MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN

Kazakh National Research Technical University named after K.I. Satbayev

Institute of Architecture and construction named after T.K. Bassenov

Department «Construction and construction materials»

Sayed Muzamil Sadat

On the theme of « Dormitory with a sports complex in Almaty »

EXPLANATORY NOTE
To the diploma project

Specialty 5B072900 – Civil engineering

Almaty, 2020 y.

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APPROVED FOR PROTECTION
Head of Department of «CandBM»
D.Tech.Sc., Professor
_ _Akmalaiuly K.
«25 » 05 2020 y.

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On the theme of « Dormitory with a sports complex in Almaty »

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Performed Sayed Muzamil Sadat

Supervisor Manizha Paktin

«25» 05 2020 y.

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5B072900 – Civil engineering

APPROVED BY
Head of Department of «CandBM»
D.Tech.Sc., Professor
_ _ Akmalaiuly K.
« 27» 01 2020 y.

ASSIGNMENT
for the implementation of the diploma project

For student *Sayed Muzamil Sadat*
Theme: « Dormitory with a sports complex in Almaty »
Approved *by order of the Rector of the University №762-b from «27» 01 2020 y.*
The deadline for completion is *«31» May 2020 y.*
Initial *submissions of the* diploma project: *_construction district - Almaty, Production The structural scheme of the building - frame, constant rigidity in height provided, columns, beams are fully cast, roof slabs are ready made of reinforced concrete.*
List of issues to be considered in the diploma project:
1 Architectural and construction department: characteristics of the construction area; three-dimensional planning decisions; architectural and design solutions; outer wall thermal engineering accounting; engineering equipment of the building;
2 Computational and constructive section: calculation of loads and creation of the calculation scheme, calculation of the board and its calculation of reinforced concrete elements based on the results and their purpose
3 Technology and organization of construction production and labor protection: land determination of the volume of underground and surface works; by calculation pump trucks necessary number determine; tower taps selection; determination of the number of concrete trucks; surface reinforced concrete of the building construction of technologic structures installation; object design of constructionmaster plan; safety and productionSanitation;
4. Department of Construction Economics: local and object preparation of estimates,
5. Safety of life and labor protection
List of drawing materials (mandatory drawings must be specified):
1 Facade of the building, sections, joints, specifications, plans - 4 sheets;
2 Drawing, specification of the column - 2 sheets;
3 Calendar plan of construction production, general construction plan, - 2 sheets
Recommended literature:
1. SNIP 2 .04-01-2010 Construction climatology, Almaty, 2011;

2. SNiP RK 2.04-03-2002 Construction heat engineering, Construction
3 Committee on MEIT RK. - Astana, 2010

SCHEDULE
preparation of thesis (project)

Sections	33%	66%	100%	Примечание
Predesign analysis Architectural and construction	18.02.2020г.-01.03.2020г.			
Settlement constructive		18.03.2020г.-29.03.2020г.		
Technology and organization of construction production and labor protection Economic			03.04.2020г.-19.04.2020г.	
Anti-plagiarism, norm control, pre-defense	19.04.2020г.-29.04.2020г.			
Defence	01.06.2020г.-06.06.2020г.			

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	Manizha Pakteen	25.05.2020	
Settlement and constructive	Manizha Pakteen	25.05.2020	
Technology and organization of construction production	Manizha Pakteen	25.05.2020	
Economic section	Manizha Pakteen	25.05.2020	
Safety and labor protection	Manizha Pakteen	25.05.2020	
Norm controller	Kozyukova.N.V	25.05.2020	

Supervisor _____ Manizha Pakteen

The task was accepted by the student _____ Sayed Muzamil Sadat

Date «_____»_____2020 y.

АҢДАТПА

Жұмыстың тақырыбы: Диссертация тақырыбы - «Алматы қаласындағы спорт кешені бар жатақхана».

Әкімшілік ғимарат Алматы қаласының Сәтбаев және Сейфулин көшелерінің қиылысында орналасқан, ғимарат қаңқасы қатты шойыннан жасалған. тон конструкцияларынан тұрады. Жоба барысында қабылданған барлық шешімдер құрылыс нормаларына сәйкес алынды. Алматы - сейсмикалық жағдайға байланысты сейсмикалық қауіпті аймақ. Дипломдық жоба бөлімдер мен суреттерден тұрады. Etabs Жерасты жұмыстары бағдарламасынан қосымша ақпарат

Есептеу, смета нәтижелері «Қосымшалар» бөлімінде көрсетілген. Жоба салыстырмалы түрде тиімді.

АННОТАЦИЯ

Тема дипломной работы «Общежитие со спортивным комплексом в Алматы».

Административное здание расположено в Алматы на пересечении улиц Сатбаева и Сефулина. Здание состоит из каркасных монолитных желейных бетонных конструкций. Все принятые в ходе проекта резолюции приняты с соблюдением строительных норм. Город Алматы, являющийся сейсмической зоной, обучен в сейсмических условиях.

Дипломный проект состоит из разделов и рисунков. Дополнительная информация, полученная из программы «Этабс», расчет подземных работ, результаты сметы указаны в разделе «Заявки». Проект разработан экономически выгодными сторонами.

ABSTRACT

The theme of thesis " Dormitory with a sports complex in Almaty ".

The administrative building is located in Almaty at the intersection of Satbayev and Sefulin streets. The building consists of a monolithic reinforced frame concrete structures. All decisions made in the course of the project were made in in accordance with the construction standards. The city of Almaty, being a seismic zone, is considered in seismic conditions.

Diploma project consists of 2 main sections and 4drawings. Additional information obtained from the program etabs.

CONTENT

INTRODUCTION

They say that student years are the brightest and most saturated period in the life of every person. Of course, this is primarily due to the carelessness and freedom of young people who have just escaped from under the parent wing.

A dormitory is a place of temporary residence for visiting students and pupils during their studies, seasonal workers during work, service or which has become permanent for employees of the institution. Accordingly, it is necessary to distinguish between student and work hostels. Dormitory accommodation is provided at the rate of at least six square meters of living space per person. According to this standard, several people can live in one room. The level of comfort in a hostel is usually quite low.

In Almaty, construction companies and contractors are not interested in the construction of hostels due to the low coefficient of subsidies. It is beneficial for them to build residential complexes, rather than educational institutions and hostels. For the southern capital, this coefficient needs to be increased, in addition, 22 land plots have been allocated for the construction of hostels in the city.

The aim of the thesis is to build a comfortable multi-bed dormitory with a sports complex, so that students cannot spend on useless things in their free time, but spend on sports and maintain a healthy lifestyle.

1 Architectural part

1.1 Basic information about the project

The diploma project is developed on the "Construction of a dormitory with a sports complex.

Raspaud false at: Almaty city , at the intersection of Sefulin and Satbayev streets ." Building characteristic:

The territory allocated for the development project of the residential complex is currently free from development.

Entrances to the courtyard of the designed hostel are organized on the 1 hand, from the southern part of the site from Sefulin on the local road.

Dormitories of 18 floors and a sports complex with 2 floors with access to secondary streets with infrastructure, as well as general green spaces, are planned on the territory .

The complex includes the construction of a multi-storey hostel in the amount of 1 buildings and a sports complex.

For a conditional mark of the level of the clean floor of the first floor of residential blocks is accepted, which corresponds to the absolute mark of 975.60

The graduation project is designed for the following construction conditions:

- humidity zone - normal;
- climatic region - II: the climate is temperate continental;
- snow area - II , the normative value of the weight of the snow cover is 0.70 kPa; wind region - I, standard value of wind pressure - 0.23 kPa;
- climatic parameters of the cold season : air temperature of the coldest day: -30˚C; air
- temperature of the coldest five-day period: -27˚C; the construction area is seismic hazard, magnitude is 9-10 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

The characteristic features of the climate of this territory are: an abundance of sunlight and heat, continentality , 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.

I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Год
-16,8	-16,5	-10,1	+3,0	+12,7	+18,2	+20,4	+17,8	+11,5	+2,6	-7,0	-14,0	1,8

Figure 1- Monthly and annual air temperatures

As can be seen from table 3.1, the average monthly temperature of the coldest month of the year of January is minus 16.8 degrees of frost, and the warmest of July is +20.4 degrees of heat.

In separate, very severe winters, the temperature can drop to 29-32 degrees (absolute minimum), but the probability of such a temperature is no more than 5%.

On hot days, the temperature can rise to 39-40 degrees Celsius. The estimated air temperature of the coldest five-day period is 25 degrees, the estimated air temperature of the hottest five-day period is 28 degrees, the average duration of the heating season is 184 days.

Atmospheric precipitation

The average amount of precipitation falling over the year is 330-370 mm.

Rainfall is unevenly distributed over the seasons of the year; the greatest amount of precipitation falls in the warm season (May-September) - 238 mm. The average annual snow depth is 22 mm; the water supply in the snow is 67 mm.

According to SNiP 2.01.07-85 * snow area by weight of snow cover - III.

Wind

The study area is characterized by frequent winds blowing mainly in the south-westerly direction. The average annual wind speed is 5.0-5.6 m / s. Wind roses are shown in Figure 2.

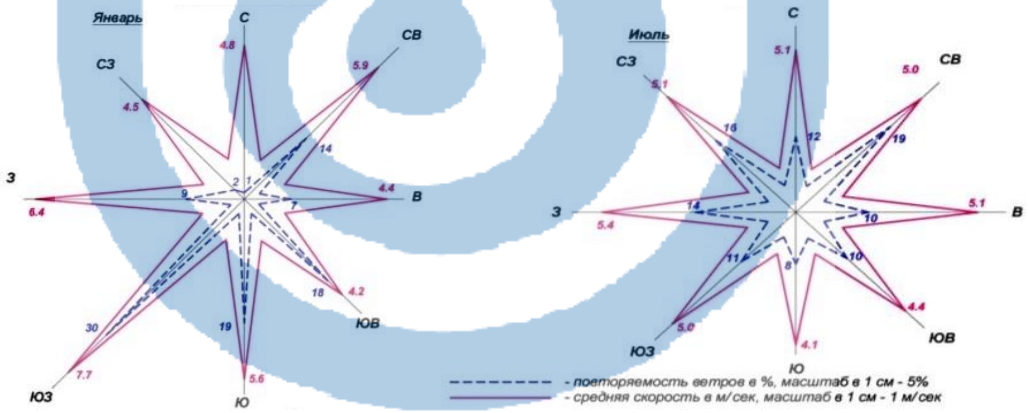

Figure 2 - Wind roses

Soil freezing depth

The standard freezing depth according to SNiPu "Construction Climatology" is 205 cm. The average depth of penetration of "0" into the soil is 234 cm (the greatest penetration is usually in March).

By analogy with data from other regions, the possible penetration of zero into the depth, with little snow, can reach 350 cm in loams (SNiP RK 5.01-01-2002, SNiP RK 2.04-01-2010)

Air humidity

The smallest value of absolute humidity in January-February (1.6-1.7 m), the highest - in July (12.7 m).

The lowest relative humidity is in the summer months (40-45%), the highest in winter.

The average annual relative humidity is 86%. The highest moisture deficit is observed in June-July (12.2-12.4 m). Low in December-February (0.3-0.4 m). The average annual humidity is 4.8 m.

1.3 General plan. Landscaping

The territory allocated for the project of building a hostel with a sports complex is located in the city of Almaty on the street. Askarov in the Bostandyk district.

Currently, most of the territory is not developed with the developed foundation pit.

Entrances to the courtyard of the hostel are organized from 2 sides from the northern and southern parts of the plot from secondary streets.

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 3.0207.2014 “Public buildings and structures” and SP RK 3.01-101-2013 “Urban planning. The improvement and landscaping of the site provided for by the project reduces the general dust content and eliminates local foci of dust .

Table 1 - Technical and economic indicators for the master plan

Name	Index
Land area	1.8 ha
Built-up area	9046.4 m^2
Building factor	0.49
Landscaping area	4392.6 m^2
Gardening rate	0.238
Hard surface	5023 m^2
The utilization of the territory	0.272

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

1.4 Space-planning solution

Volumetric - planning decision was made in accordance with the location of the entrances, the functional and technological organization of workers. The level of the clean floor of the first floor is taken as a conventional mark of 0,000. On the general plan, this level corresponds to the absolute mark. The highest elevation of the building is +55.8 m.

The building of the sports complex was designed with two floors , without a basement and ground floor. It includes the following set of floors:

The 1st floor is equipped with a dining room, a sports area and fitness rooms. In accordance with the functional purpose of the premises, the height of the first floor is 6.3 m.

- 2nd floor floor plan is the same. At the same time, the second floor has a height of 3.3m

.

All rooms are lit with natural light according to the requirements of SP RK 2.04-104-2012

* "Natural and artificial lighting." According to this document, in accordance with the requirements for lighting in the building, psycho-emotional comfort should be provided. At the same time, low color discrimination requirements are imposed.

1.5 Constructive solutions of the object

The graduation project of the hostel with a sports complex was developed in accordance with SN RK 5.01.-02-2013, SNiP 2.01.19-2004, SNiP RK 2.03-30-2017.

The base plate is 600 mm thick, reinforced with reinforcement with a diameter of 14 mm of class A500C.

Slab and cover 200mm thick.

Monolithic reinforced concrete columns 400x400 mm thick.

Walls and partitions monolithic and reinforced concrete 200mm.

Monolithic reinforced concrete stairs 200 mm thick.

Monolithic reinforced concrete parapet 150 mm thick.

To reinforce all reinforced concrete structures, A500C class reinforcement was used.

For a conditional mark of 0.000, the floor of the first floor is taken.

Installation of monolithic structures is carried out in accordance with SNiP 5.03.37-2005.

Apply anti-corrosion coating to all embedded parts and connecting elements of reinforced concrete structures by galvanizing with zinc plating.

Work on anticorrosion protection shall be carried out in accordance with SNiP RK 2.0119-

2004 “Protection of building structures from corrosion. Rules for the production and acceptance of work "

Perform welding work in accordance with the instructions of SN 393-78 and GOST 526480.

Welding of embedded parts is carried out with electrodes E-42, satisfying the requirements of GOST 9467-75.

In the process of construction and installation work, it is necessary to develop measures for fire protection and for monitoring the implementation of fire safety rules.

Horizontal waterproofing is made of cement mortar M100 with sealing additives.

1.6 Thermomechanical 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:

$$ГСОП=(тв-тотпер)*zотпер \quad (1)$$

where tv = 21 ℃ is the temperature of internal air, ℃;

$t_{отпер}$= 1,7 ℃ – - average temperature of the heating period;

$z_{отпер}$= 160 сут. - the duration of the heating period;

ГСОП=(21-1,7)*160=3088 ℃*day

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

$$R^{тр}_0 = 2,45 \text{ ℃/Вт}$$

Table 2 - The composition of the outer wall

Name of material	ϒ ,kg / m 0 3	2 λ, W / m C	δ, m	R = δ/ λ, n 2 m ℃ / W
Cement-sand mortar	1800	0.76	0,03	0,039
Extruded expanded polystyrene	40	0,03	0.06	2
Cellular concrete	600	0.26	0.30	1.15
Cement-sand mortar	1800	0.76	0,03	0,039

The heat transfer resistance of the building envelope should be determined by the formula 2.2:

$$R0 = \frac{1}{\alpha_в} + \frac{\delta 1}{\gamma 1} + \frac{\delta 2}{\gamma 2} + \frac{\delta 3}{\gamma 3} + \frac{\delta 4}{\gamma 4} + \frac{1}{\alpha_н} \quad (2)$$

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

The condition is satisfied. We take the thickness of the insulation 60 mm.

1.7 Ant seismic activities

The seismic hazard of the construction zones should be determined using a map of seismic generating zones of the territory of Kazakhstan, a set of maps of the general seismic zoning of the territory of the Republic of Kazakhstan, or according to the list of settlements located in seismic zones.

List of settlements located in the seismic zones of the Republic

Kazakhstan, with an indication of seismic hazard for them in points and in accelerations, is given in the mandatory Appendix B.

Our hotel is located in a seismic zone, therefore antiseismic measures are necessary. Seismicity of the work area according to SP 2.03-30-2017 9 points.

The category of soils by seismic properties is II (second). The adjusted value of seismicity should be taken equal to 9 (nine) points.

Since the hotel has a non-symmetrical shape, we divide it into separate blocks. Between the blocks we perform a deformation seam.

Antiseismic seams should be performed by erecting paired walls, paired frames or frames and walls.

The width of the anti-seismic seam between buildings or compartments should be taken no less than the total value of their calculated horizontal displacements at the appropriate level, calculated using expression (7.31).

With a building height of up to 5 m, the width of the anti-seismic seam, regardless of the calculation results, should be at least 30 mm. The width of the anti-seismic seam for buildings of higher height should be increased by 20 mm for every 5 m of height.

Antiseismic seams separating the foundations (except for pile foundations) may be taken with a width of 10 mm.

Structures of antiseismic seams and their filling should not impede the mutual movements of adjacent compartments during earthquakes.

In buildings located on construction sites with a seismicity of 8 points or more, it is not allowed to provide the possibility of mutual movements of adjacent compartments due to the movement of span structures freely lying on the structures of adjacent compartments.

