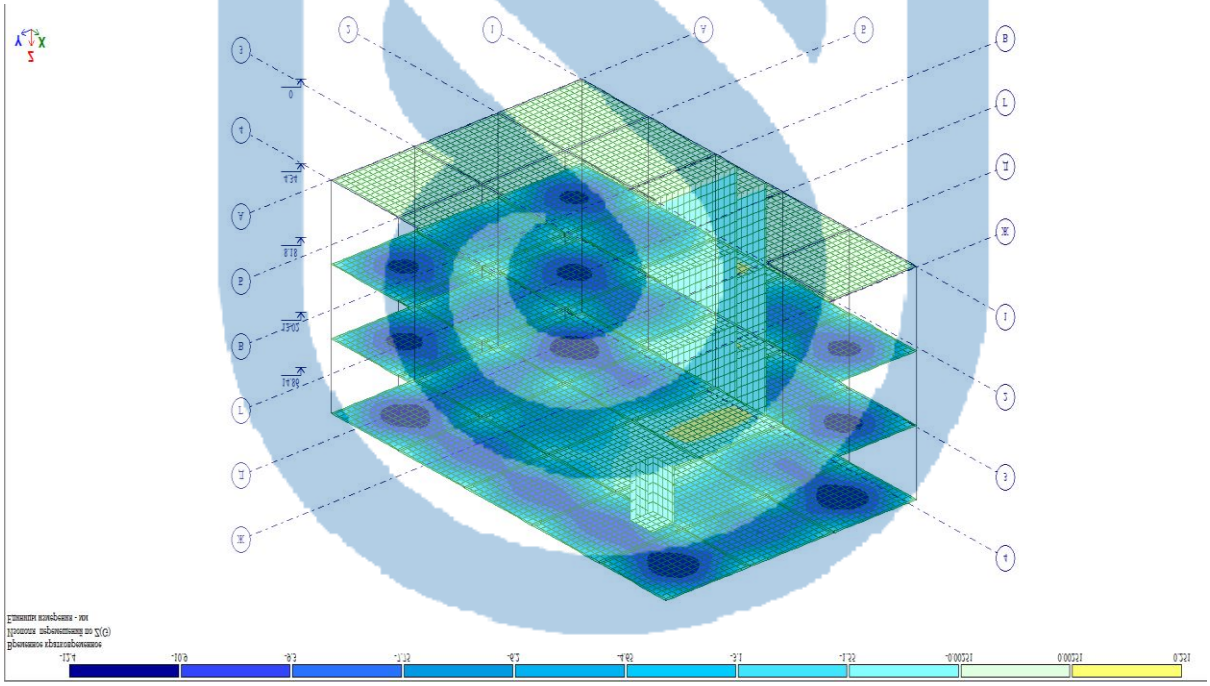


Figure A.6 - Mosaic of movement along the Z axis

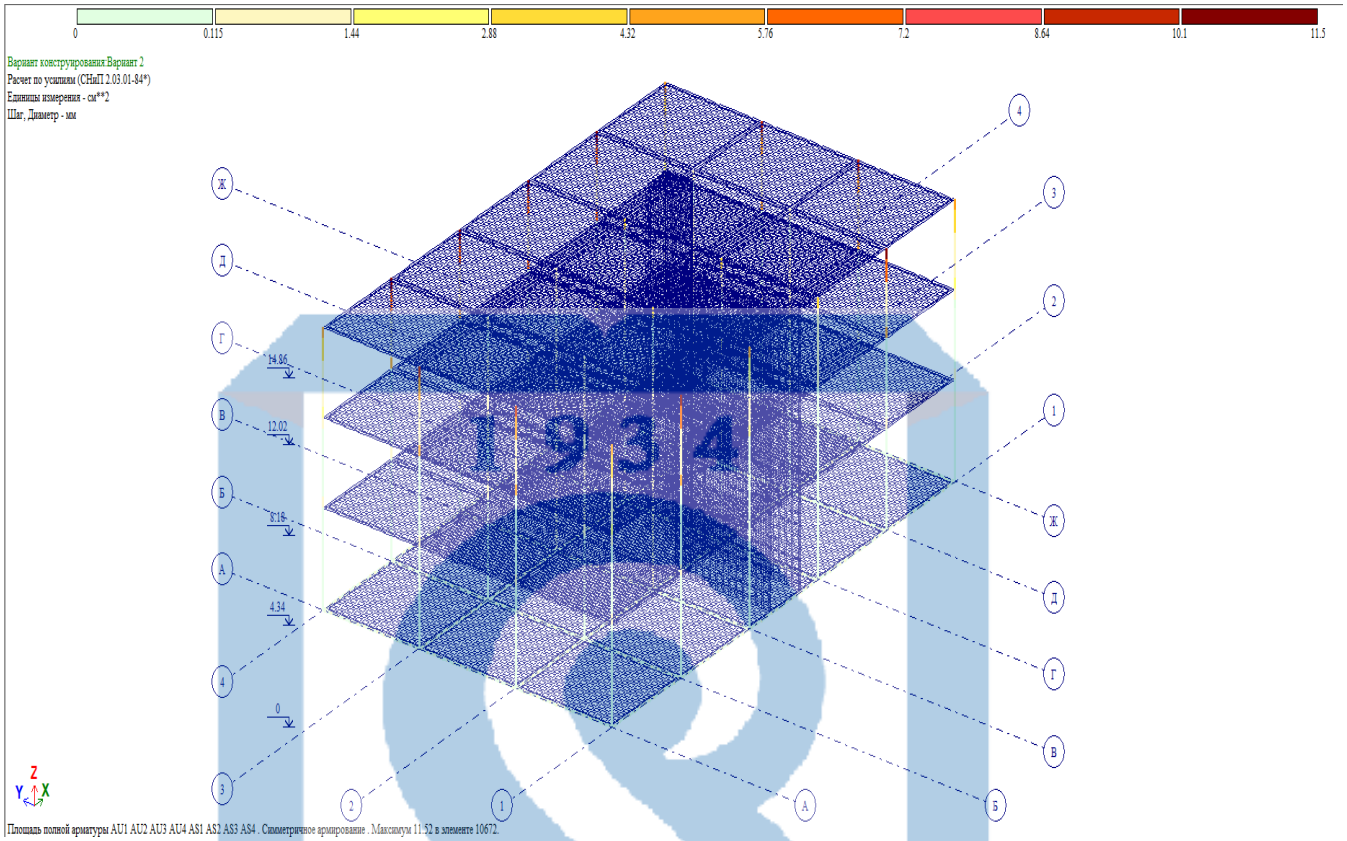


Figure A.12 - Design. Column

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: Мохаммди Мохамад Назир

Название: Residential complex in Semey

Координатор:Манижа Пактин

Коэффициент подобия 1:1,4

Коэффициент подобия 2:0

Замена букв:67

Интервалы:0

Микропробелы:0

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:

Обнаруженные в работе заимствования являются добросовестными,и не обладают признаками плагиата. В связи с чем,признаю работу самлстоятельной и допускаю ее к защите.

…… ……

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: Мохаммди Мохамад Назир

Название: Residential complex in Semey

Координатор: Манижа Пактин

Коэффициент подобия 1:1,4

Коэффициент подобия 2:0

Замена букв:67

Интервалы:0

Микропробелы:0

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:

Обнаруженные в работе заимствования являются добросовестными и не обладают признаками плагиата. В связи с чем, работа признается самостоятельной и допускается к защите;

....

Дата *Подпись заведующего кафедрой /*

начальника структурного подразделения

Окончательное решение в отношении допуска к защите, включая обоснование:

Работа признается самостоятельной и допускается к защите.

Обнаруженные в работе заимствования являются добросовестными и не обладают признаками плагиата.

…… …… ……

Дата *Подпись заведующего кафедрой /*

начальника структурного подразделения

МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ РЕСПУБЛИКИ КАЗАХСТАН
СӘТБАЕВ УНИВЕРСИТЕТІ

RESPONSE

OF THE SUPERVISOR

For the graduation project

Mohammady Mohammad Nazir, 5B072900-Civil Engineering

Topic: “Residential Building Semey City ”

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. Mohammady Mohammad Nazir 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
PhD Researcher, Senior lecturer
_____ Paktin.M
«25» 05 2020y,