

# WORKING PROJECT

Album  
KM (Steel Structures)  
Project:

Almaty, 2024

Inv. No. / Signature	Signature and Date	Replaces Inv. No.

Inv. No. / Signature	Signature and Date	Replaces Inv. No.	Agreed:			
			Architect		Ch. Spec. VK	
			Constructor		Ch. Spec. SS	
			Ch. Spec. OB		Ch. Spec. EL	

### Explanatory Note

## General Provisions

## 1. Primary Data

- 1.1. The working drawings of reinforced concrete structures are developed based on technical documentation specified in the general notes of the architectural drawings (AR series).
- 1.2. The reference elevation 0.000 corresponds to the finished floor level of the first floor, which matches the absolute elevation of 718.85 indicated on the master plan.
- 1.3. Site conditions:
  - Climatic zone: IIIB
  - Standard snow load for Snow Region II: 120 kg/m<sup>2</sup>
  - Standard wind pressure for Wind Region II: 39 kg/m<sup>2</sup>
  - Design temperature: -25 °C
  - Seismic intensity: 9 points (confirmed site-specific value: 9 points)
  - Soil seismic classification: Category II
- 1.4. Building importance class: II (second)
- 1.5. Operational conditions: heated interior
- 1.6. Engineering and geological conditions of the construction site are provided in sheet KZh-2-4
- 1.7. Fire resistance rating of the building: Class II (per SP RK 2.02-101-2014)
  - Functional fire hazard class: F 3.1
  - Structural fire hazard class: C1
  - Fire hazard class of building materials: KO
- 1.8. Load safety factors γ<sub>f</sub>:
  - For self-weight of structural elements – 1.05

## 2. Project Characteristics

2.1. Design decisions are made in accordance with the following standards and regulations:

- SP RK 2.03-30-2017\* "Construction in Seismic Zones"
- SP RK EN 1990:2002+A1:2005/2011 "Basis of Structural Design"
- SP RK EN 1991-1-1:2002/2011 "Actions on Structures – Part 1-1: Self-weight, Permanent and Imposed Loads on Buildings"
- SP RK EN 1991-1-3:2003/2011 "Actions on Structures – Part 1-3: General Actions – Snow Loads"
- SP RK EN 1992-1-1:2004/2011 "Design of Concrete Structures – Part 1-1: General Rules and Rules for Buildings"
- SP RK EN 1993-1-1:2005/2011 "Design of Steel Structures – Part 1-1: General Rules and Rules for Buildings" (with amendments as of 30.12.2021)
- SN RK 2.01-01-2013 "Protection of Structures from Corrosion"
- SN RK 5.01-102-2013 "Foundations of Buildings and Structures"

## 2.2. Materials

Foundations: cast-in-place concrete, strength class C20/25 (B25)  
 Frame and slabs: cast-in-place concrete, strength class C20/25 (B25)  
 Reinforcement:  
     Longitudinal – A400C (GOST 34028-2016)  
     Transverse – A240 (GOST 34028-2016)

### 3. Structural Solutions

3.1. The canopy is attached to an existing reinforced concrete building.  
The building plan is rectangular, dimensions: 10.1 × 3.08 m  
The structural system is a steel frame  
Exterior wals: sandwich panels and aluminum curtain wall systems  
Foundation: monolithic concrete (socket-type footing)  
Steel frame: welded and hot-rolled profiles  
Concrete elements: class C20/25 (B25) with A240 and A400C reinforcement per GOST 34028-2016  
Steel elements: steel grade C245

#### 4. Element Connections

- 4.1. All shop connections – welded; assembly connections – bolted and welded.  
Beam-to-column connections – welded.  
Corrugated sheets are fixed to purlins using self-tapping screws.
- 4.2. Bolted assembly joints:  
Bolts of accuracy class B (normal accuracy) are used.
- 4.3. Fabrication and installation of bolted connections must comply with SNiP RK 5.04-18-2002 and this specification.
- 4.4. Fasteners:  
Bolts: GOST 7798-70\*, coarse thread, tolerance field 6g, strength class 5.8 (GOST 1759.4-78)  
Nuts: GOST 5915-70, tolerance field 6H (GOST 1759.5-78)  
Washers: GOST 11371-78\*  
Spring washers: GOST 6402-70\*
- 4.5. Use of fasteners without marking or certification, including second-grade or automatic steel fasteners, is prohibited.
- 4.6. During assembly, bolt threads must not enter the hole deeper than half the thickness of the connected element adjacent to the nut.  
In single-shear joints, bolt heads should face the thinner element; in double-shear joints the thinner splice plate.