2 Structural part

2.1 Collection of loads

Total nodal loads on the main circuit:
Load 1 PX = 0 PY = 0 PZ = 5351.02 PUX = 7.98887e-014 PUY = -6.06459e-014
PUZ = 0
Load 2 PX = 0 PY = 0 PZ = 5248 PUX = 0 PUY = 0 PUZ = 0
Load 3 PX = 0 PY = 0 PZ = 4025.68 PUX = 9.91969e-014 PUY = -8.10779e-014
PUZ = 0 Load 4 PX = 0 PY = 0 PZ = 399.36 PUX = -4.96131e-015 PUY = 0 PUZ = 0 Load 5 PX = 0 PY = 0 PZ = 2415.41 PUX = 5.82539e-014 PUY = -5.06313e-014
PUZ = 0
Load 6 PX = 0 PY = 0 PZ = 3220.54 PUX = 8.09195e-014 PUY = -6.43539e-014
PUZ = 0
Load 7 PX = 0 PY = 0 PZ = 259.2 PUX = 0 PUY = 0 PUZ = 0
Calculation completed successfully
Elapsed time = 2 min
The calculation results in LIRA-CAD are given in Appendix A

2.2 Design of column

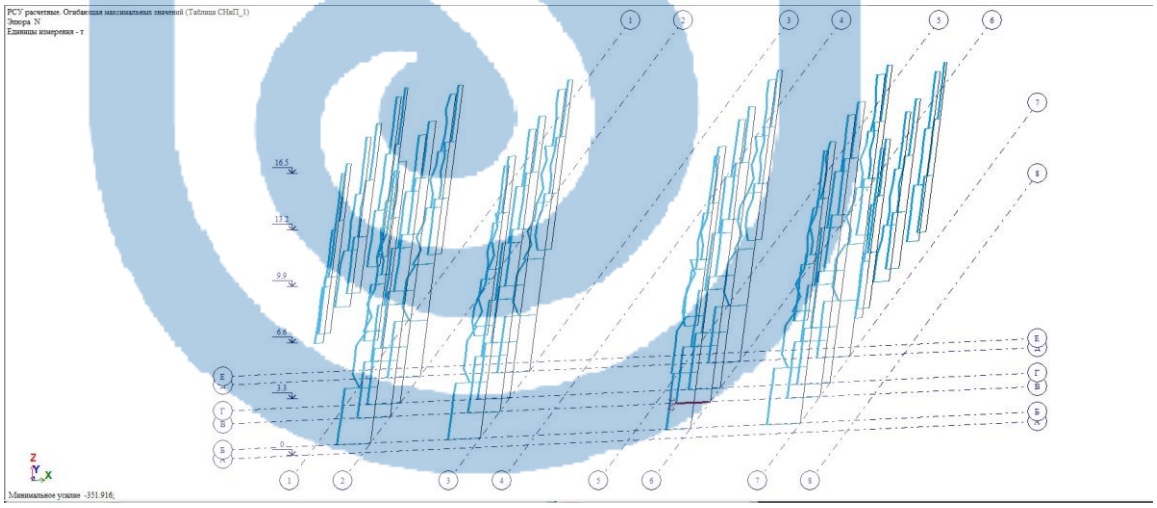

Figure 3 - Diagram of longitudinal forces

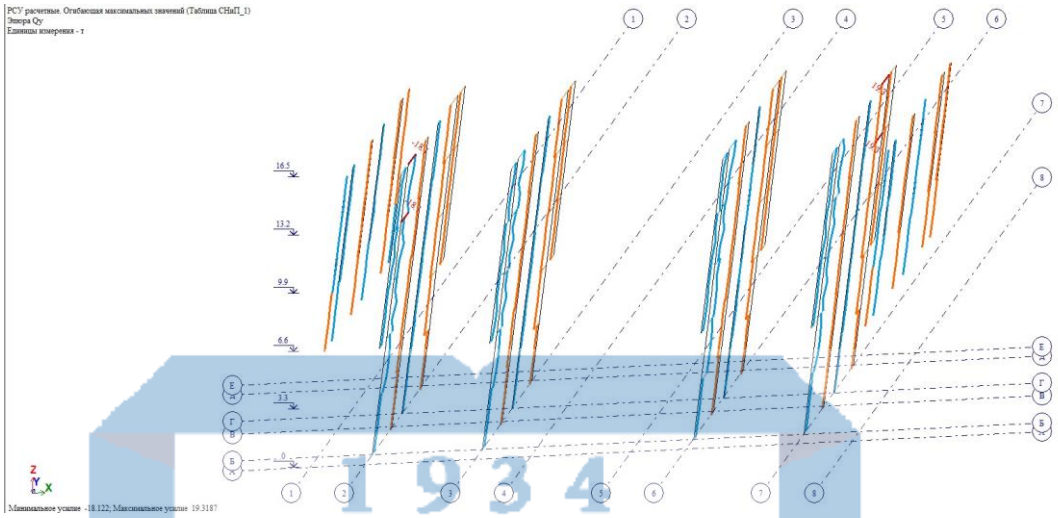

Figure 4 - Diagram of shear forces

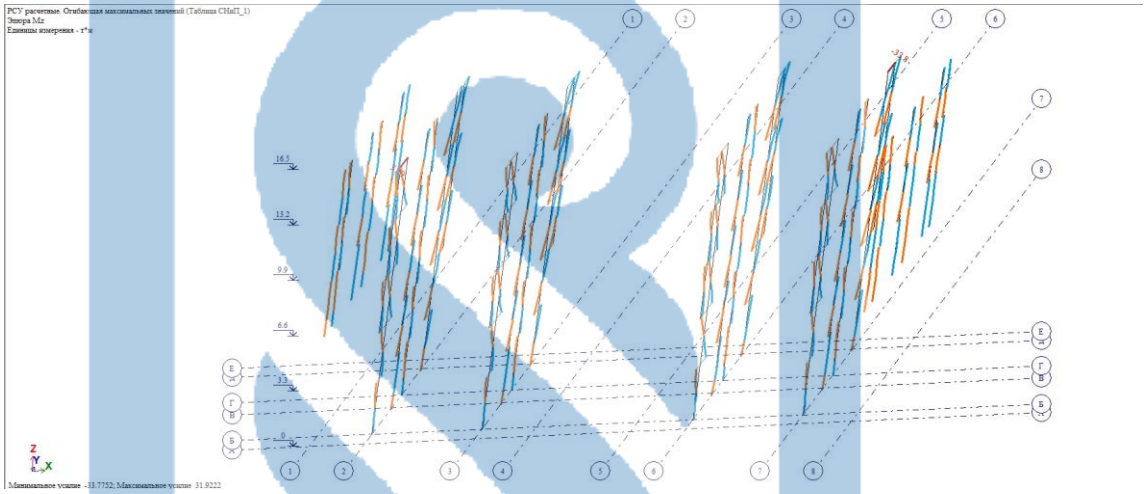

Figure 5 - Diagram of bending moments

Initial data

Section column 500x500mm. For calculation - heavy concrete B25; γb2 = 0.9; reinforcement class A500C according to the results of calculations performed in the LIRA program; Rb = 14.5MPa; Rs = ¬¬270MPa; Rsc = 270 MPa; Eb = 3 * 104MPa; Es = 2 * 105 MPa.

Protective layer of concrete a = a′ = 30mm. When calculating the strength of the column, it is considered as an eccentrically compressed element. Constant load forces: Estimated Column Length:

$$l_0 = 0.7h = 0.73 = 2.1m$$

Column working height:

$$h_0 = h\text{-}a = 600\text{-}40 = 560mm$$

Find the values of the moments of external forces relative to the least compressed (stretched reinforcement)

$$M1 = M + 0.5N\ (h0\text{-}a') = 671.1 + 0.52272.7\ (0.56\text{-}0.04) = 1262\ kN.m$$

For continuous use

$$Mu = M1 + 0.5N\ (h0\text{-}a') = 452.7 + 0.5 \cdot 2113.9\ (0.56\text{-}0.04) = 1002.3\ kN.m$$

M_u Section inertia radius:

I = √ (h ^ 2/12) = √ (〖60〗 ^ 2/12) = 17.32 cm

Due to the fact that l_0 / i = 210 / 17.32 = 12.12 <14, the deflection of the column can be ignored.

The conditional critical force N_crc is determined by the formula: [17, p. 30, f.20]

Check the condition δ_e> δ_ (e, min)

δ_ (e, min) = 0.5- (0.01l_0) / h - 0.01Rb= e_0 / h = 295.3 / 600 = 0.49> δ_ (e, min) = 0.5- (0.01l_0) / h - 0.01Rb = 0.5- (0.01 * 2100) / 600 - 0.01 * 13.05 = 0.334

We take δ_e = 0.49

α = E_s / E_b = (2 · 〖10〗 ^ 5) / (2,05 · 〖10〗 ^ 4) = 6.67 [17, p. 39]

Section inertia moment for concrete

J = (bh ^ 3) / 12 (2.27) = 〖50 · 60〗 ^ 3/12 = 9 · 〖10〗 ^ (5) 〖cm〗 ^ 4

We set the coefficient of reinforcement in the first approximation μ = 2 · 0.005 = 0.01.

The moment of inertia of the armature section relative to the center of gravity of the concrete. sections:

J_s = μbh_0 (0.5-a) ^ 2 = 0.01 · 50 · 56 (0.5 · 50-4) ^ 2 = 0.12 · 〖10〗 ^ 5 〖cm〗 ^ 4;

Conditional critical force:

N_cr = (6.4 · 3 · 〖10〗 ^ 4) / (2100) ^ 2 [(9 * 〖10〗 ^ 3) / 1.79 (0.11 / (0.1 + 0.49) + 0.1) +6.67 · 0.12 · 〖10〗 ^ 9] = 34847 kN.

The coefficient of influence of the deflection on the eccentricity:

η = 1 / (1-N / N_cr) = 1 / (1-2272.7 / 34847) = 1.07; [17, p. 30, f. 19]

The eccentricity, taking into account the deflection, is equal to:

e = e_0 η + 0.5 (h-a) = 295.3 · 1.07 + 0.5 · 560 = 595.97 mm.

Concrete Compressed Area Height:

X = N / (Rb * b) = (2272.3 * 〖10〗 ^ 3) / (13.05 * 500) = 348.2mm

The limited relative height adopted for the compressed zone of concrete:

ξ_R = ω / (1 + Rs / 500 (1-ω / 1,1)) = 0.75 / (1 + 270/500 (1-0.75 / 1,1)) = 1.5, [17, p. 31, f.25]

where ω = α-0,008 · Rb [17, p. 31, form. 26] - characteristic of the compressed zone ofconcrete ω = 0.85-0.008 · Rb = 0.85-0.008 · 13.05 = 0.75

Reinforcement is defined in accordance with paragraph 3.62:

α_n = N / (R_b bh_0) = (2272.3 * 〖10〗 ^ 3) / (13.05 · 500 · 560) = 0.62

α_m1 = (N * e) / (R_b b 〖h_0〗 ^ 2) = (2272.3 * 〖10〗 ^ 3 * 595.97) / (13.05 · 500 · 〖560〗 ^ 2) = 0.66 <ξ_R = 1.5δ ^, = a ^, / h_0 (2.35) δ ^, = 40/560 = =0.07;

As = As1 is determined by the formula:

As = As1 = (R_b bh_0) / Rs * (αm1-αn (1-αn / 2)) / (1-δ′)

As = As1 = (13.05 * 500 * 560) / 270 * (0.53-0.62 (1-0.62 / 2)) / (1-0.07) = 1487.2 mm

Reinforcement percentage

$$\mu = (As + As1) / bh = (2 * 1487.2) / (600 * 500) = 0.01 \geq \mu = 0.01$$

We specify the percentage $\mu = (0.01 + 0.01) /2=0.01$

J_s = μbh_0 (0.5h-a) ^ 2 = 0.01 * 50 * 56 (0.5 * 60-3) 2 = 0.19 * 105cm4=

= (6.4 · 3 · 〖10〗 ^ 4) / (2100) ^ 2 [(2.13 * 〖10〗 ^ 3) / 1.79 (0.11 / (0.1 + 0.49) +0 , 1) + 6.67· 0.19 · x 〖10〗 ^ 9] = 55174kN

The coefficient η = 1 / (1-N / N_cr) = 1 / (1-2272.7 / 55174) = 1.04 [17, p. 30, f.19]

e = e_0 η + 0.5 (h-a) = 295.3 * 1.04 + 0.5 * 560 = 587.1mm

α_m1 = (N * e) / (R_b bh_0) = (2272.7 * 〖10〗 ^ 3 * 587.1) / (13.05 · 500 〗 ^ 2) =0.65 As = As1 = (R_b bh_0) / Rs * (αm1-αn (1-αn / 2)) / (1-δ′) = (13.05 * 500 * 560) / 270 * (0.65-0.62 (1-0.62 / 2)) / (1-0.07) = 3233mm2

We accept A500C reinforcement As + As1 = 6466 mm2 (8Ø32).

2.3 Crossbar calculation

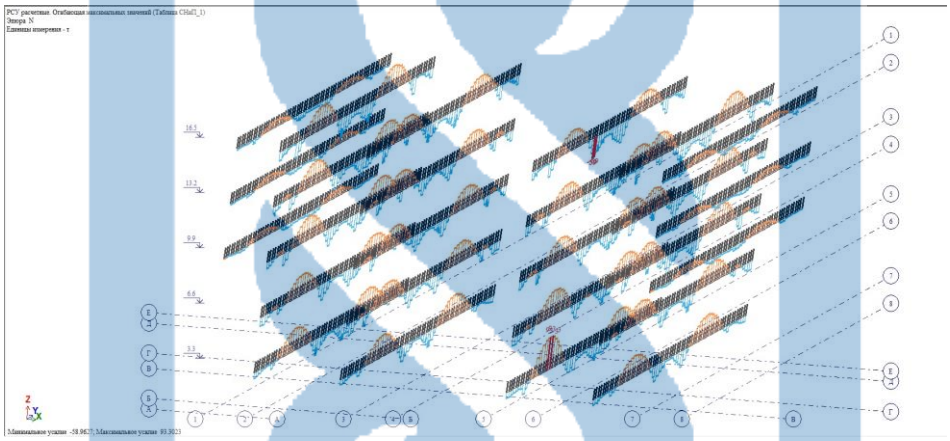

Figure 6 - Diagram of longitudinal forces

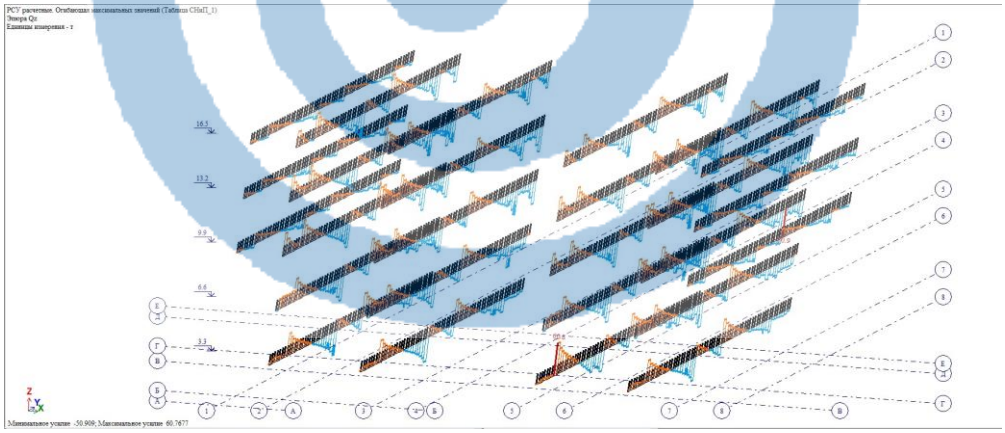

Figure 7 - Diagram of shear forces

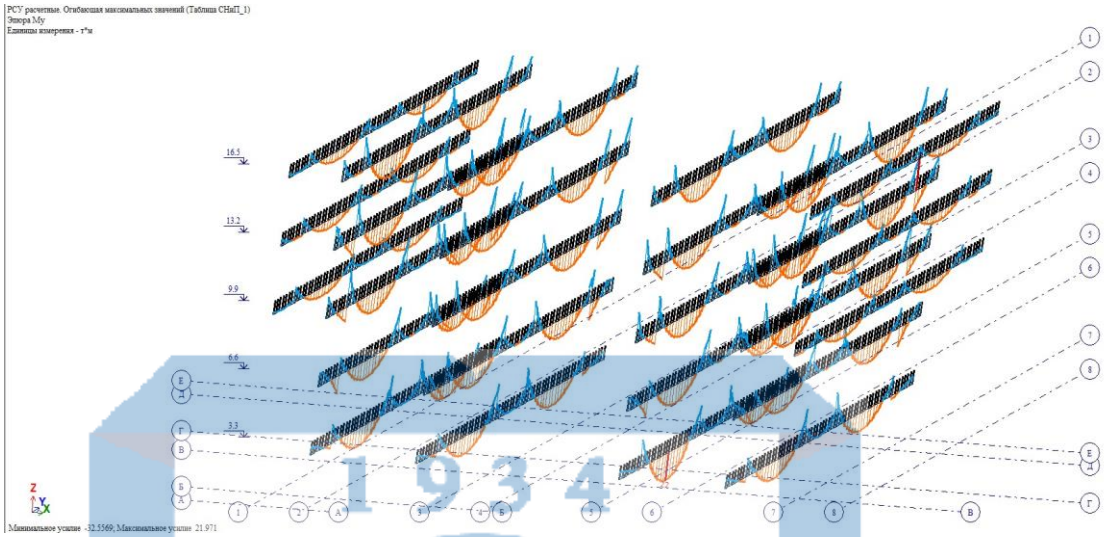

Figure 8 - Diagram of bending moments

Initial data:

The calculation of the crossbar is made according to the NTP RK 02-01-1.1-2011

The rectangular section taken for the column has dimensions b = 500 mm, h = 500 mm; $c1$ = 30 mm. Concrete of class C30 / 37 (fck = 30 MPa, γc = 1.5, fcd = αcc · fck⁄γc =

0.85 · 30 / 1.5 = 17.0 MPa, αss = 0.85). S500 class fittings (fyk = 500MPa, $fyd = fyk/\gamma s$ = 500 / 1.15 = 435 MPa, Es = NTP RK 02-01-1.1-2011 45 20 · 104MPa).

A Determination of the cross-sectional area of the reinforcement

Bend. moment MEd = 225.53 kN · m and longitudinal force NEd = −630.07 kN Need: determine the cross-sectional area of the longitudinal reinforcement. Payment. $d = h$ - $c1$ = 500-30 = 470mm = 47cm.

225.53 / (- 630.07) · 0.50 = 1.17 <3.5 → calculation using the diagram a - v. We find $aEds$ and vEd by the formulas:

a_Eds = 225.53 * 〖10〗 ^ 6 / (17.0 · 00 · 〖470〗 ^ 2) = 0.12 and (2.3)

v_Ed = −630070 / 17.0 · 500 · 470 = −0.158.

The required area of longitudinal reinforcement according to Fig. B.2 is зав1 / h =

30/500 = 0.06 (Appendix B) → ωtot.

A_ (s, tot) = 0.38 · 500 · 500/435 / 17.0 = 3712.6 mm2.

As = 3712.6 / 2 = 1846.3 mm2.

Accepted: 3Ø28 + 3Ø28 $S500$ ($As1$ + $As2$ = 1885 + 1885 = 3770 mm2).

B Calculation of checking the width of the opening of cracks normal to the longitudinal axis of the element.

Working section height

(2.6) d = 500 - 30 - 8 - 20/2 = 452 mm.

(2.7) ρ = 1885/500 · 452 = 0.0083 (0.9%). [18, p. 126]

Using the data from table 8.3, we check the width of the crack openings for rectangular sections reinforced with reinforcement of class St500 at 0.5% ≤ ρ ≤1.0% of the internal shoulder. power pairs, calculated:

z = 0.85 d = 0.85 · 452 = 384.2 mm. Stresses in tensile reinforcement:

(2.8) σ_s = 225.53 * 106 * 1885 · 384.2 = 311.4 N / mm2.

[18, p. 112, f8.13]

According to table 8.3, dmax = 12 mm at σs = 311.4 MPa and wk, lim = 0.4 mm.