"The technical solutions adopted in the working drawings comply with the environmental, sanitary, hygienic, fire safety, and other applicable construction codes and regulations, as well as state standards in force in the Republic of Kazakhstan, and ensure the safe use of the facility for human life and health, provided that the measures outlined in the working project are followed."

Chief Project Engineer \_\_\_\_\_

#### 4.7. Fastener Details

Nuts on permanent bolts must be secured against self-loosening using spring washers or lock nuts. In bolted joints subjected to tensile forces, the use of spring washers is not permitted.

After assembly, joints must be cleaned, filled, and primed according to clause 4.34 of SNiP 3.03.01-87.

## 5. Welding of Steel Structures

Steel structures shall be welded using electrodes of type E42A for manual arc welding in accordance with GOST 9467-75\*.

Weld seams must comply with the requirements of SNiP RK 5.04-23-2002.

All box-section elements shall be sealed at their ends with end plates welded continuously.

Any openings in such elements must be sealed with continuous welds to prevent water ingress.

## 6. Anti-Seismic Measures

Seismic protection measures are provided in accordance with SN RK 2.03-30-2017 "Construction in Seismic Zones of the Republic of Kazakhstan".

The spatial and structural design ensures symmetry and regular mass/stiffness distribution in both plan and elevation, as per SN RK 2.03-30-2017.

Structural analysis was performed using the "LIRA-SAPR 2021" software package based on the finite element method.

Load-bearing structures were analyzed for basic and special load combinations, with seismic forces considered as special loads. These were applied in accordance with SN RK 2.03-30-2017.

## 7. Anti-Corrosion and Fire Protection Measures

Corrosion protection is provided in accordance with SN RK 2.01-01-2013 "Protection of Building Structures from Corrosion".

All steel load-bearing structures must be painted with PF-115 enamel in two coats over GF-21 primer.

Total coating thickness must be no less than 50 microns.

Before applying the coating, surfaces must be cleaned of mill scale, rust, and slag.

Surface preparation must meet degree 3 per GOST 9.402-2004.

Paintwork quality must correspond to Class VII as per GOST 9.032-74.

For repair and maintenance facilities, non-combustible walls, partitions, and roof elements with fire resistance rating R<sub>EI</sub> 120 must be used; beams and purlins – R15.

## 8. Fire-Resistant Coating

After installation, all steel structures shall be coated twice with the fire-retardant paint Pentafos-KhS.

## 9. Applicable Regulatory Documents

Construction and installation works shall comply with the following documents:

- SN RK 2.01-01-2013 "Protection of Building Structures from Corrosion"
- SNIP RK 1.03-05-2001 "Occupational Safety and Health in Construction"
- SNIP 3.01.04-87 "Commissioning of Completed Construction Projects"
- SNIP RK 5.04-18-2002 "Steel Structures. Rules for Production and Acceptance"
- SNIP RK 1.03-06-2002 "Construction Management. Organization of Construction of Enterprises, Buildings, and Facilities"
- SN RK EN 1993-1-1:2005/2011 "Design of Steel Structures"

## 10. List of Works Requiring Inspection Certificates

- Welded joints of beams, columns, braces, and purlins
- Installation and alignment of columns
- Installation and alignment of main beams
- Installation and alignment of purlins, braces, and struts
- Corrosion protection of welded joints
- Application of corrosion protection: cleaning, priming, each coating layer, and final inspection of protected elements

## 11. Fastening of Structural Elements

Design loads are provided in tf (metric tons) and tf-m.  
Structural elements must resist combined action of M (moment), N (axial force), and Q (shear) as per the schedules.  
Welds for support plates must be designed with a safety factor  $K = 1.5$  and service factor  $m = 0.65$ .  
All weld joints shall be detailed in the KMD drawings based on the applied design loads.

## 12. Guidelines for KMD & PPR Drawings, Fabrication and Installation

The following works must be certified as hidden works:

- Fixing of column base plates
- Assembly of concealed beam-to-column connections
- Nondestructive testing of welds
- Cleaning, priming, and application of corrosion protection
- Assembly and connection of structural frame elements hidden by enclosing structures (e.g. ceiling frames)
- Welding of slabs or similar work where composite action between structural and enclosing elements is considered

List	Title / Name	Note
1	General Data	
2	Technical Specification of Steel	
3	Structural Nodes 1...6	