Accepted diameter ∅ = 20 mm> $\emptyset max$ = 6 mm, i.e. it is necessary to check the width of the crack opening with a calculated method.

Since the moment dEd is designed for a quasi-constant combination of loads, when checking the crack opening width, we use the effective elastic modulus:

The previous value of the creep coefficient φ (∞, t0) is determined from the nomogram given in Fig. 6.1a. At h0 = 2Ac / u = 2 · 500 · 500/2 (500 + 500) = 250 mm and RH = 50% for t0 = 30 days. → φ (∞, t0) = 2.8.

Ec, eff = 30 · 〖10〗 ^ 3 / 1 + 2.8 = 7.9 · 〖10〗 ^ 3.

The reduction coefficient ae = Es / Ec, eff = 20 · 10/4 7.9 · 103 = 25.3. Determination of the height of the compressed zone: [18, p. 127]

Substituting the values:

x ≈ 160 mm. Armature stresses:

σ_s = 225.53 · 〖10〗 ^ 6/1885 (452 - 160/3) = 300.11 MPa.

Estimated crack opening width according to the formula:

$$wk = sr, max\ (\varepsilon sm - \varepsilon cm), \qquad (3)$$

where sr, max - max. the distance between the cracks, we find by the formula:

sr, max = 3.4 · c + 0.425k1 · k2 · ∅ / ρeff = 3.4 · 30 + 0.425 · 0.8 · 0.5 20 / 0.0314 = 210 mm.

at$k$1 = 0.8 - for profile periodicity rods;

k2 = 0.5 - in bending;

kt = 0.4 - for a quasi-constant combination of loads.

ρ_eff = 1885/500 · 120 = 0.0314.

The value $\varepsilon sm - \varepsilon cm$

$\varepsilon sm - \varepsilon cm$ = 300.11−0.4 (2.2 / 0.0314) (1 + 25.3 · 0.0314) / / 20 · 〖10〗 ^ 4 = 124.91* 〖10〗 ^ (- 5) ≥ 0.6 · σs Es = 0.6 · 150.06 · 〖10〗 ^ (- 5) = 90 · 〖10〗 ^ (- 5),

the condition is

$wk = sr, max\ (\varepsilon sm - \varepsilon cm)$ = 210 · 124.9 · 〖10〗 ^ (- 5) = 0.262 <$wlim$ = 0.4 mm.

Check for the width of the crack opening is performed

3 Department of Construction Production Technology

3.1 Determining the scope of work

The calculation of the volume of work begins with the determination of the volume of concrete, reinforcement consumption and formwork according to structural drawings. The area of the published surface and the volume of concrete are calculated according to the geometric dimensions of the structures. The results are tabulated. The required number of prefabricated elements is also determined: universal prefabricated panels, support rafters, telescopic racks, trusses, wooden plywood beams, laminated plywood sheets. The number of elements is included in Table 3.

Table 3 - Determining the scope of work

Mark of element	Elements	Volume of concrete to be laid, m3		Steel consumption, t		Area of the published page, m2	
		One item	all	For one element	all	For on element	all
Solid ceilings							
ПМ1	1	365,7	365,7	29,2	29,2	1828,6	1828,6
ПМ2	1	240,2	240,2	19,2	19,2	1201,3	1201,3
Solid Column							
ҰМ1	58	1,08	62,64	1,40	81,4	7,2	417,6
ҰМ2	38	0,48	18,24	0,62	23,7	4,8	182,4
diaphagrams							
Д1	4	4,1	16,4	5,23	20,92	42,45	169,8
Д2	2	3,67	7,34	4,78	9,56	37,17	74,34
A set of diaphragms:	6		23,74		30,48		244,14
Lift shaft							
Lift shafts	1	12,6	12,6	9,36	9,36	130,32	130,32
staircase							
staircase	1	9,17	9,17	8,49	8,49	92,88	92,88

Before starting the construction of the frame of the prefabricated building, it is necessary to equip the warehouses near the facility (for reinforcement products, formwork), to provide places for receiving concrete mix.

To build the frame of a prefabricated building, we use a universal prefabricated form. Transfer of molds is performed by a crane. Delivery of all reinforcement products is carried out by crane.

Transportation of the concrete mix is carried out by auto-concrete mixers from the nearest mortar - concrete mix, which allows to maintain the uniformity and the required mobility of the concrete mix.

The following schemes of supply of concrete mixture to the structure can be:

with cranes in the culverts; with auto-concrete pumps.

Disassembly of molds is carried out manually. The box is grounded by a crane. On site, the enclosure is cleaned, lubricated, inspected and then used in the next cycle.

Devices for concrete works are accepted depending on the intensity of concreting, which is determined based on the time norm for concrete workers to lay the concrete mix.

Table 4 - Determining the number of template elements

Names of elemets	Number of elements	Mass of 1 element	Mass of all elements
Area of the mold 3600x3000	42	0,114	4,788
Area of the mold 1600x3000	37	0,09	3,33
Disassemble the stand	60	0,035	2,1
Telescopic supports	465	0,018	8,37
Trenoga	465	0,006	2,79
Fork for the beam	280	0,002	0,56
General:			21,82

Option 1

An additional tower crane is used to lower the reinforcement, lower the formwork and further supply the reinforcement products, formwork and necessary construction products and equipment.

Delivery of concrete mix to the construction site is carried out according to the "crane-shovel" scheme. When the crane is delivered, the concrete mix is unloaded from the truck to the rotary shafts, the capacity of which must be doubled by the intensity of the concrete mixing and the capacity of the truck body transporting the concrete mix.

Option 2

An additional tower crane is used to lower the reinforcement, lower the formwork and further supply the reinforcement products, formwork and necessary construction products and equipment. The concrete mixture is delivered to the place of laying by means of a concrete pump.

Select an additional tap for option 1

The main technological parameters of the crane are: hook flight L m, hook lifting height H m, crane load capacity Q, etc. To select a crane, we calculate the above characteristics. Hook lift height:

$$Нк = Н0 + Нб + Нэ + Нстр \quad (4)$$

where H0 = 55.8 m - the height of the building; Nb = 0.5 m - the height of the hole for safe work;

Ne = 3.16 m is the height of the element, in this case the turning angle height;

Нстр = 3.3 m - height of ropes.

Nk = 55.8+ 0.5 + 3.16 + 3.3 = 62.76 m.

Hook flight:

$$L = Lп + Lб + Lo\text{-}0.9 \text{ m}, \quad (5)$$

where Ln = 62.7 m - the distance from the edge of the foundation of the building to the farthest column.

Lб = 1 m - safety zone from the edge of the building foundation to the edge of the crane foundation.

Lo = 3.6 m is the distance from the edge of the crane foundation to the axis of the crane tower.

1.05 m is the distance from the axis of the crane tower to the edge of the crane tower. L = 62.7 + 1 + 3.6-1.05 = 66.25 m.

The mass of the rising element

The calculation is made on a bucket with concrete, because it has the largest mass.

We accept a rotary bucket with a capacity of 2 m3. Technical characteristics are given in Table 5.

Table 5 - Determining the number of template elements

Indicator	Capacity, m3
	2,0
Response criteria. for shooting, mm	800x600
Response criteria. to shoot	Maxillary
Mass, t	0,9
Dimensions	
length	3160
width	1232
height	1040

$$Q=Q_б+Q_{бет}+Q_{стр}, \quad (6)$$

where Qb = 0.9 t - weight of the bucket,

Qbet = 2.2 * 2 = 4.4 t - weight of bucket concrete, Qstr = 0.06 t - weight of rope.

Q = 0.9 + 4.4 + 0.06 = 5.36 t.

As an additional crane we choose a COMEDILCT / B-8 crane with a hoist height of 62.3 m. The height of the tower can vary from 8.2 to 62.3 m. The crane support is a concrete foundation, to which the crane is attached with anchor bolts. The crane shaft rotates on a roller bearing with two turning mechanisms.

Choice of additional crane and concrete pump for option 2

Choosing a crane

For the second version of the work, we get a COMEDILCT / B-8 crane, ie the mass of the formwork and the mass of the reinforcement does not exceed the mass of the bucket with concrete, and the height of the formwork is less than the height of the bucket. Selection of concrete pump

To deliver concrete to the highest point of the building, a concrete pump with a concrete delivery height of at least 54 m is required. Its technical characteristics are given in Table 6.

Table 6 - Technical description BN - 80 concrete pump

Indicator	The essence
Pump type	hydraulic piston
Productivity, m3 / hour	80
Feeding height, m	120
Transmission distance, m	520
Fuel consumption, l / h	21
Fuel tank capacity, l	50
Volume of the receiving hopper, m3	0,6
Dimensions and chassis of the concrete pump mm:	
length	5500
width	1800
height	2300
weight, t	4,5
chassis type	pneumatic chassis
Concrete mix for concrete pump:	
fraction, mm	till 40
convenient branding	П2
movement of the mixture	9

Feasibility study of the options for the height of the transmission rate

Substantiation of the final version of the work on concreting the structure is carried out by technical and economic comparison of the considered options.

To compare the options, it is necessary to calculate for each version of the concrete work.

For the first and second options, the time and salary for concrete work are calculated. The results of the calculation of concrete works are given in Table 3.5.

Before performing the above calculation, we first determine the time norms and the assessment of the transfer of the concrete mixture to the structure with the concrete pump BN-80 and the discharge of the concrete mixture from the concrete mixer to the chassis and the receiving hopper of the concrete pump.

Feasibility study of concrete mix delivery options is carried out for the top layer, as the concrete mix "crane - chase" scheme

depends on the delivery time, and the rate of delivery of concrete mix by truck does not depend on the height of the building.

Calculation 1

Determining the time and price norm for unloading the concrete pump into the bucket and the receiving hopper of the concrete pump.

We accept concrete mixer 69363B.

The volume of the transported mixture is 5 m3.

KAMAZ-55111 base car.

Unloading time is 300 s.

The hourly rate for the driver is 0.79 tenge.

Time norm for unloading 100 m3 of concrete mix:

$$1 * 100 * 300 / (5 * 3600) = 1.67 \text{ mash / h.}$$

Price: 0.79 * 1.67 = 1.32 tg

Determination of time and evaluation standards for the delivery of concrete mixture to the structure with a concrete pump BN-80.

The operational performance of the concrete pump is determined by the following formula:

$$Pe = Pt * K1 * K2 \quad (7)$$

where Pt = 80 m3 / h - technical capacity of the concrete pump, K1 = 0.5 - use of coefficient of technical performance performance

K2 = 0.65 - coefficient of reduction of concrete pump performance

$$Pe = 80 * 0.5 * 0.65 = 26 \text{ m3 / h}$$

The concrete pump is serviced by a unit of three people:

- concrete pumping machine operator 1 person 4th category,
- locksmith 4 category 1 person,
- 1 person of concrete worker of 2 categories.

Time norm of 1 m3 of concrete mix:

- for workers: 1 * 2/26 = 0.077 man-hours, - for the driver: 1 * 1/26 = 0.0385 man-hours, The assessment is:
- for workers: 0.64 * 0.077 = 0.0493 tenge, - for the driver: 0.79 * 0.0385 = 0.0304 tenge.

We determine the cost of work for each option;

$$Ci = ПЗ + НР \quad (8)$$

where ПЗ = (Зраб + См-ч * Nм-ч + Спп) * И,

Zrab - the wages of construction workers are defined in the table of this explanatory note;

Sm-h - car-hour price, rubles,

Nm-h - the number of machine hours of machine work is defined in Table 3.6 of the explanatory note,

SPP - the cost of installing the foundation of an additional tower crane, I = 148,629 - the average conversion factor from the base price level in 1984 to the current price level in 2012;

НР = К * (Зраб + Змаш) (9)

where K = 1.12 - the amount of overhead costs (as a percentage) from the payroll of workers - builders and mechanics.

Zmash - the salary of drivers is defined in Table 3.6 of this explanatory note.

Option 1

An additional tower crane COMEDIL CTT / B-8 is used to deliver the concrete mix to the laying site. Cm-h = 8.47 tg;

Nм-ч = 29,41mash - hours;

Zrab = 194.75 tg;

Zmash = 26.82 tenge; And = 148,629.

The cost of installing the foundation of the additional tower crane is not taken into account, as the tower crane will be used in the installation before concreting.

PZ = (194.75 + 8.47 * 29.41) * 148.629 = 65 969.4 tg;

HP = 1.12 * (194.75 + 29.41) * 148.629 = 37 314.7 tg; Ci = 65 969.4 + 37 314.7 = 103 284.1 tg.

Option 2

BN-80 concrete pump is used to deliver the concrete mixture to the place of laying.

Cm-h = 17.36 tg;

Nm-h = 7.65 mash - hours;

Zrab = 142.52 tg;

Zmash = 6.04 tenge; And = 148,629.

The cost of installing the foundation of the additional tower crane is not taken into account, as the tower crane will be used in the installation before concreting. ПЗ = (142,52 + 17.36 * 7,65) * 148,629 = 34 899,8 тг; HP = 1.12 * (142.52 + 6.04) * 148.629 = 34 723 tg; Ci = 34 899.8 + 34 723 = 69 622.8 tg.

Table 7 - Feasibility study of options

Name of indicators	UNIT		The value of indicator by options	
			Option 1	Option 1
Scope of work	- sa	mash	29,41	7,65
Labor intensity		high	244,31	200,74
Duration of shift installation		shift	15,26	12,56
Cost (prices for 2012)		tenge	103284,1	69 622,8

3.1 Basically, as a result of the data obtained, we accept the feasibility study for further development of Option 1 (crane-sink), as the crane is required to perform reinforcement, formwork, masonry and other work.

3.2 Selection of vehicles

We receive a 69363V truck concrete mixer to transport the concrete mix from the concrete plant to the construction site.

The volume of the transported mixture is 5 m3.

KAMAZ-55111 base car.

Unloading time is 300 s.

The performance of the vehicle in the method of portion delivery of the mixture is determined by the following formula:

$$Птр = Qтр * tсм * квр * 60 / tц \quad (10)$$

where Qtr = 5 m3 - portion volume of concrete mix transported in one flight; tсм = 8 hours - shift duration;

kvr = 0.9 - working time utilization factor; tц = t3 + tГП + tВ + tпп + to - general transportation of concrete mix cycle duration; t3 = 8 min - loading time of the vehicle at the concrete plant; tГП = 20 min - travel by truck instead of laying the mixture from the factory time; tВ = 8 min - time of unloading of concrete mix; tpp = 20 min - idle time of the vehicle to the concrete plant; to = 5 min - cleaning, washing and service time.

Ptr = 5□8□60□0.9 / (8 + 20 + 8 + 20 + 5) = 35 .4 m3-shift.

The need for vehicles to ensure the required intensity of concrete mixing:

$$N = Pbet * tcm / Ptr \quad (11)$$

where Pbet = k * n / Nvr - drinking capacity of concrete workers per hour,

k = 2 - number of concrete workers,

n = 4 - number of people in units, Hbr - time norm for laying concrete mix.

Selection of the number of auto-concrete mixers for concreting columns, diaphragms and walls.

Pbet = 2 * 4 / 1.6 = 5.0 m3 / h,

N = 5.0 * 8 / 35.4 = 1.13

We accept concreting poles, diaphragms and walls with 2 auto-concrete mixers 69363B per shift.

Selection of the number of auto concrete mixers for concreting paving slabs.

Pbet = 2 * 4 / 0.57 = 14.04 m3 / hour,

N = 14.04 * 8 / 35.4 = 3.17

We accept 4 concrete mixers 69363B per shift for concreting slabs. A depth vibrator with a flexible shaft is used to compact the concrete mix in the columns, diaphragms and walls of the rigid core and elevator shaft. Model IV-75 with the following characteristics: - oscillation frequency 20000 Hz; vibrator:

- diameter 28 mm;
- length 400 mm; - weight 14.3 kg.
- thickness of concreting layer 35-40 cm; - technical capacity 4-7 m3 / h.

Movable vibration is used on the paving slab to compact the concrete mix.

Model EVR-380 with the following technical characteristics:

- aluminum profiles 180x40x4 mm;
- length 2.5-4.5 m;
- 220 V vibration unit; - power 0.5 kW; - weight 69 kg.

3.2 Technology of work performance

Installation of columns and walls

DOKA molds were selected for molding works. Universal molds are used for kneading beams, diaphragms and stiffeners. Wedge lock serves as a template.

The support molds are also used to keep the molds in the design condition.

Cover mold device and mold care

The telescopic supports will be delivered to the construction site in disassembled form. Collect them immediately before installation. The nut of the screw jack is installed approximately 1/2 of the height of the transition groove, which allows you to subsequently level the assembled molds, working with the jack device by raising or lowering the movable rod.

The roof is assembled at once to cover all of the mold. Normal installation begins with the installation of telescopic supports, the vertical position of which is provided by the triangles. Then wooden plywood beams are installed on the telescopic supports in the form of grids, on which laminated plywood sheets are laid. The leveling of the assembled molds begins after checking the marks with the help of a level. This is achieved by means of screw jacks.

The deck of the molds and all threaded parts, regardless of whether they are in use or in stock, must be covered with a layer of lubricant.

Inventory molds, as well as supporting elements (supports) and similar fasteners (clamps, clamps, locks) must be cleaned of cement mortar after each turn. Scrapers and metal brushes are used for this purpose. It is strictly forbidden to use

hammers and other impact tools to remove mold elements from the solution. The use of inventory molds requires mandatory lubrication and thorough cleaning of cement mortar residues after each cycle. The lubricant must not leave oil stains, the lubrication must not impair the strength of the surface of reinforced concrete structures, the lubricating components must not contain volatile and harmful substances. Lubricants must be fire-safe, and the technology of their preparation and application must allow to mechanize these processes.

Reinforcement and concreting of ceilings

Work on the installation of ceiling fittings, given in this technological scheme. Prior to the start of reinforcement of monolithic structures, the following work must be performed on the typical floor:

- the work on installation of monolithic structures of columns in the

corresponding occupations of the lower layer is completed; - stairwells are installed in the occupations of the ground floor;

- openings in inventory panels are closed;
- devices for lighting the workplace, as well as devices for connecting electrical appliances and welding machines were prepared and installed on the floor;
- geodetic control of monolithic structures of the lower layer was conducted;
- control of acceptance of reinforcement products in the warehouse near the object.

Checks the fittings when receiving them in the warehouse near the facility: - the presence of labels on the elements, indicating the brand and number of elements;

- carries out control measurements, inspection of elements, as well as control of the strength of welded joints.

Reinforcement products are manufactured at the plant and delivered to the construction site by truck. Loading and unloading operations must prevent deformation, bending, damage to the welded joints of reinforcing elements, grids, frames and individual rods.