## List of Referenced and Attached Documents

Designation	Title / Name	Note
SN RK 2.03-30-2017*	"Construction in Seismic Zones"	
SN RK EN 1990:2002+A1:2005/2011	"Basis of Structural Design"	
ST RK EN 10279-2016	Hot-Rolled Steel Channels	
SN RK EN 1991-1-1:2002/2011	"Actions on Structures. Part 1-1: Self-Weight, Permanent and Imposed Loads on Buildings"	
SN RK EN 1991-1-3:2003/2011	"Actions on Structures. Part 1-3: General Actions – Snow Loads"	
SN RK 5.01-102-2013	"Foundations of Buildings and Structures"	
SN RK EN 1992-1-1:2004/2011	"Design of Concrete Structures. Part 1-1: General Rules and Rules for Buildings"	
SN RK 2.01-01-2013	"Protection of Building Structures from Corrosion"	
SNiP RK 1.03-05-2001	"Occupational Health and Safety in Construction"	
SNiP RK 1.03-06-2002	"Construction Process. Organization of Construction of Enterprises, Buildings, and Structures"	

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Profile Type (GOST, TU)	Steel Grade and GOST	Designation and Profile Size	N n.n.	Steel Weight by Structural Elements, t						Total Weight, t
				Columns	Beams Girders	Braces Struts	Purlins	Gable	Sandwich Panel Gates	
I-Beam with Parallel Flange Faces, Type (B), Standard I-Beam ST RK EN 10034-2012	C245  GOST 27772-2015	┐ 20Б1	1		0,54		0.787			
			2							
			3							
	Grand total:		4		0,54		0.787			
Total Profile Quantity			5		0,54		0.787			1.321
I-Beam with Parallel Flange Faces, Type (K), Standard I-Beam ST RK EN 10034-2012	C245  GOST 27772-2015	┐ 20K1	6							
		┐ 30K1	7							
			8							
	Grand total:		9							
Total Profile Quantity			10							
U-Channel with Parallel Flange Faces, ST RK EN 10279-2016	C245  GOST 27772-2015	┐ 18П	11							
			12							
			13							
	Grand total:		14							
Total Profile Quantity			15							
Square Steel Tube according to GOST 30245-94	C245  GOST 27772-2015	□ 80x80x4	16					0,53		
		□ 200x200x5	17	0.32						
			18							
			19							
	Grand total:		20	0.32				0,53		
Total Profile Quantity			21	0.32				0,53		0,85
Equal Angle Bars ST RK EN 10056-1-2012	C245  GOST 27772-2015	└ 50x50x5	22			0,128				
		└ 110x110x7	23							
			24							
	Grand total:		25			0,128				
Total Profile Quantity			26			0,128				0,128
Hot-Rolled Steel Plate ST RK EN 10025-1-2015	C245  GOST 27772-2015	— t=6	27		0,04	0,025	0,025			
		— t=8	28	0,025	0,05		0,025			
		— t=10	29							
		— t=12	30							
		— t=14	31							
		— t=16	32							
		— t=20	33	0,17						
		— t=24	34							
		— t=30	35							
	Grand total:		36	0,195	0,09	0,025	0,05			
Total Profile Quantity			37	0,195	0,09	0,025	0,05			0,36
Total Weight, Steel Grade C245			38	0,515	0,63	0,153	0,837	0,53		2,665