Spatial frames of columns are assembled from a flat frame, joints are made by spot welding. Space frames are mounted with a tower crane COMEDILCTT / B-8. Previously concreted reinforcement structures must be carefully adjusted, inspected and brought to the design condition before installation of the output block.

Laying of concrete mix and maintenance of concrete is performed by specialized joints. The work they perform includes:

- cleaning of molds before concreting, sealing all holes more than 10 mm wide and lubricating the surface of steel molds;
- cleaning of fittings from rust, dirt and sticky concrete solution; - processing of working seams;
- testing and inspection of equipment, inventory and devices used in the construction of concrete mixes;
- receipt, delivery and loading of concrete mix into columns;

- installation and relocation of trucks and vehicles in the process of concreting; - cleaning of mechanisms, tools and devices from sticky concrete and mud after concreting;

- watering of concrete during the initial hardening stage and covering it with moisture-requiring materials (sand, sawdust).

Each member of the concrete crew performs one or more specified work processes. The work of specialized joints of concrete workers is carried out in two shifts. Joints must be provided with a set of tools. Control and maintenance of paved concrete must be provided.

Table 8 – Control and maintenance of paved concrete

Name of indicators	unit	number
Volume of concrete to be laid	м^3	198.7
Duration of shift work	shift	18
Labor intensity of work	man-shift	94
Production per person-shift	m3 / person-shift	2.11
Salary per person-shift	tg / person-shift	1559.2

4 Economic part

The building has 18 floors, the dimensions of the planned axes are 19.2 × 35.4m m. 2 Elevator, Elevator hall, heated building with smokeless stairs.

Solid reinforced concrete frame is used as the lifting system of the building. The horizontal and longitudinal rigidity of the building is provided by the installation of diaphragms, as well as the creation of a hard disk of the roof.

The ceilings are made of solid 200 mm thick. The columns are made of solid reinforced concrete with a cross section of 400x400 mm. Loads are accepted by solid cast diaphragms with a thickness of 200 mm.

Calculation complex for determining the amount of project costs. In addition, the budget is a management tool used by management in the project implementation process, a tool for monitoring and analyzing the cost of funds for the project.

The volume of capital investments is determined on the basis of estimates:

1 Construction works;

2 Technological, Energy, hoisting - transport and other equipment, devices, tools and production inventory necessary for the operation of enterprises;

3 Work on the installation of this equipment,

4 Development of the construction site;

5 implementation of technological and author's supervision; 6) Development of project documentation.

It is very important to correctly determine the estimated cost of the project. The estimate, which accurately reflects the level of costs required, depends on the assessment of the cost-effectiveness of the project, planning and financing of capital investments. The more accurately the set of estimates and the accuracy of the proposed forecasts are determined. Organizes work on construction, reconstruction or expansion of buildings, structures, enterprises and their complexes.

Estimates in the process of designing enterprises, buildings and structures are made on the basis of graphic materials, the features of the accompanying records and determine the amount of costs associated with the construction, reconstruction or expansion of buildings, structures, enterprises and their complexes.

The estimated cost of construction and installation works is used to determine the contract price and to conclude contracts between the Customer and the Contractor, between the general contractor and subcontractors, as well as for settlements between them.

It is very important to correctly determine the estimated cost of the project. The estimate, which accurately reflects the level of costs required, depends on the assessment of the cost-effectiveness of the project, planning and financing of capital investments.

The more accurately the set of estimates and the accuracy of the proposed forecasts are determined.

Estimates are needed to evaluate the options for design solutions for the construction and reconstruction of industrial and non-industrial facilities and to choose the economic location. In addition, the estimated cost is used to compare the

options for the organization of construction and work production, the choice of design and construction materials.

On the basis of the estimate and the calendar plan the project budget is made and accounting, reporting and an estimation of activities of the Customer are carried out. Therefore, the estimated cost should not only cover the costs, but also ensure a certain profit. Estimation of the estimated cost of work and actual costs is the basis for determining the sources of benefits and reasons for costly work. But in any case, the estimate gives only a forecast of the final cost of the project, as its final cost will be known after the completion of project financing.

Preliminary calculation of the cost of construction is carried out at the design stage in the development of the feasibility study on the basis of aggregated standards, for objects of industrial significance can be used aggregate indicators of the basic cost of construction, models of industries and subsectors. On the basis of representative objects describing the model of residential buildings for mass construction to determine their value at current and projected prices at the initial stage of design for housing and social facilities, as well as for the calculation of capital investments for both cities and complex construction of housing estates It is recommended to use aggregate indicators of the developed base cost

The estimate documentation of the object is developed in connection with SNiP RK A2.2-1-2001 "Instructions for the composition of design and estimate documentation for the construction of institutions, buildings and structures and the procedure for production, coordination, approval." The estimate was calculated in 2001 according to SNiP RK 8.02-02-2002 "Procedure for determining the estimated cost of construction in the Republic of Kazakhstan". The transition from 2001 prices to 2009 prices is calculated using the calculated monthly index provided for in the legislative budget.

Estimated documentation was developed on the basis of project materials related to 12 territorial districts in the software complex ABC-4 (version 3.16.1)4 Occupational safety and health

Rope calculation

Hanging of cargo is one of the most responsible operations when performing rigging works. The design of the ropes must ensure the safety and comfort of work, as well as the ability to quickly hook and unload the load. The number of branches of the suspended ropes is selected depending on the weight of the load to be lifted and the diameter of the rope. Usually, due to the increase in the diameter of the rope tends to use loops with a small number of branches. The load capacity of the ropes is determined by the breaking strength of the rope, taking into account the number of points and the coefficient of strength. Permissible force at each point in the vertical position of the sling;

Table 9 - Industrial sanitation, fire safety and labor protection

Decisions on industrial sanitation, fire safety and labor protection	These solutions are part of the developed diploma project		
	account explanatory note		schedule section sheet of №
	part	№ pages	
volume-planning decisions on safety: - the dimensions of the sanitary protection zone, the sanitary gap are determined;	СБ		
- location of platforms, passages, entrance gates and entrance doors in terms of safety	СБ		
thermal engineering calculations of fencing structures were carried out			
based on the use of heating systems, local exhaust, exhaust, general exchange ventilation.	ТХ		
The ropes were counted	СБ		
fire safety	ТХ		
the following were identified: categories of premises and buildings for general explosion and fire hazard; the required degree of fire resistance of the building; basic construction	ПОС		

$$S = G \cdot g / (k \cdot n \cdot \cos \alpha) \quad (12)$$

where G is the weight of the load. H (kgf);
g - acceleration of free fall (g = 10 m / s2);
n is the number of sling branches;
α - Angle branches rope (in degrees).

Substitute for the coefficient m to calculate 1 / cosα;

$$S = m \cdot G \cdot g / (k \cdot n), \quad (13)$$

$$S = 1.41 \cdot 2980 \cdot 10 / (0.75 \cdot 4) = 14006 \text{ H} = 14, \text{ kN}$$

where m is the coefficient α = 45º - m = 1.41, depending on the vertical slope of the branch.

The ropes were calculated to replace the bucket with a weight of 2.98 tons of concrete, the total weight of the load to be lifted was 2980 kg, the number of rope branches was m = 4, kz = 0.75. The ropes must be tested for strength P / S ≥ k

P> S · k = 14 · 6 = 84 kN where P is the total rope breaking strength H (kgf) according to the certificate; S - maximum traction of rope branches; k is the coefficient of strength fund = 6.

The rope was selected according to the tensile strength R found and its technical data were determined: temporary tensile strength, maximum design, and its diameter.

The found R 6x19 corresponds to a rope of double construction of type lk-r (1 + 6 + 6/6) + 1 o.s. (GOST 2688-80) with a diameter of 14 mm, the design breaking force of the rope is 98 kN.

Occupational safety is a system of protection of life and health of employees in the process of labor activity, which includes legal, socio-economic, organizational, technical, sanitary, treatment, prevention, rehabilitation and other measures.

Occupational safety requirements are understood as state regulatory requirements for labor protection, including occupational safety standards, as well as labor protection requirements established by labor protection rules and instructions.

The state guarantees employees the protection of their right to work in conditions that meet the requirements of labor protection.

The working conditions provided for in the employment contract must comply with the requirements of labor protection

The total cost of the project is 1029808579.

CONCLUSION

The diploma design task for the construction of dormitory with sport complex in Almaty city was completed in full in accordance with the curriculum. Makes up 9 pages of graphic section and explanatory notes. The diploma project is based on the literature adopted in the construction, the purpose of which is to create a modern and comfortable building. New materials and technologies were used in the project. Technical and economic indicators of the project confirm the rationality of the decisions made.

The following results were achieved during the writing of the thesis: - In the design of any building is not only the choice of spatial and architectural solutions, but also the correct placement of the object in the middle of the urban construction site. - The architectural decision of the building, first of all, should be based on the correct choice of lifting structures. Modern construction allows the use of a number of highposition systems, including the leading position of the monolithic frame.

- It is possible to calculate structures with the help of computer technology, which is a software package. In this way, the process of calculation and assembly is capacious, it is possible to record the effects on the design schedule of the building with all the necessary loads. The combination of different loads of the elements of the main building gives accurate results.
- At the same time, the technology of construction production is designed taking into account all modern methods and techniques of production. Effective timing of construction machinery and equipment and the fact that it often reduces the complexity of the labor process, allows you to plan correctly.
- Development of estimates of construction costs, local estimates allow to assess the versatility and feasibility of the construction project of the facility. ABC-4 software package significantly simplifies this calculation;
- In today's society, it is important to assess the impact of construction on the environment, for which calculations are made in relation to the environment. - In any industry, including construction, human life requires safe, comfortable and legally protected employment in accordance with the law. For this purpose, there will be a set of measures for safety and health.

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Application A

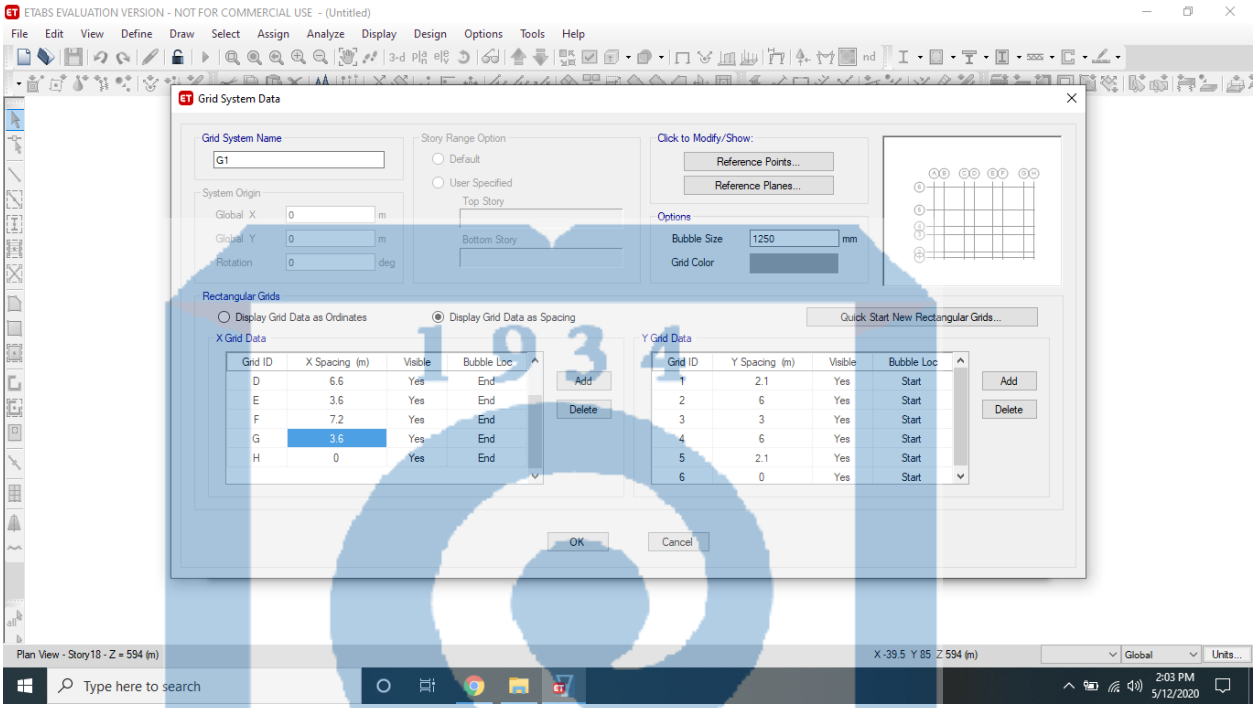


Figure A.1 - Design of the building

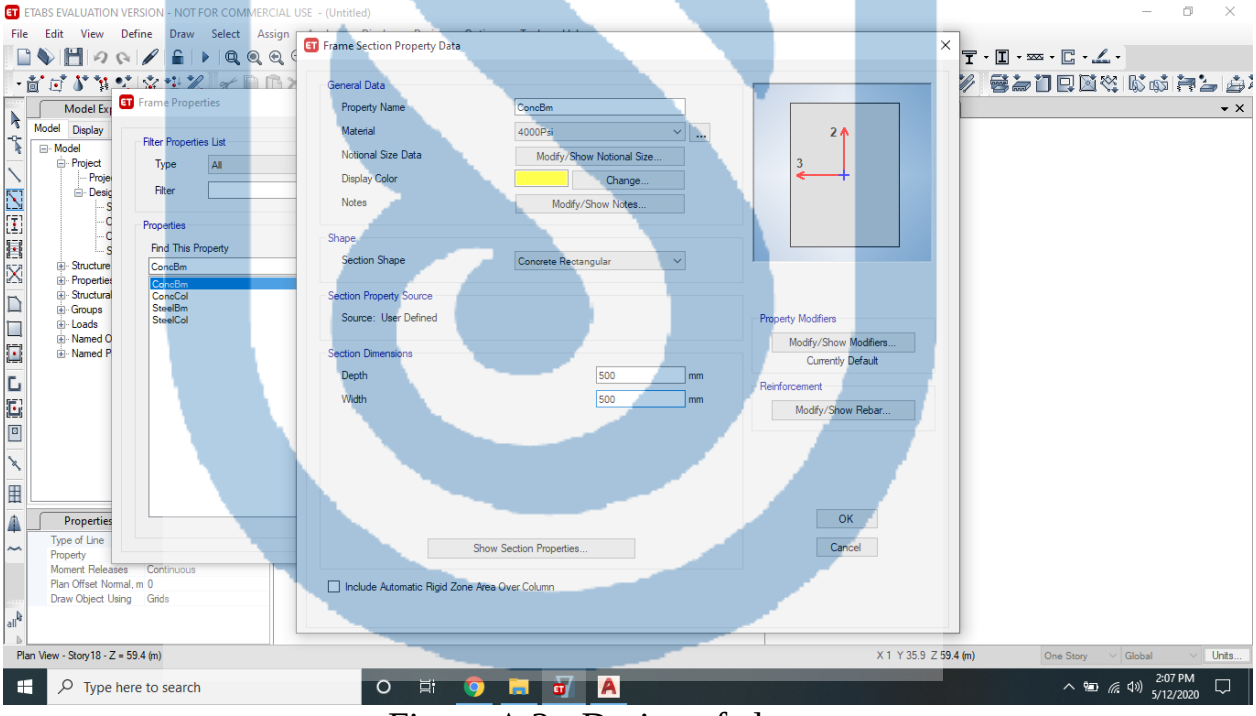


Figure A.2 - Design of elements

Continuation of application A

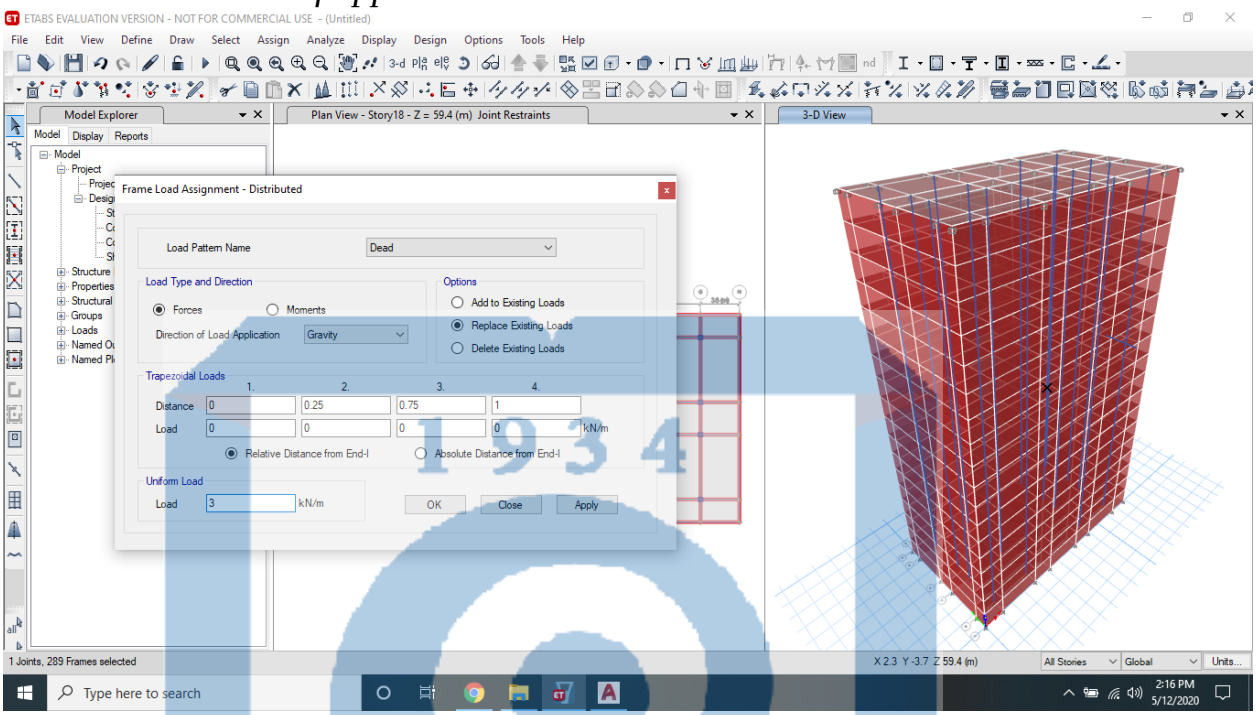


Figure A.1 - Forces

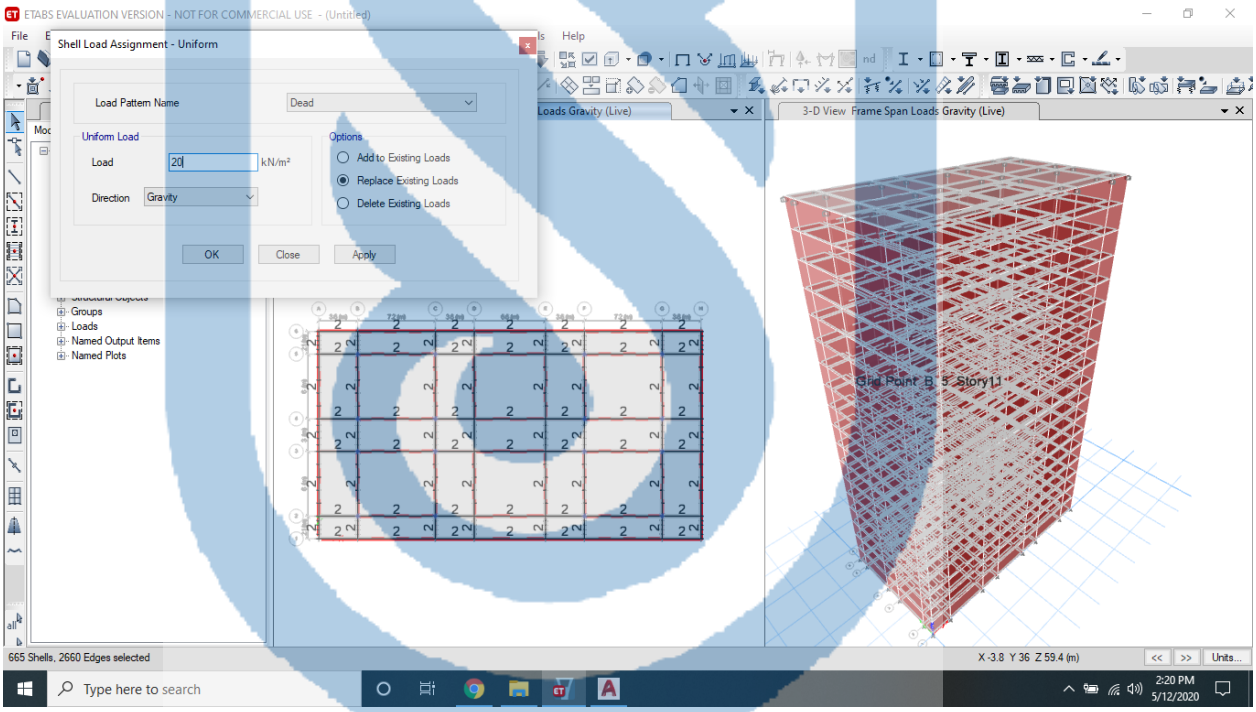
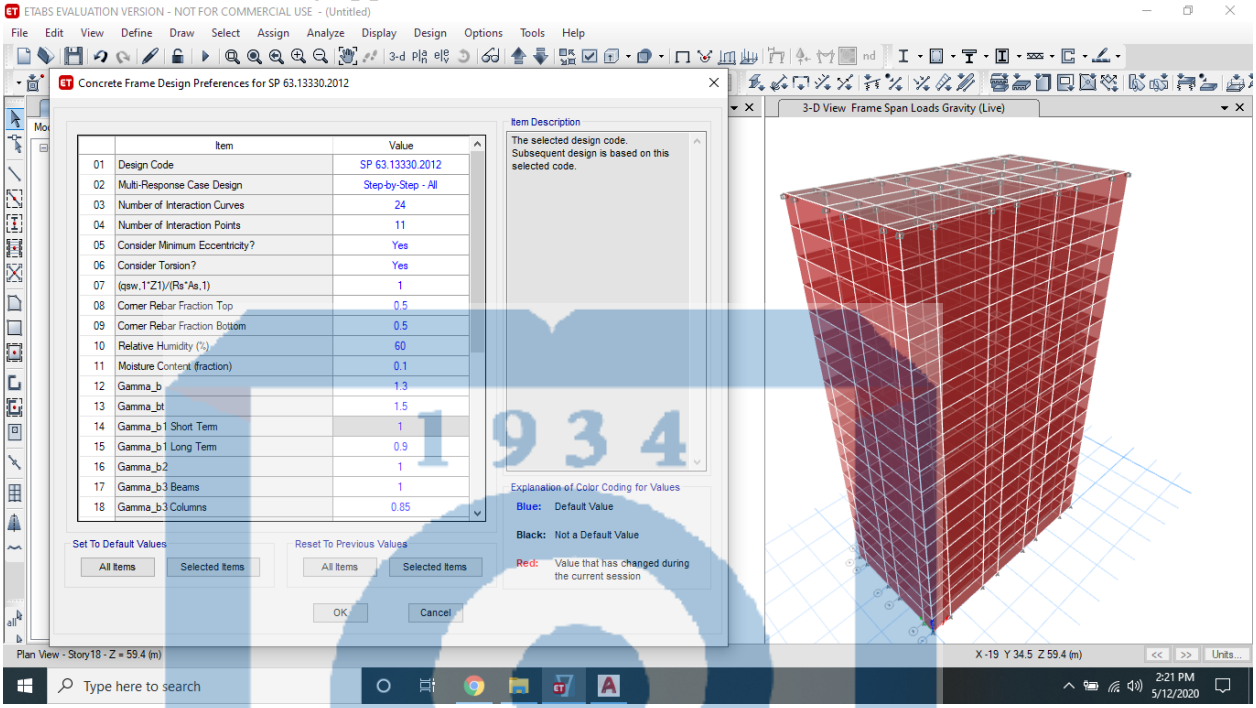


Figure A.2 - Forces



	Item	Value
01	Design Code	SP 63.13330.2012
02	Multi-Response Case Design	Step-by-Step - All
03	Number of Interaction Curves	24
04	Number of Interaction Points	11
05	Consider Minimum Eccentricity?	Yes
06	Consider Torsion?	Yes
07	(qsw,1*Z1)/(Rs*As,1)	1
08	Corner Rebar Fraction Top	0.5
09	Corner Rebar Fraction Bottom	0.5
10	Relative Humidity (%)	60
11	Moisture Content (fraction)	0.1
12	Gamma_b	1.3
13	Gamma_bt	1.5
14	Gamma_b1 Short Term	1
15	Gamma_b1 Long Term	0.9
16	Gamma_b2	1
17	Gamma_b3 Beams	1
18	Gamma_b3 Columns	0.85

Figure A.3 - Information about design

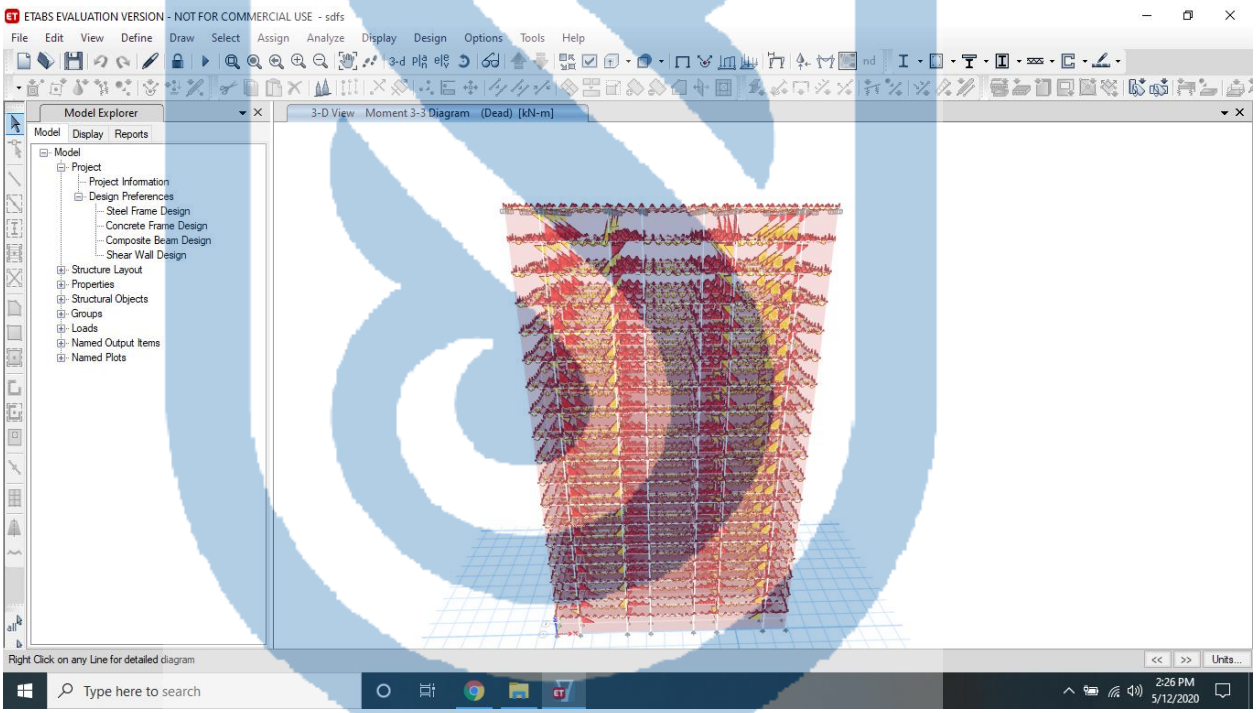


Figure A.4 - Moments

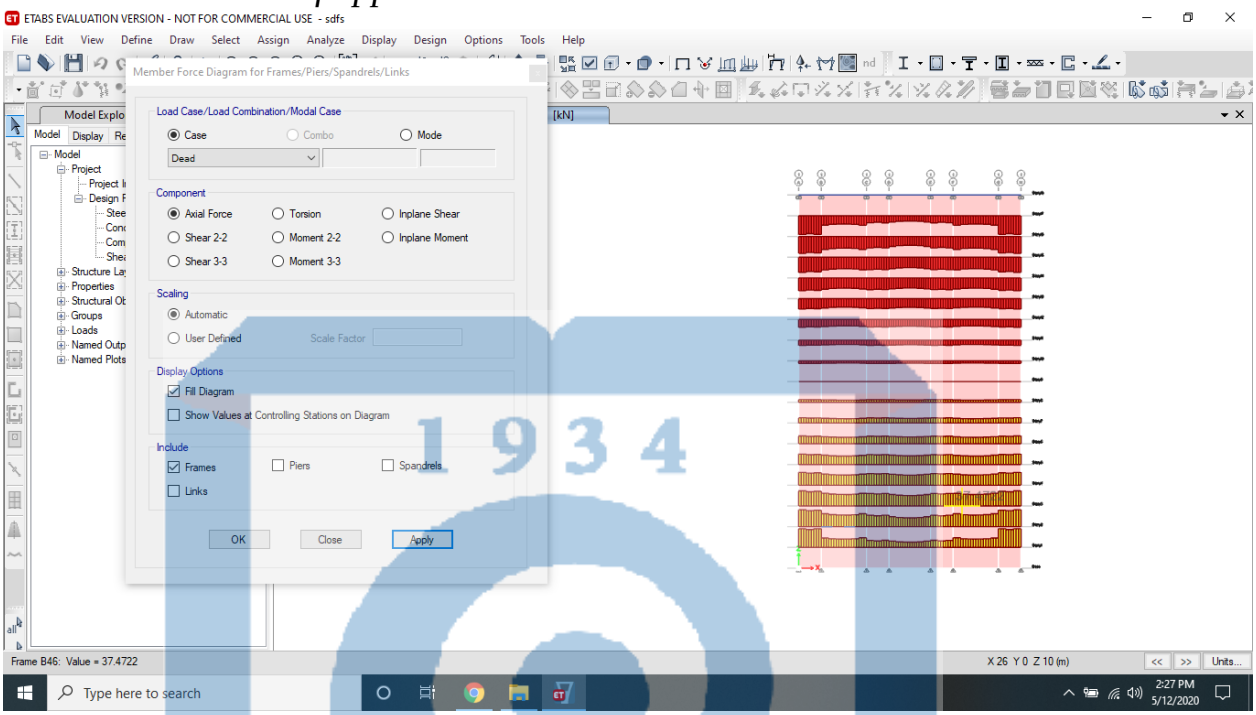


Figure A.5 - Axial forces

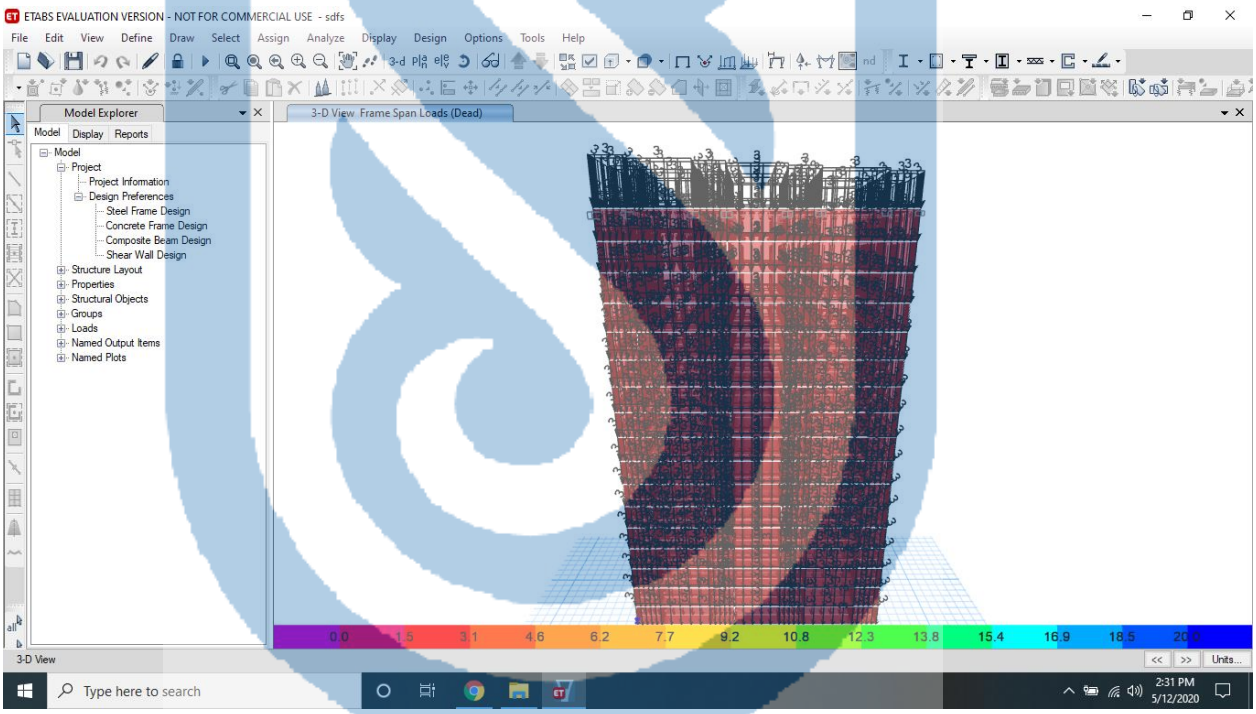


Figure A.8 - Analyzing

Construction Name Dormitory with sport complex in Almaty city

Object name dormitory

Local estimate No. 02-001-001
(Local estimate)

on the General construction work
(name of work and costs)

Base:

Estimated cost 1 0 29808.579 thousand tenge
Estimated salary 18 2489.658 thousand tenge
Normative labor input 6 4.69373 thousands of people

Compiled at current prices as of 2020.

No. p / p	Norm code, resource code	Name of work and costs	unit of measurement	amount	Unit cost, tenge		Total cost, tenge			Overhead, tenge	Total cost with NR and SP, tenge	Labor costs of construction workers, total
					Total	machine operation	Total	machine operation	materials			
					salary of construction workers	including salary of drivers	salary of construction workers	including salary of drivers	equipment, furniture, inventory	Estimated profit, tenge		Labor costs of drivers, total
1	2	3	4	5	6	7	8	9	10	eleven	12	thirteen
		Coef. 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 residential and civil facilities in the cramped conditions of the built-up part of cities										
1	1101-0201-1001	Plot number 1 Earthwork	m3 soil cushion	481.0	515.69	620.71	320517	222763	151	6 5192	358886	0.79
					1.64	175.7 2	623	63 366	-	20 177		37.16

1	2	3	4	5	6	7	8	9	10	eleven	12	thirteen
2	1101-0205-0202t. 11. Sec. 3.179K = 1.2	Soil 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 m 2 and a depth of 2 m. [Manual processing, cleaning the bottom and walls with filling the soil in pits and trenches, developed by a mechanized method]	m3 of soil	862.0	3244.34	-	2872186	-	-	1879974	5092333	2450.13
					3244.34	-	2472186	-	-	400173		-
3	1101-0102-0320	Soil of 2 groups. Development with loading onto dump trucks by HITACHI excavators with 1 m3 bucket	m3 of soil	3585.0	204.32	199.04	528179	514523	717	63011	728485	14.80
					5.01	28.85	12939	74576	-	57295		73.75
4	1101-0104-0405	Trenches and pits. Filling with bulldozers with a capacity of 79 kW (108 l) when moving soil up to 5 m. Soil group 2	m3 of soil	2224.0	20.57	20.57	27177	25177	-	6867	44608	-
					-	7.79	-	9537	-	3064		5.35
5	1101-0201-0102	Primer. Sealing with trailed rollers on pneumatic wheels 25 tons. The first pass along one track with a layer thickness of 30 cm.	m3 compacted soil	2025.0	76.42	76.42	231162	231162	-	61566	616146	-
					-	30.27	-	86009	-	23418		48.67
6	1101-0101-0320	Soil of 2 groups. Development into a dump with HITACHI excavators with 1 m3 bucket	m3 of soil	2224.0	155.98	151.69	190921	225668	-	20046	287844	6.01
					4.29	18.45	6053	22588	-	188877		25.34
7	1110-0113-0101		m2 fence	2710.0	5749.87	324.51	13282189	749621	6499125	5775797	19507025	4516.05
					2611.88	132.61	6033443	306331	-	1819039		150.09
8	1101-0207-1301	Shrubs and dense forests are dense. Cutting in soil of natural occurrence by brush cutters on a tractor 79 kW (108 l s)	ha	0.95	24456.22	24456.22	23233	23233	-	5355	32075	-
					-	7828.95	-	7437	-	2287		4.13
		Total section number 1					16949564	1925147	6499973	7685808	32006202	6987.78
							9524444	565344	-	1970830		344.49
		Section No. 2 Foundations										