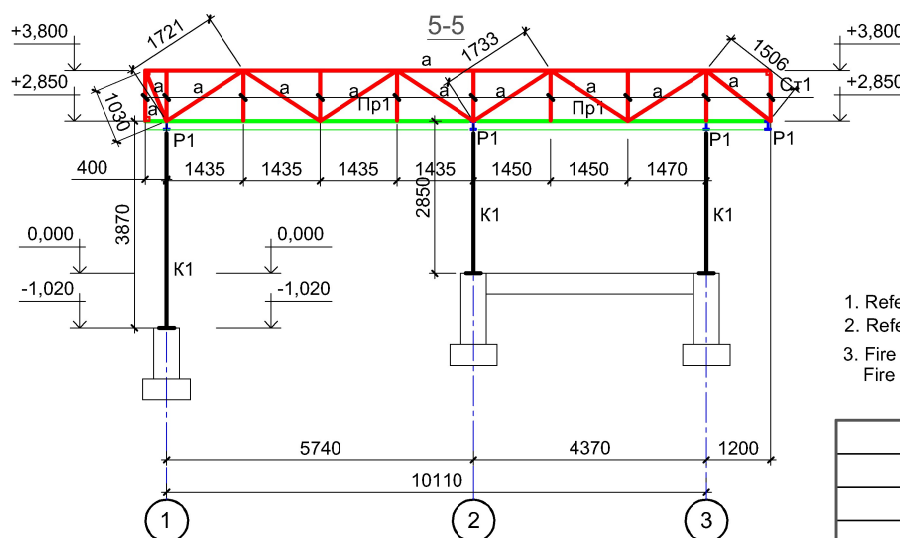
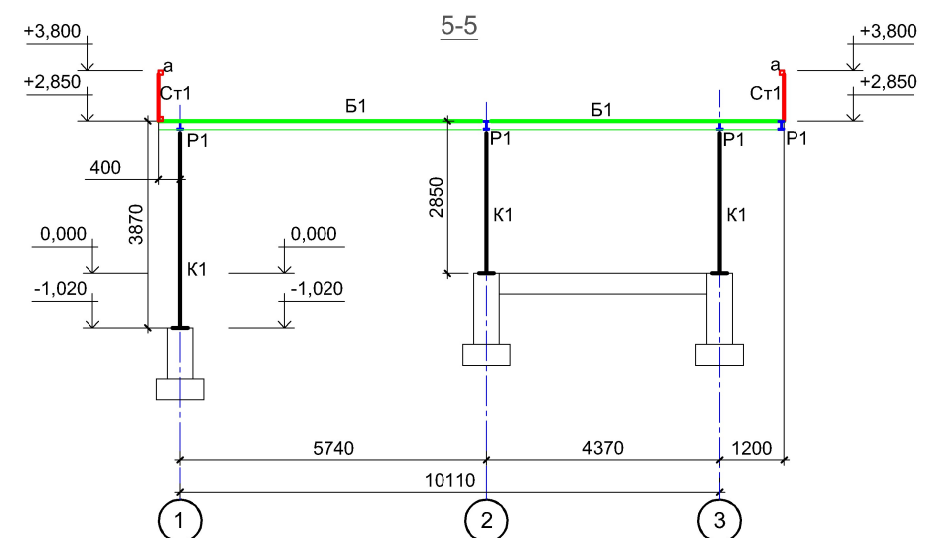
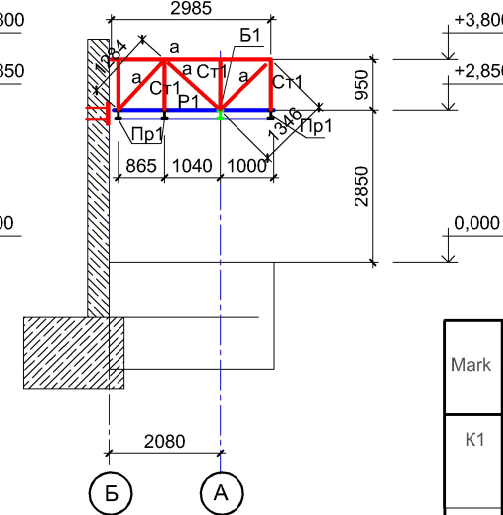
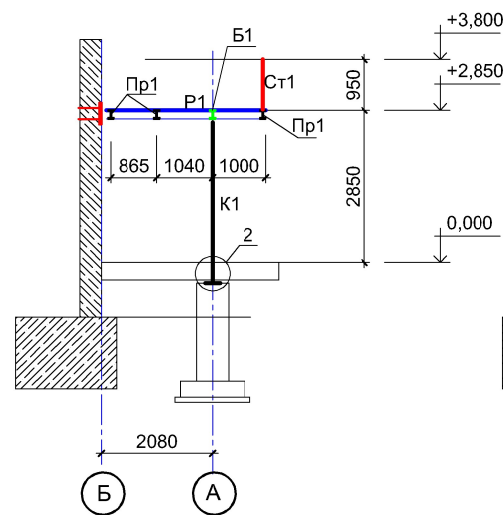
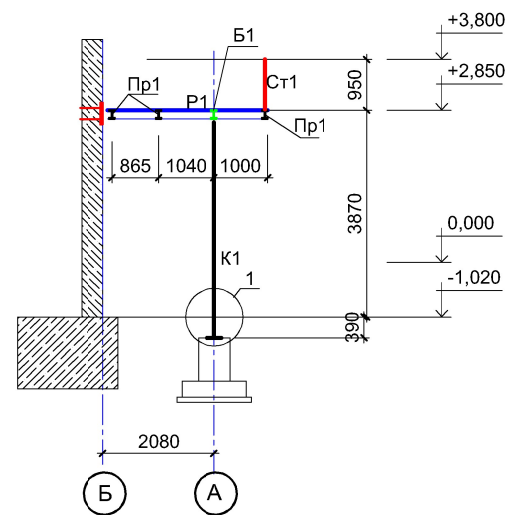
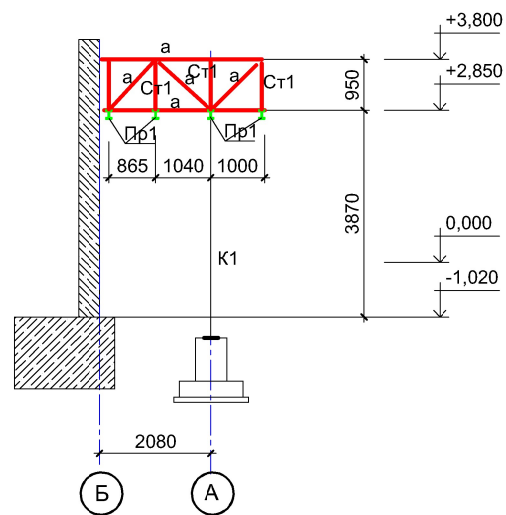