1	2	3	4	5	6	7	8	9	10	eleven	12	thirteen
9	1108-0101-0307	Walls, foundations. Waterproofing of the side coating with bitumen in 2 layers on a leveled surface of crushed stone, brick, concrete	m2 surface	7122.5	895.51	22.94	5482748	140448	3507814	1722416	8881577	1492.67
					299.63	2.87	1834486	17574	-	576413		08/14
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	t	300.0	209067.00	-	53312085		53312085	-	62077052	
					-	-		-	-	4264967		-
eleven	1137-0104-0204	Stationary wooden stationary simple massive blocks. Installation and dismantling upon delivery of 10-25 tons of concrete tower cranes	m2 of opal surface	190.0	3648.10	249.90	656656	44981	329493	268829	999524	264.96
					1567.68	73.53	282182	13235	-	74039		8.59
12	1106-0101-0115	Reinforced concrete foundation slabs are flat. device	m3	1600.0	21508.74	1906.13	32263113	2859191	26177223	3508341	40633170	3087.75
					2151.13	419.08	3226699	628621	-	2861716		496.46
thirteen	1106-0101-0101	Concrete preparation. device	m3	400.0	15994.07	1241.59	4798223	372476	4018681	441466	5658864	465.75
					1356.88	260.20	407066	78061	-	419175		62.55
		Total section number 2					96512825	3417096	87345296	5941052	220650187	5311.13
							5750433	737491	-	8196310		581.68
		Frame section number 3										
14	1106-0501-0201	Columns of civil buildings in metal formwork. device	m3	300.64	66542.93	31647.41	13351173	6349736	3711785	4215757	19072284	2868.05
					16395.79	6693.82	3289652	1343048	-	1405354		1073.29
fifteen	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	26.7	209067.00	-	5163955		5163955	-	6077071	
					-	-		-	-	413116		-
sixteen	1137-0104-0601	Metal mesh formwork. Installation and dismantling upon delivery of 10-25 tons of concrete tower cranes	m2 of opal surface	2008.4	7644.45	226.67	15337823	454789	10168890	4355722	41269029	4360.91
					2349.55	36.07	4714144	72364	-	1575484		48.22

		Total for section No. 3					33852951	6804525	19044630	8571479	54 818384	7228.96
							8003796	1415412	-	3393954		1121.51

1	2	3	4	5	6	7	8	9	10	eleven	12	thirteen
		Section No. 4 Overlap										
17	1106-0801-0101	Beam-free ceilings up to 200 mm thick. Devices at heights from the reference area to 6 m	m3	2000.9	36752.46	2067.30	66187500	3722994	44686949	16920184	92756299	16692.54
					9871.48	453.14	17777557	816052	-	6648615		645.54
eighteen	2107-0510-1003	The formwork is collapsible panel board, the ShchD brand 1,5x0,4, the size is 1500x400x417 mm, GOST 23477-79	m2	4001.5	15707.00	-	57144560		47144560	-	50916125	
					-	-		-	-	3771565		-
nineteen	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	262.0	209067.00	-	52684884		52684884	-	56899675	
					-	-		-	-	4214791		-
		Total section number 4					166016944	3722994	144516393	16920184	197572099	16692.54
							17777557	816052	-	14634971		645.54
		Section 5 of the Wall										
twenty	1108-0701-0101	An open inventory forest up to 16 m high tubular for masonry and cladding. Installation and disassembly	m2 vertical projection	2863.2	736.39	2.12	2034802	5855	560192	1368524	3675592	1379.11
					631.54	1.00	1468755	2776	-	272266		2.22
21	1108-0301-0101	Walls made of lightweight concrete stones. Brickwork without facing with a floor height of up to 4 m	m3 masonry	602.64	9050.69	3005.13	5001774	1660757	823150	2666173	8281383	2364.19
					5856.07	631.49	2517867	348986	-	613436		279.64
		Total section number 5					7036576	1666612	1483342	4034697	22956975	3743.30
							3986622	351762	-	885702		281.86
		Section No. 6 Roofing										

22	1112-0101-0201	Four-layer flat roofs from rolled roofing materials on bitumen mastic with a protective layer of gravel on antiseptic bitumen mastic. device	m2 of roof	3012.0	3339.91	150.58	8389863	378266	7093054	887753	10019825	759.75
					365.66	18.47	918543	46406	-	78 2209		09/31
		Total for section No. 6					8389863	378266	7093054	887753	199 19825	759.75
							918543	46406	-	742209		09/31
		Section No. 7 Narueno finish										

1	2	3	4	5	6	7	8	9	10	eleven	12	thirteen
23	1115-0109-0101	Facades ventilated on a metal frame. Fiber cement cladding device with cradles	m2 of cladding	1581.6	9491.06	52.43	13112844	72438	363903	10153146	35127269	10157.45
					9175.23	10.81	12676503	14929	-	1861279		9.85
24	2103-0499-9903	Straight stone cladding	m2	1462.6	-	-	-		-	-	-	
		Total section number 7					13112844	72438	363903	10153146	35127269	10157.45
							12676503	14929	-	1861279		9.85
		Department No. 8 Interior decoration										
25	1115-0203-0201	Walls inside buildings. Plastering with cement-lime or cement mortar on stone and concrete is simple.	m2 of plastered surface	1000.6	1203.88	80.31	1181729	78830	261292	723491	2057638	733.75
					857.38	63.93	841607	62757	-	152418		60.05
		Total section number 8					1181729	78830	261292	723491	3057638	733.75
							841607	62757	-	152418		60.05
		Overall rating					343053296	18065908	266507883	54917610	1029808 579	51614.66
							58479505	4010153	-	31837673		3079.07
		Overall rating:	tenge				1029808 579					
		including:										
		- salary of builders	tenge				88479505					
		- the cost of operating the machines	tenge				74065908					

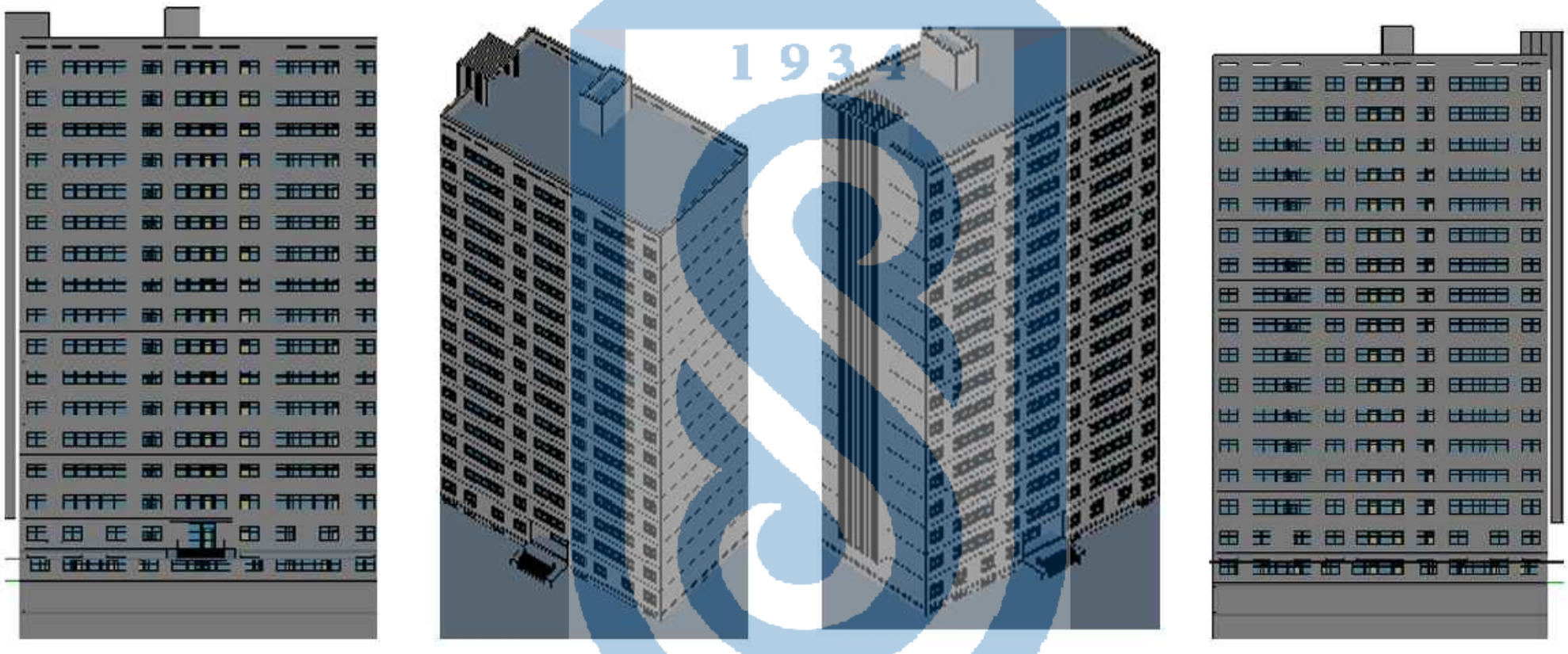
		- including driver salary	tenge				4010153					
		- materials, products and designs	tenge				866507883					
		- overhead	tenge				64917610					

1	2	3	4	5	6	7	8	9	10	eleven	12	thirteen
		- estimated profit	tenge				31837673					

Compiled Sayed Muzamil S adat
position, signature (initials, surname)

Checked
position, signature (initials, surname)

DORMITORY VIEWS



Front view | side view | side view | back view

				KazNITU -5B072900 .29-03/2020 DP		
				Dormitory with Sport complex in Almaty		
name	Document №	Signature	date			
Head of Dep	Akmalayuli K.A.			Architectural part	Level / Sheet / scale	
Superviser	Manizha Paktin				DP / 1 / 1:200	
Consultant	Manizha Paktin					
Controller	Kozyukova.N.V			Facades	Department of Construction and Building Materials	
Prepared by	S.M.Sadat					

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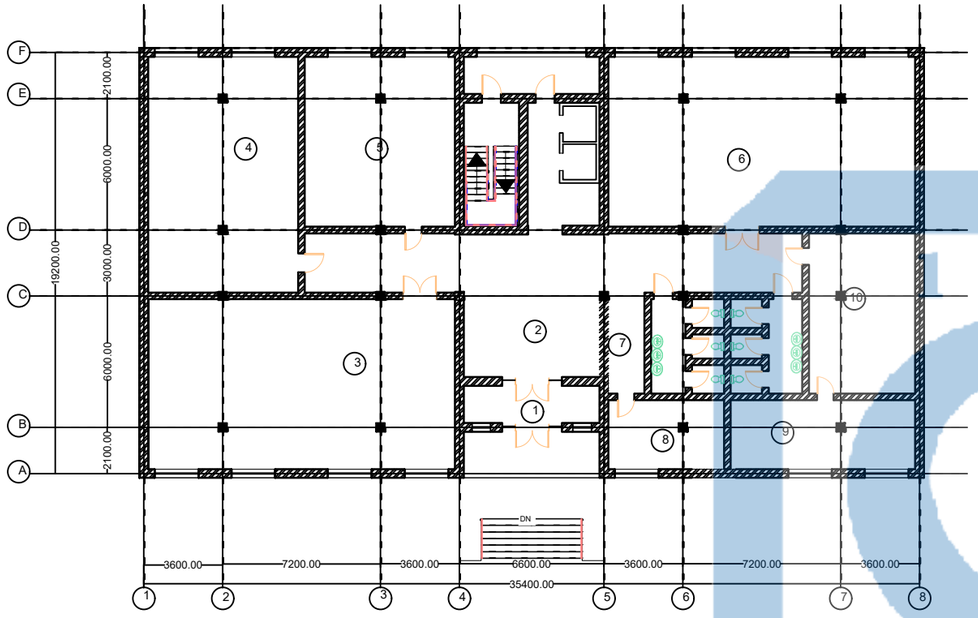
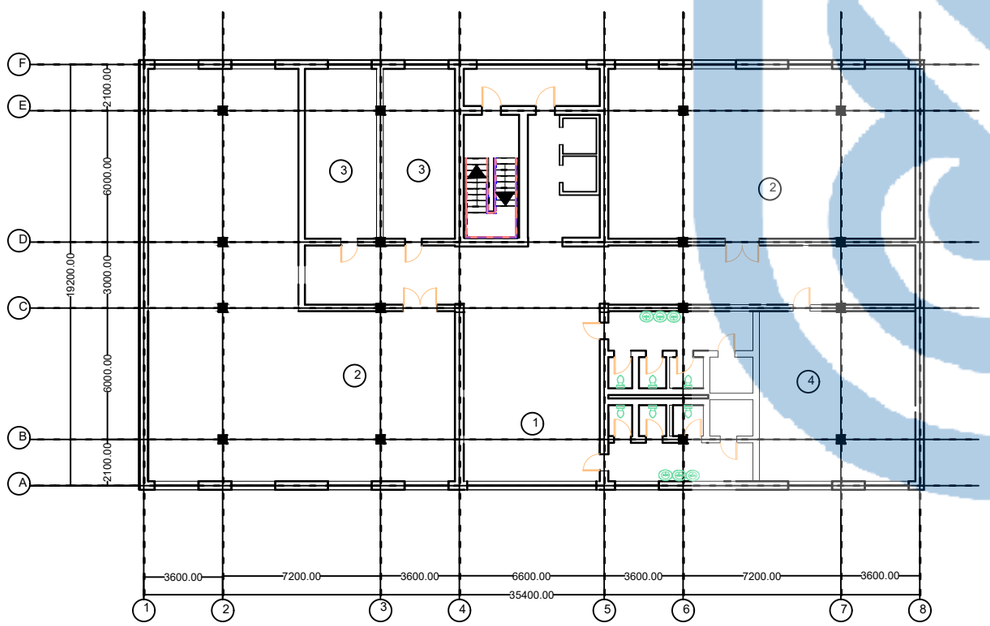
PRODUCED BY AN AUTODESK STUDENT VERSION



FIRST FLOOR

NO	FIRST FLOOR EXPLAINATION	AREA
1	TABMBOUR	10,9m2
2	THE LOBBY	22,8m2
3	STUDY HALL	107,9m2
4	CLUB ROOM	75,3m2
5	DRAWING ROOM	53m2
6	ASSEMBLY HALL	107,9m2
7	SECURITY GUARD	10m2
8	GUARD ROOM	16,5m2
9	TECHNICALROOM	26,5m2
10	ADMISSION ROOM	35,4m2
11	C/Y	



UNDERGROUND FLOOR

NO	UNDERGROUND FLOOR EXPLANATION	AREA
1	THE LOBBY	48,8m2
2	SPORT ROOM	108,2m2
3	LOCKER ROOM	24,7m2
4	TECHNICAL ROOM	55,2m2
5	C/Y	

				KazNITU -5B072900 .29-03/2020 DP
				Dormitory with Sport complex in Almaty
name	Document №	Signature	date	
Head of Dep	Akmalayuli K.A.			Architectural part
Superviser	Manizha Paktin			
Consultant	Manizha Paktin			
Controller	Kozyukova.N.V			
Prepared by	S.M.Sadat			Plan of first and underground floor

Level	Sheet	scale
DP	2	1:200

Department of Construction and Building Materials

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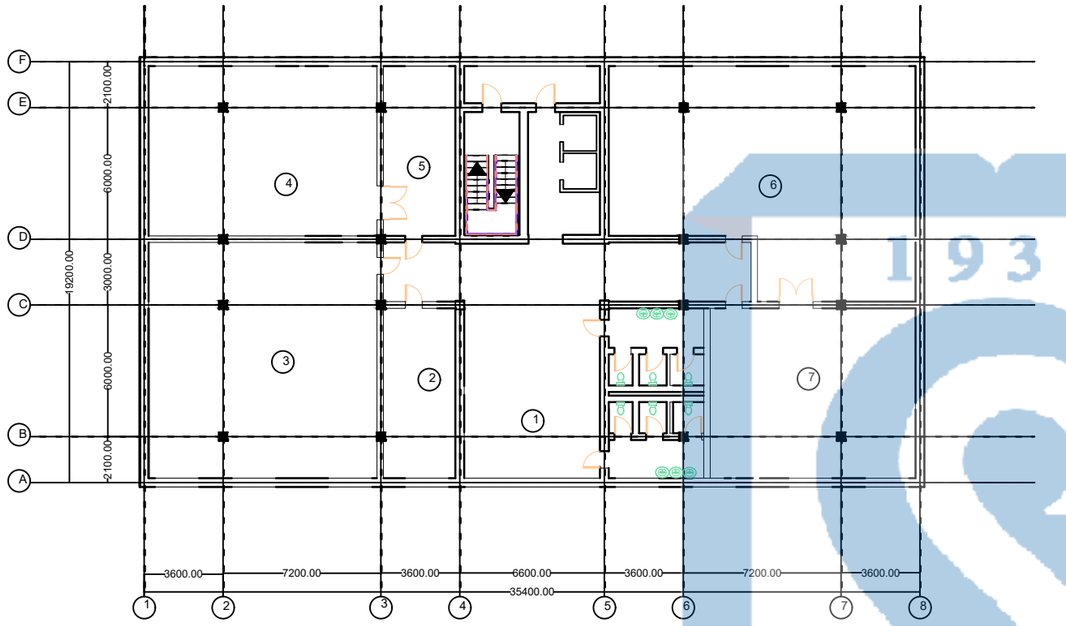
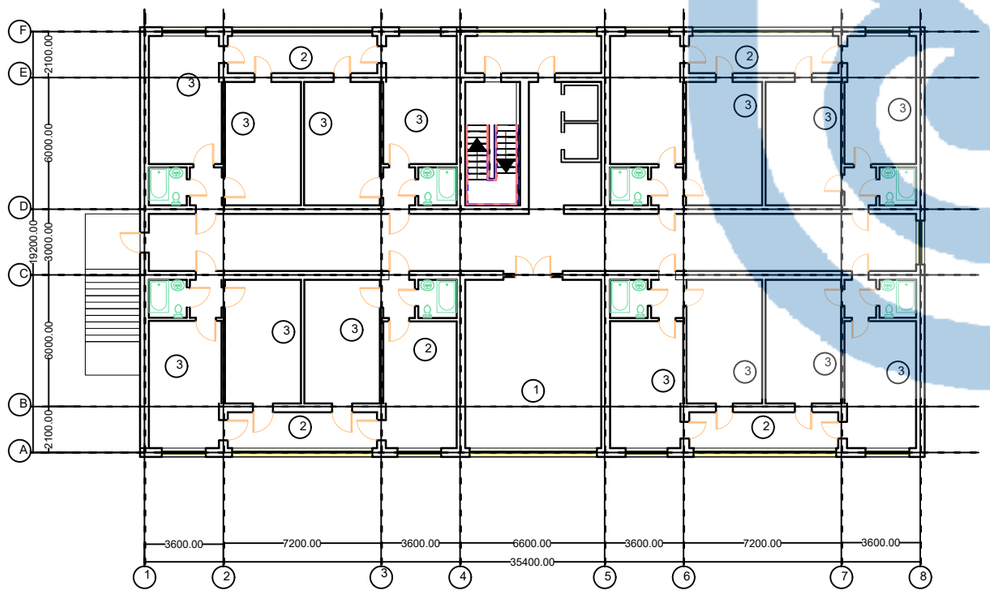


BASEMENT

NO	BASEMENT EXPLAINATION	AREA
1	THE LOBBY	10,9m2
2	STORAGE WAREHOUSE	22,8m2
3	TECHNICAL ROOM	107,9m2
4	CLEAN DRESSING ROOM	75,3m2
5	DRESSING ROOM	53m2
6	LAUNDRY	107,9m2
7	DRESS STORAGE	10m2
8	C/Y	16,5m2



TIPIC FLOOR

NO	TIPIC EXPLAINATION	AREA
1	DINING ROOM	48,8m2
2	LOGGIA	11,3m2
3	BED ROOM	18m2
4	C/Y	

				KazNITU -5B072900 .29-03/2020 DP
				Dormitory with Sport complex in Almaty
name	Document №	Signature	date	
Head of Dep	Akmalayuli K.A.			Architectural part
Superviser	Manizha Paktin			
Consultant	Manizha Paktin			
Controller	Kozyukova.N.V			
Prepared by	S.M.Sadat			Plan of Tipic and basement floor

Level	Sheet	scale
DP	3	1:200

Department of Construction and Building Materials

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				KazNITU -5B072900 .29-03/2020 DP	
				Dormitory with Sport complex in Almaty	
name	Document №	Signature	date		
Head of Dep	Akmalayuli K.A.			Architectural part	Level: DP; Sheet: 4; scale: 1:200
Superviser	Manizha Paktin				
Consultant	Manizha Paktin				
Controller	Kozyukova.N.V			Sections	Department of Construction and Building Materials
Prepared by	S.M.Sadat				

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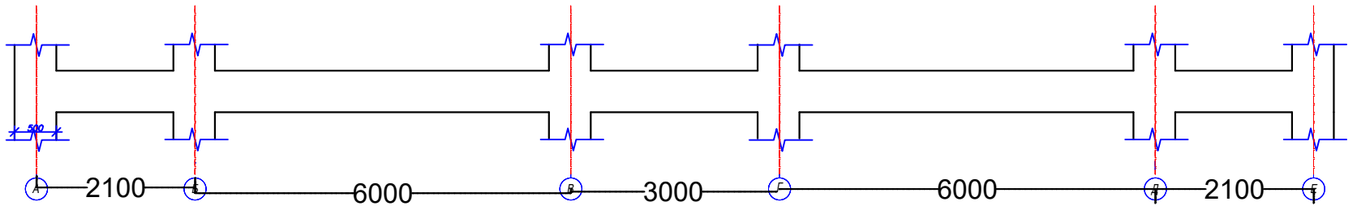
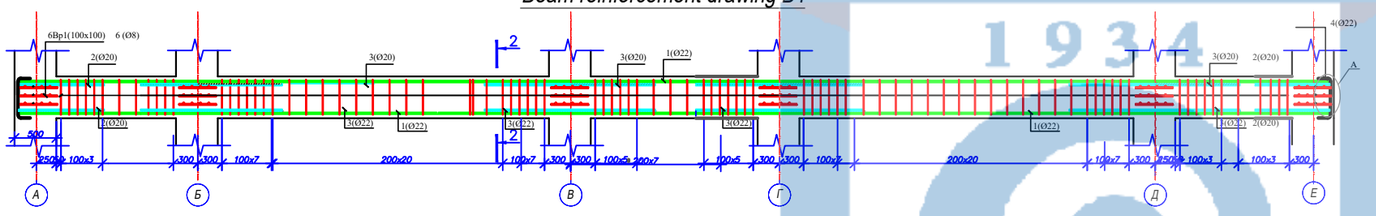
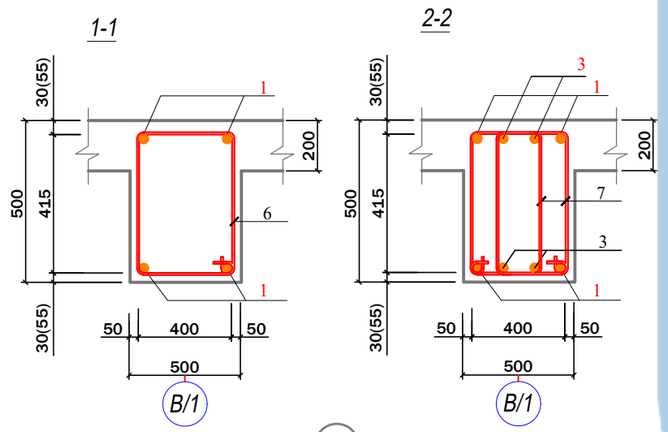
BEAM FORMWORK B1



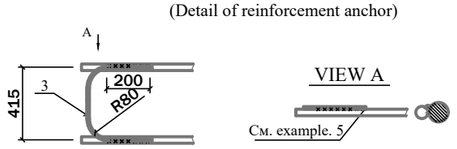
Beam reinforcement drawing B1





A

(Detail of reinforcement anchor)



Specification of the crossbar beam B1

Поз.	Designation	Name			Qty.	mass kg	Note
		R-1 crossbar				155.6	кг
1	ГОСТ Р 5781-82*	Ф 22	A-III	L= 19900	4	59.382	237.5 кг
2	ГОСТ Р 5781-82*	Ф 20	A-III	L= 1020	8	2.515	20.12 кг
3	ГОСТ Р 5781-82*	Ф 20	A-III	L= 2040	16	5.031	80.496 кг
4	ГОСТ Р 5781-82*	Ф 22	A-III	L= 815	4	2.432	9.728 кг
5	ГОСТ Р 5781-82*	Сетка 6Вр1 с ячейкой 100x100					
6	ГОСТ Р 5781-82*	Ф 8	A-I	L= 1550	108	0.578	62.424 кг
7	ГОСТ Р 5781-82*	Ф 8	A-I	L= 1350	108	0.533	57.564 кг
		concrete B25			0.96	м3	

1. Concrete and reinforcement work shall be carried out in accordance with the instructions SNiP RK 5.03-37-2005. "Bearing and enclosing structures."
2. Knit the fittings with knitting wire at all intersections.
3. Place joints of adjacent rods apart. Joint spacing 1.5 x L overlap
4. Dock the upper longitudinal reinforcement of the crossbars in the span, the lower one at the supports
5. The joining of the rods to each other is performed on welding with overlays according to the type electrodes E50A-UONI 13/55-UD.
6. The height of the weld should be equal to 0.25d, but not less than 4 mm: the width of the weld should be equal to 0.5d, but not less than 10 mm.
7. Formwork should be removed after concrete reaches 70% of design strength.

Parts list

position	sketch
6	
7	
4	

Statement of steel consumption, kg

mark of element	Reinforcing products									
	reinforcement mark									
	A-I				A-III					all kg
	ГОСТ 5781-82*				ГОСТ 5781-82*					
	Ø6	Ø8	Ø10	Итого	Ø18	Ø20	Ø22	Ø28	final	
Crossbar P1	0	119.98	0	119.98	0	100.6	247.3	0	347.9	467.88

KazNITU -5B072900 .29-03/2020 DP

Dormitory with Sport complex in Almaty

name	Document №	Signature	date
Head of Dep	Akmalayuli K.A.		
Superviser	Manizha Paktin		
Consultant	Zhambakina.Z.M		
Controller	Kozyukova.N.V		
Prepared by	S.M.Sadat		

Construction part

Level	Sheet	scale
DP	5	1:200

Beams

Department of Construction and Building Materials

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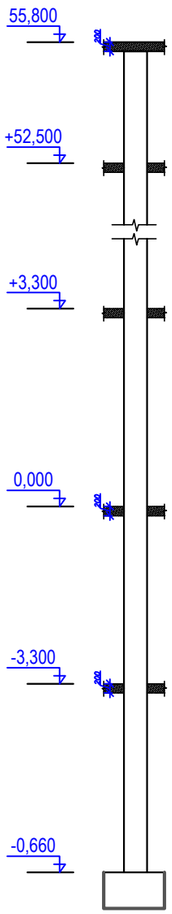
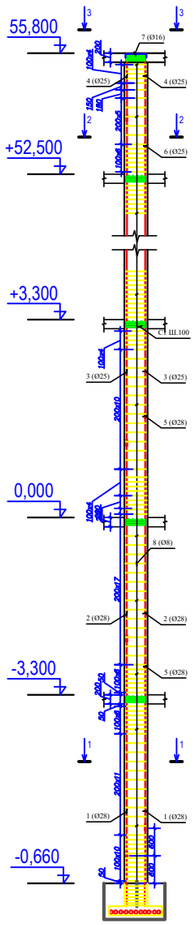
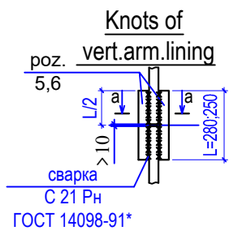
Formwork drawing of the column K1



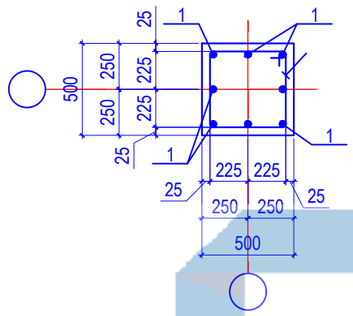
Reinforcement drawing of the K1 column



Knots of vert.arm.lining

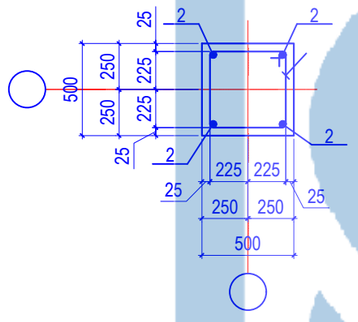


1 - 1



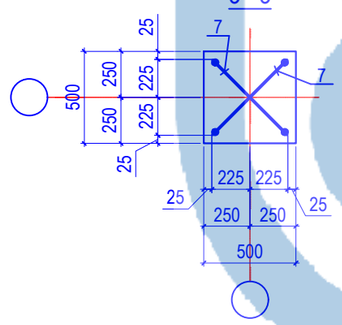
8
ш.100;180;200

2 - 2

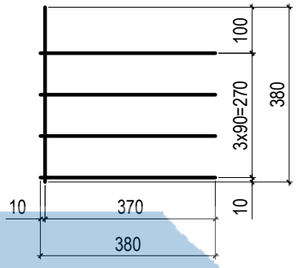


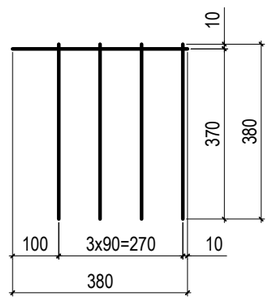
8
ш.100;180;200

3 - 3

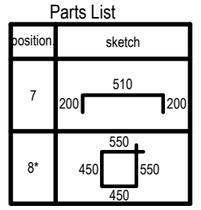


Grid C1





Parts List



Specification of reinforcing products for a monolithic column Km1 (kg.)

mark pos.	Designation	Name		Qty.	Weight units, kg	Note
		Детали				
1	ГОСТ 34028-2016	Ø28A500	L=4100	8	19.818	158,54
2	ГОСТ 34028-2016	Ø28A500	L=4850	8	23.443	187,544
3	ГОСТ 34028-2016	Ø25A500	L=62700	4	241.6	966.4
4	ГОСТ 34028-2016	Ø25A500	L=2630	4	10.1	40.4
5	ГОСТ 34028-2016	Ø28A500	L=280	8	1.4	11.2
6	ГОСТ 34028-2016	Ø25A500	L=250	80	1	80
7	ГОСТ 34028-2016	Ø16A500	L=910	2	1.4	2.8
8*	ГОСТ 34028-2016	Ø8A240	L=2000	452	0.789	356.63
		Grids				
C1		Grid C1	part.	22	1.5	33.0
		Materials				
		Concrete. B25 м3		19.4		
		Grid C1				
C1	ГОСТ 34028-2016	Ø8 A240	L=380	33	0.15	4.95

* see parts list

				KazNITU -5B072900 .29-03/2020 DP
				Dormitory with Sport complex in Almaty
name	Document №	Signature	date	
Head of Dep	Akmalayuli K.A.			Construction part
Superviser	Manizha Paktin			Level: DP; Sheet: 6; scale: 1:200
Consultant	Zhambakina.Z.M			
Controller	Kozyukova.N.V			Columns
Prepared by	S.M.Sadat			Department of Construction and Building Materials

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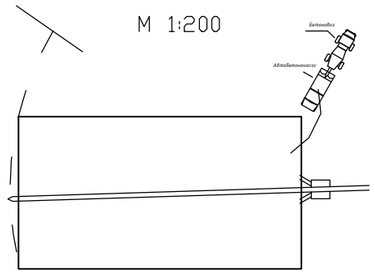
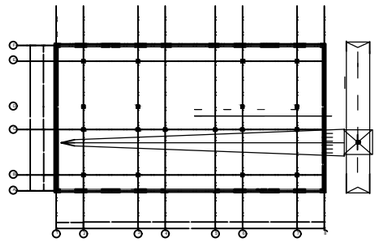
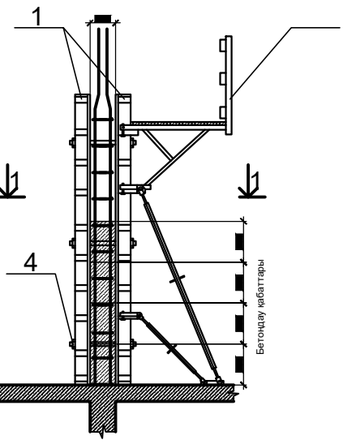
Схема стройки

М 1:200

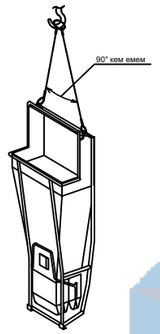




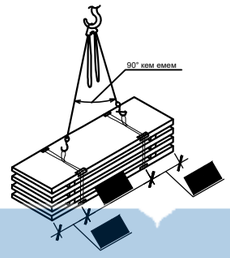


2–2 3–3

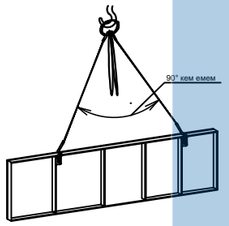
Hinging scheme of a rotary hopper



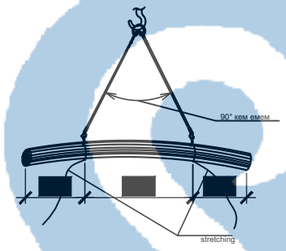
Scheme of looping the package



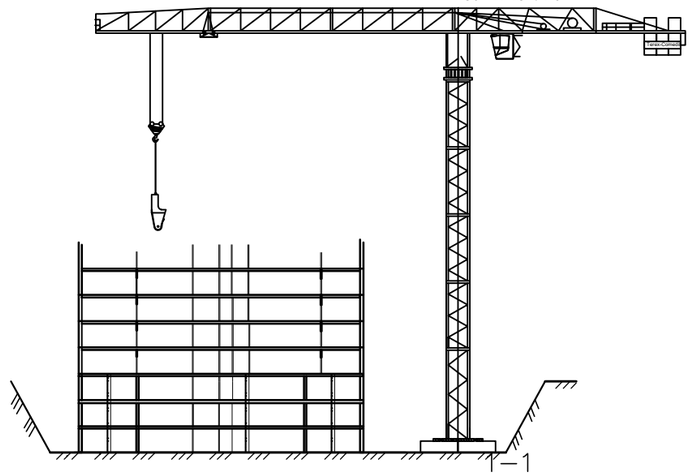
Hinging scheme of prefabricated molds



Reinforcement looping scheme



construction scheme COMEDILCT / B-8

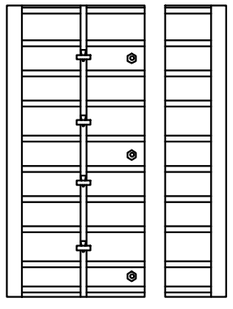


Schedule

№	Job title	work capcity unit	work capcity num	work capacity person per shift com	work capacity person per shift schedule	forms stream of executio	Joint composition link	Cars Mark	Cars number	Number of plans tait-ch	Per day number of shifts	Full-time work Full-time work	march 2020 1 2 3 4 5 6 7 8 9
1	Unloading of fittings with a crane	100 т	0.82	1.23 (0.63)	1.6 (0.8)	116.25	М 5р-1, Т 2р-2	СТТ/В-8	1	1	1	1.0	
	Unloading molds with a crane	100 т	0.42	0.63 (0.32)									
2	Transmission of reinforcing frames by crane	100 т	0.65	1.54 (0.76)	18.0 (3.00)	109.22	М 5р-1, Т 2р-2 Кр 5р-2, 4р-2	СТТ/В-8	1	3	2	1.5	
	Cranes and walls with a crane transfer of positions	100 т	0.12	0.2 (0.1)									
	Columns and wall reinforcement	1 каркас	50	1.95									
	Columns and walls setting positions	1 м2	57.54	15.07									
3	And FIG acceptance of wall formations	1 м3	59.03	0.83 (0.35)	11.00 (2.00)	113.36	М 5р-1, Б 2р-1 Кр 5р-2, 4р-2	СТТ/В-8	1	2	2	1.0	
	Forming of concrete mix	1 м3	59.03	11.64									
4	Concrete care	100 м2	39.02	4.2	4.0		Кр 2р-1				2	2.0	
5	Columns and walls disassembly of molds	1 м2	57.54	6.72	6.0	112.00	Кр 5р-2, 4р-2 М 5р-1, Т 2р-2	СТТ/В-8	1	1.5	2	1.0	
6	Transfer of ceilings to the ceiling with a crane	100 т	0.3	0.49 (0.24)	(4.00) 18.00	109.39	Кр 5р-2, 4р-2 М 5р-1, Т 2р-2	СТТ/В-8	1	4	2	2	
	Setting the ceilings	1 м2	68.33	19.2									
7	Provision of fittings for ceilings	100 т	0.17	0.4 (0.2)	18.00 (3.00)	109.46	М 5р-1, Т 2р-2 Кр 5р-2, 4р-2	СТТ/В-8	1	3	2	1.5	
	Installation and fastening of fittings	1 т	16.8	19.2									
8	Acceptance of concrete mix and ceilings Give the molds	1 м3	139.67	1.97 (0.84)	10.0 (2.0)	119.7	М 5р-1, Б 2р-1 Кр 5р-2, 4р-2	СТТ/В-8	1	2	2	1	
	Formwork of concrete mix ceilings to build	1 м3	139.67	10.00									
9	Concrete care	100 м2	5.98	0.12	4.0		Кр 2р-1				2	2.0	
10	Disassembly of ceilings	1 м2	698.33	9.62	3.0	112.29	Кр 5р-2, 4р-2				2	1.5	
			TOTAL:	102.17 (27.69)	94 (24.8)	108.4							