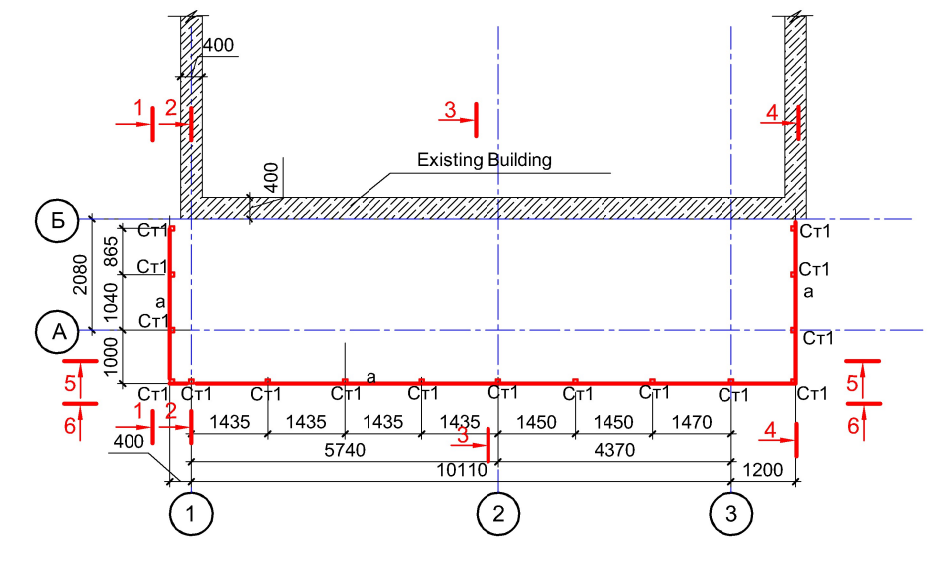
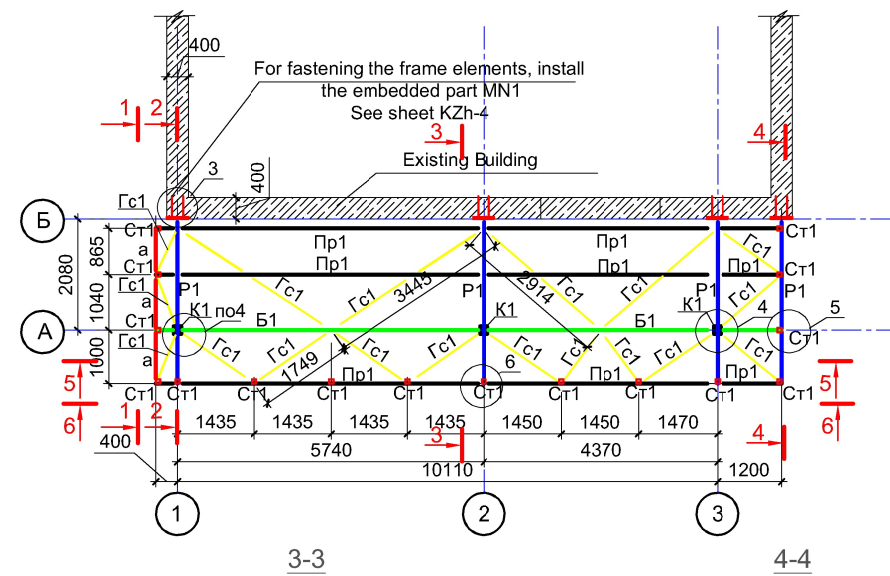
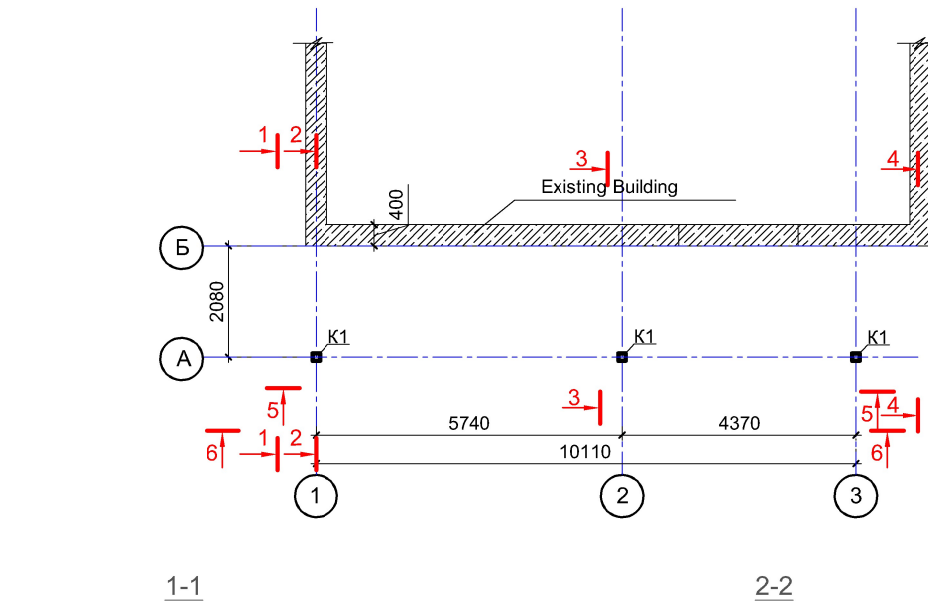
1. For Welding 1% - 2.665 × 0.01 = 0.027 tons
2. Mass Adjustment for KMD Development 3% - 2.665 × 0.03 = 0.08 tons
3. For Waste 3.7% - 2.665 × 0.037 = 0.098 tons

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Frame Elements Layout at Elevation -1.020

Frame Elements Layout at Elevation +2.850

Frame Elements Layout at Elevation +3.800



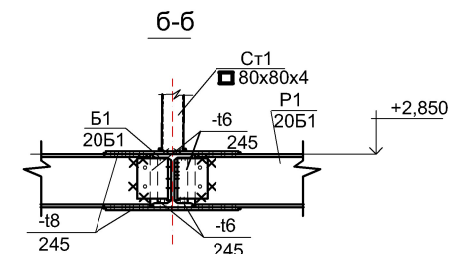
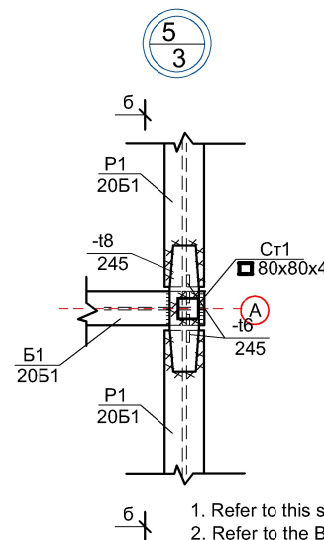
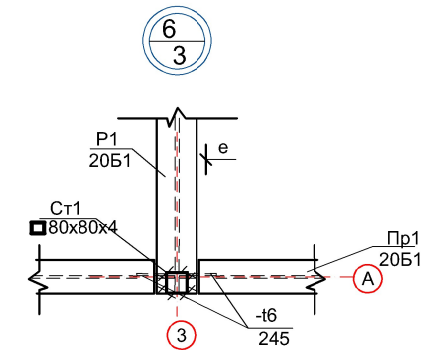
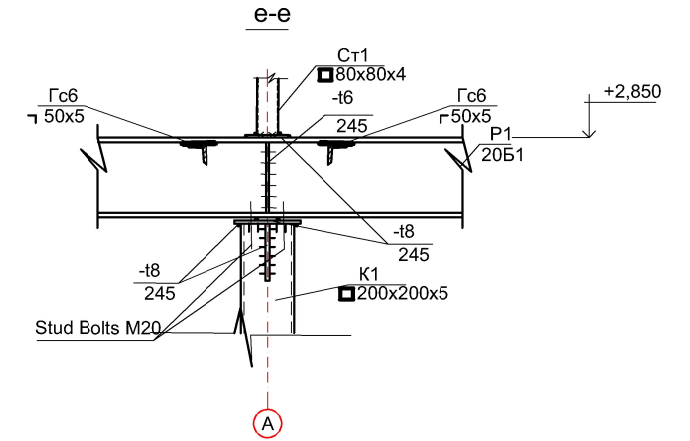
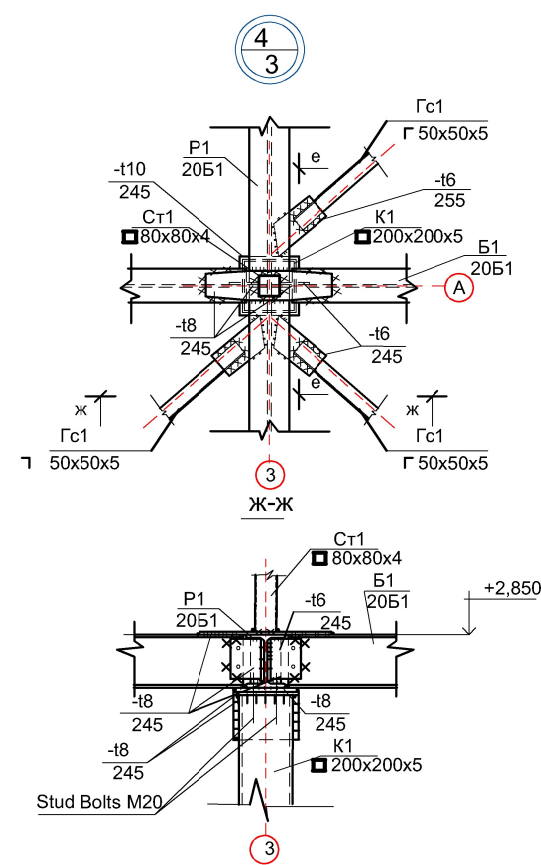
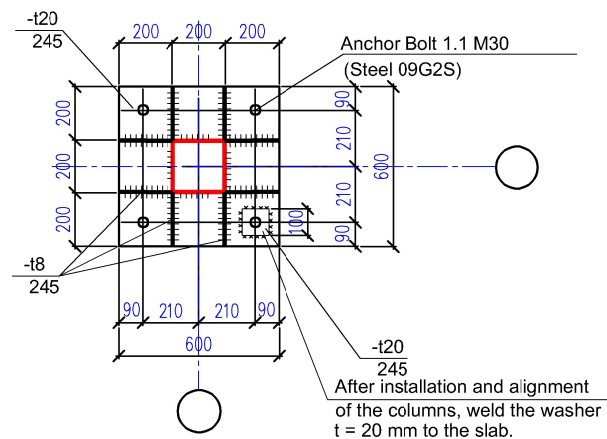
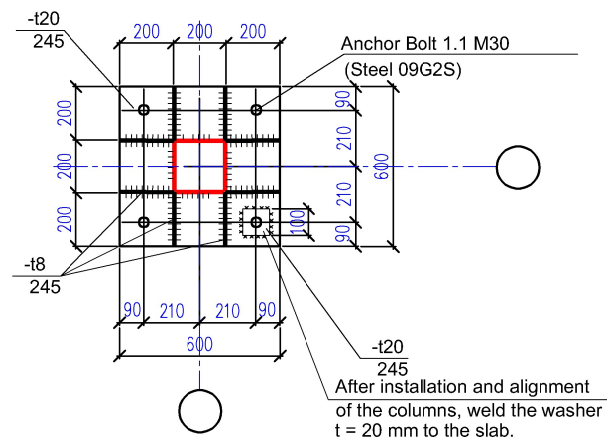