Diagram of the workers' movement

Inventory of molding elements

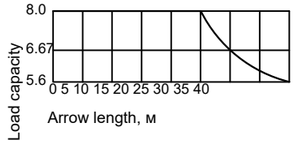


№	name	num
1	Formwork board 600x3000	4
2	Formwork board 450x3000	2
3	Disassemble the stand	2
4	Shkvoren	6
5	Wedge castle	8
6	Mattresses	1

Technical and economic indicators

№	Name of indicators	unit	num
1	Volume of concrete to be laid	м3	198.7
2	Duration of work	Shift	18
3	Labor intensity of work	Man-shift	94
4	Production per person-shift	m3 / person-shift	2.11
5	Salary per person-shift	tg / person-swi	1559.2

COMEDIL CTT/B-8 crane load characteristics



				KazNITU -5B072900 .29-03/2020 DP
				Dormitory with Sport complex in Almaty
name	Document №	Signature	date	
Head of Dep	Akmalayuli K.A.			Technology part
Superviser	Manizha Paktin			Level: DP; Sheet: 7; scale: 1:200
Consultant	Kashkinbaev.I			
Controller	Kozyukova.N.V			Technological map of Cranes
Prepared by	S.M.Sadat			Department of Construction and Building Materials

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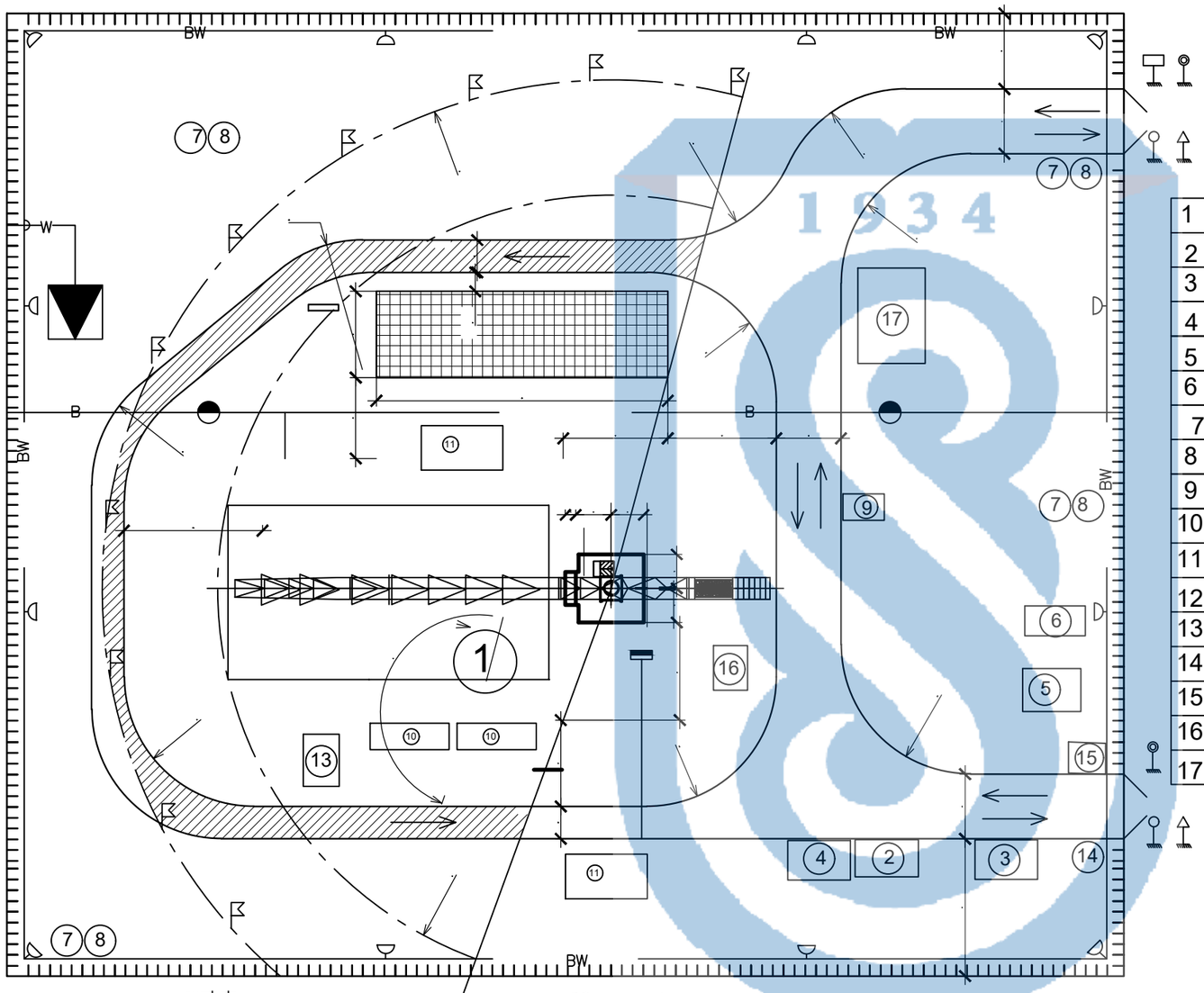
construction master plan



construction master plan explanation

1	dormitory	permanent
2	foreman contra	temoporary
3	10 people house	temoporary
4	10 wardrobe	temoporary
5	bathroom	temoporary
6	kitchen	temoporary
7	toilets E	temoporary
8	toilets	temoporary
9	resentments container	temoporary
10	open warehouse	temoporary
11	closed cremia	temoporary
12	down loads flame	temoporary
13	derep	temoporary
14	object power	temoporary
15	guard	temoporary
16	fire fighting	temoporary
17	mechanical room	temoporary

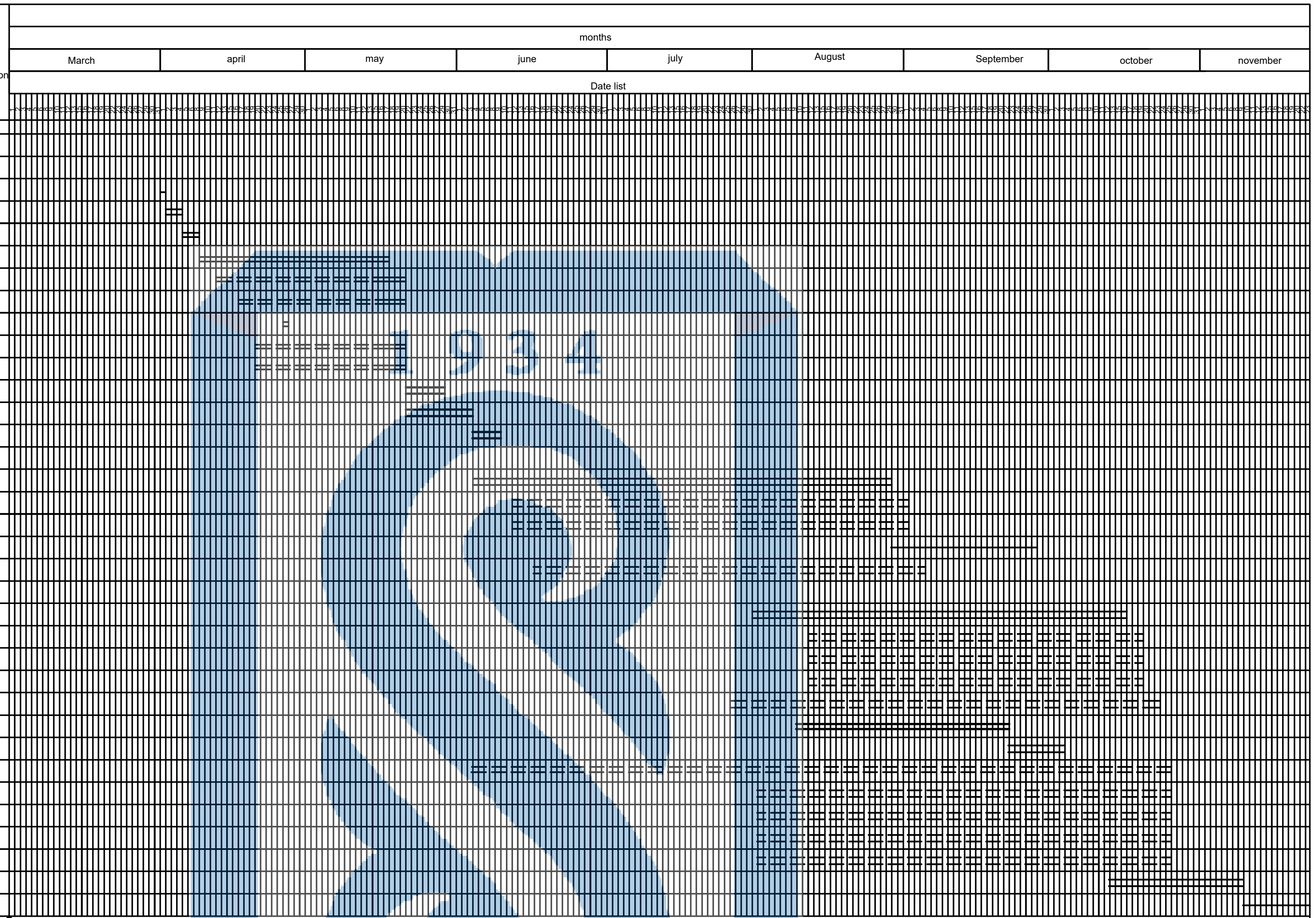
symbols

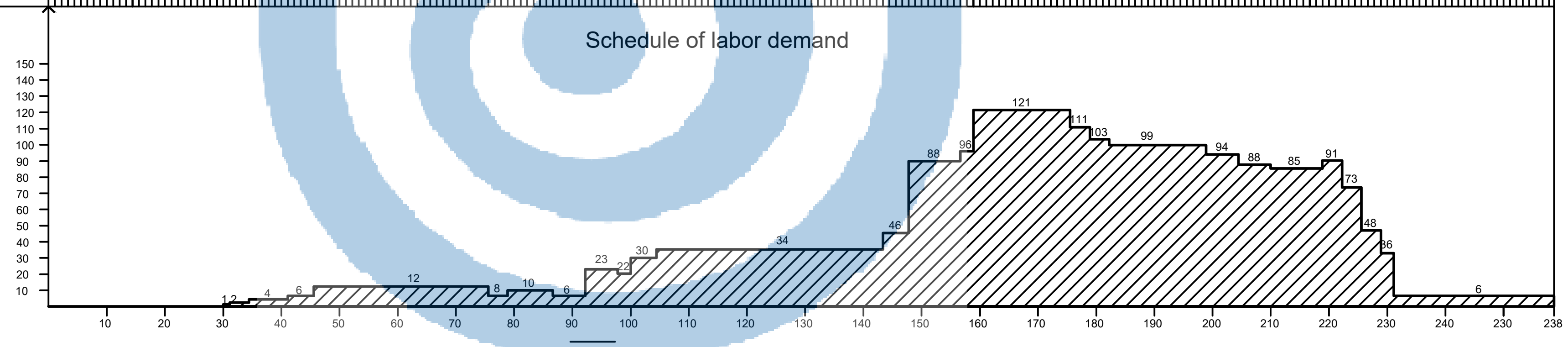
- object passing
- prohibition of unauthorized people
- speed limiting signs
- parking sign
- road danger zone
- external storage
- BW — temporary electrical system
- W — DC power system
- B — transformer
- disturbution paddle
- fire hydrant
- light bulb
- fire protection
- crane working danger areas
- protecion)

				KazNITU -5B072900 .29-03/2020 DP
				Dormitory with Sport complex in Almaty
name	Document №	Signature	date	
Head of Dep	Akmalayuli K.A.			Technology part
Superviser	Manizha Paktin			Level: DP; Sheet: 8; scale: 1:200
Consultant	Kashkinbaev.I			
Controller	Kozyukova.N.V			Construction master plan
Prepared by	S.M.Sadat			Department of Construction and Building Materials

Schedule of production work

№ п/п	Job title	Scope of work: unit.	Scope of work: number	Еңбек шығыны Адам.ауысым	Necessary car: Name	Necessary car: Number	Duration of work day	shift amount	working shift amount	Brigade composition
1	2	3	4	5	6	7	8	9	10	11
1	Preparatory work						30			
2	The structure of the underground part									
2.1	Cutting the vegetative layer	1000м^3	0,3	0,5	ДЗ-25	0,5	1	1	1	маш 6р
2.2	Soil preparation with an excavator	100м^3	2,29	5,5	Э10011А камаз 5814V	5,5	3	2	2	маш 6р маш 6р
2.3	Manual preparation of the bottom	100м^3	3,4	23,1			3	2	4	землекоп 3р
2.4	Drilling rig	м^3	364	271,6	камазМБУ-20 камаз 5814V СКГ-40А	115	34	2	4	маш 6р-1 пом 4р-1 3р-1 кран 6р мон 4р-1 3р-1
2.5	Concrete preparation device	100м^3	0,2	3,3	камазМБУ-20 камаз 5814V СКГ-40А	4	4	2	2	бетонщик 4р-1 3р-1
2.6	Monolithic rover device	100м^3	1,5	107,3	СКГ-40А миксер камаз 5814V	42	7	2	8	машинист 6р-1 сварщик 4р-1 бл-ик 4р13р12р1 бет-ик4р-13р-1 ар-ик4р-1 2р-1
2.7	Monolithic foundation device	100м^3	0,23	6,3	СКГ-40А миксер камаз 5814V	1	1	2	8	машинист 6р-1 сварщик 4р-1 бл-ик 4р13р12р1 бет-ик4р-13р-1 ар-ик4р-1 2р-1
2.8	Device of monolithic walls	100м^3	0,75	98,6	СКГ-40А миксер камаз 5814V	57	6	2	8	машинист 6р-1 сварщик 4р-1 бл-ик 4р13р12р1 бет-ик4р-13р-1 ар-ик4р-1 2р-1
2.9	Device of monolithic columns	100м^3	0,24	47	СКГ-40А миксер камаз 5814V	43	3	2	8	машинист 6р-1 сварщик 4р-1 бл-ик 4р13р12р1 бет-ик4р-13р-1 ар-ик4р-1 2р-1
2.10	Waterproofing foundations	100м^2	1,97	5,2			1	2	4	изолировщик 3р-1 2р-1
2.11	The structure of external networks	100м^2	1,97	144	Э10011А		12	2	6	машинист 6р-1 слесарь-сант 4р-1
2.12	Close the cavity	1000м^3	2	8,4	ДЗ-25	8,4	5	2	1	маш 6р-1
3	The device of the ground part									
3.1	Construction of monolithic structures	100м^3	18,2	2390,1	КБ-408.21 миксер камаз5814V	53,9	75	2	16	машинист 6р-1 сварщик 4р-1 бет-ик4р-13р-1 ар-ик 4р-12р-1
3.2	Exterior walls, balconies	м^3	696,7	470,3	КБ-408.21 миксер камаз5814V	34,8	30	2	8	машинист 6р-1 каменьщик 3р
3.3	Laying partitions	100м^2	22,3	281	КБ-408.21 миксер камаз5814V	4	17	2	8	машинист 6р-1 каменьщик 3р
3.4	Construction of the roof	100м^2	64,4	156	КБ-408.21	1	26	1	6	кровельщик 2р 3р-2 4р-2 5р-1 машинист 6р-1
3.5	Filling the gaps	100м^2	11,6	200,6	КБ-408.21	8,8	25	2	4	машинист 6р-1 плотник 4р-1 3р-1
4	Finishing work									
4.1	Plastering works	100м^2	289,9	2390,4	КБ-408.21	117,2	67	2	18	машинист 6р-1 штукатур 4р-2 3р-2 2р-1 5р-1
4.2	Painting works	100м^2	42,8	258,4			21	2	6	маляр 5р-1 4р-1 3р-1
4.3	General works	м^2	108,7	729			41	2	9	маляр 5р-1 4р-1 3р-1
4.4	Wall cladding	100м^2	10,1	307,4			16	2	10	плиточник 4р-1 3р-1
4.5	Floor structure	100м^2	55,1	684,9	КБ-408.21	9,5	29	2	12	плит-к пар-ик 4р-1 3р-1 бетонщик 4р-1 3р-1
5	Facade finishing	100м^2	29,4	593			38	2	8	монтажник 4р-1 3р-1
6	Installation of elevators		0	60,22	КБ-408.21	1	10	2	3	монтажник 5р-1 4р-1 3р-1
7	Other works	%	10	271	КБ-408.21		23	2	6	разно-раб-1
8	Plumbing works	%	8	217			18	2	6	слесарь-сант 4р-1
9	Ventilation	%	5	135,8			11	2	6	монтажник 4р-1 3р-1
10	Electrical installation work	%	5	135,8			11	2	6	электрик 4р-1
11	Weak power lines	%	5	135,8			11	2	6	электрик 4р-1
12	Landscaping	%	5	135,8			11	2	6	бпигада по благоустр
13	Handing over the object									





TEP

N п/п	NAME	Unity изм.	Number
1	Total labor intensity	pers per day	8120
2	Duration of construction	month	8,9
3	Norms. duration of construction	month	15
4	Uneven workforce coefficient of movement	---	0,28

KazNITU -5B072900 .29-03/2020 DP				
Dormitory with Sport complex in Almaty				
name	Document №	Signature	date	
Head of Dep	Akmalayuli K.A.			
Superviser	Manizha Paktin			
Consultant	Kashkinbaev.I			
Controller	Kozyukova.N.V			
Prepared by	S.M.Sadat			

Technology part	Level	Sheet	scale
	DP	9	1:200
Calendar plan	Department of Construction and Building Materials		

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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: Садат Саид Музамиль

Название: Dormitory with a sports complex in Almaty

Координатор: Манижа Пактин

Коэффициент подобия 1:2,7

Коэффициент подобия 2:0,5

Замена букв:51

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

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: Садат Саид Музамиль

Название: Dormitory with a sports complex in Almaty

Координатор:Манижа Пактин

Коэффициент подобия 1:2,7

Коэффициент подобия 2:0,5

Замена букв:51

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*

МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ РЕСПУБЛИКИ КАЗАХСТАН
СӘТБАЕВ УНИВЕРСИТЕТІ

RESPONSE

OF THE SUPERVISOR
For the graduation project
Sadat Said Muzamel 5B072900-civil Engineering

Topic: “Dormitory with sport complex in Almaty 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. Sadat Said Muzamel 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 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,