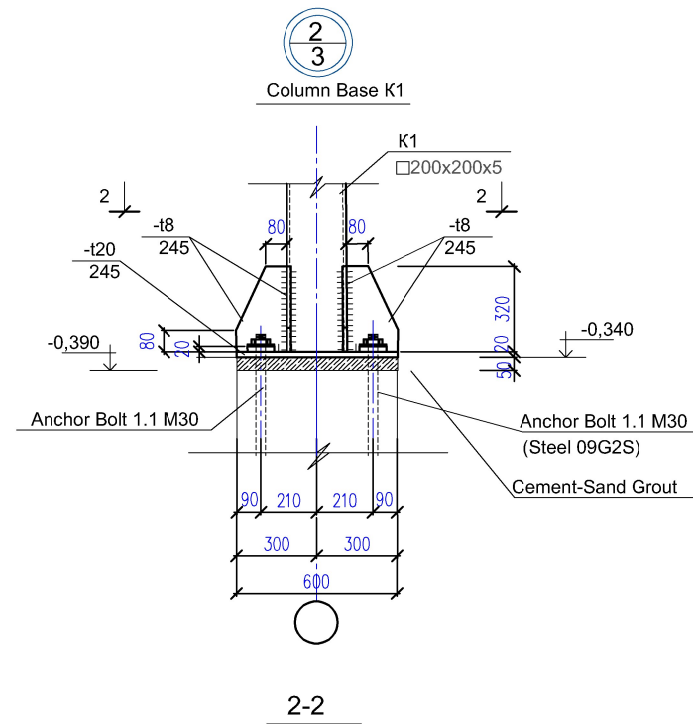
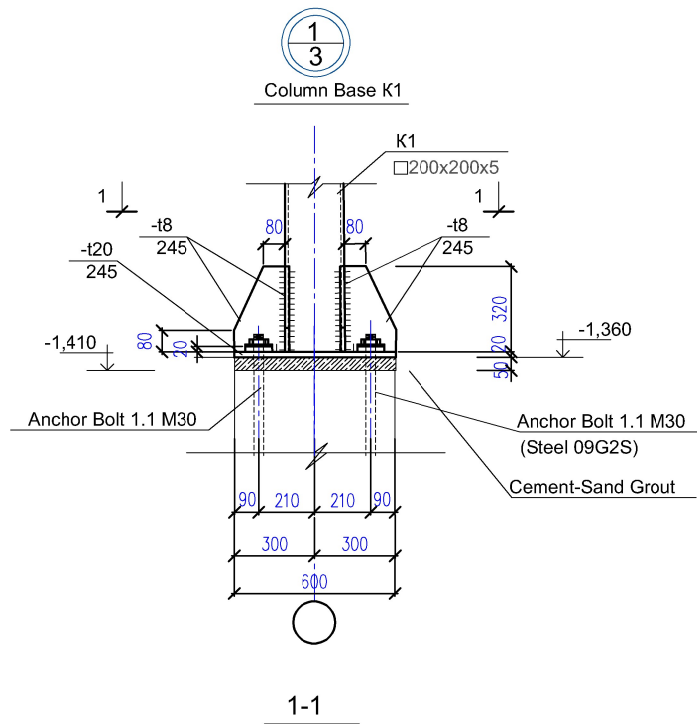
Bill of Elements									
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	Sketch	Pos.	Composition	N <sub>T</sub>	M <sub>T*M</sub>	Q <sub>T</sub>			
K1		1	□ 200x200x5	min -7.0 max -43.0	4.00	2.0		C245	
		2						C245	
P1		3	┐ 2051		8.0	15.0		C245	
		4						C245	
B1		5	┐ 2051		6.0	6.0		C245	
		6						C245	
Пр1		7	┐ 2051		6.0	6.0		C245	
Гс1		8	┐ 50x50x5	10.0				C245	
Ст1			□ 80x4	10.0				C245	
a			□ 80x4	10.0				C245	

1. Refer to this sheet along with sheets KM 4.
2. Refer to the Bill of Elements on sheet KM 3.
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Fire Resistance Rating for Roof Beams, Purlins, and Braces - R15.

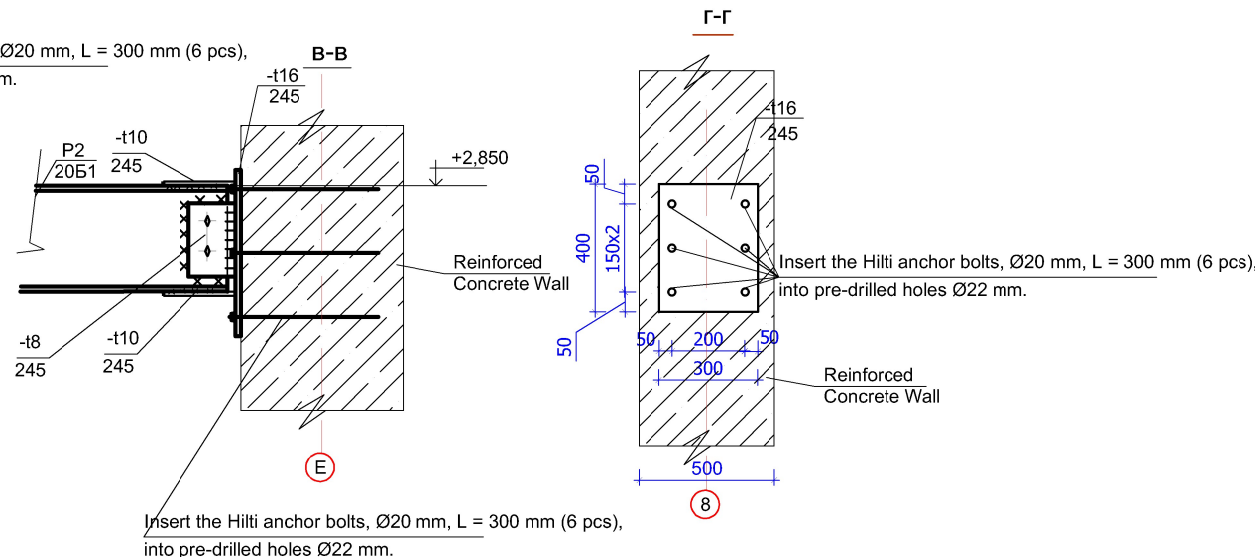
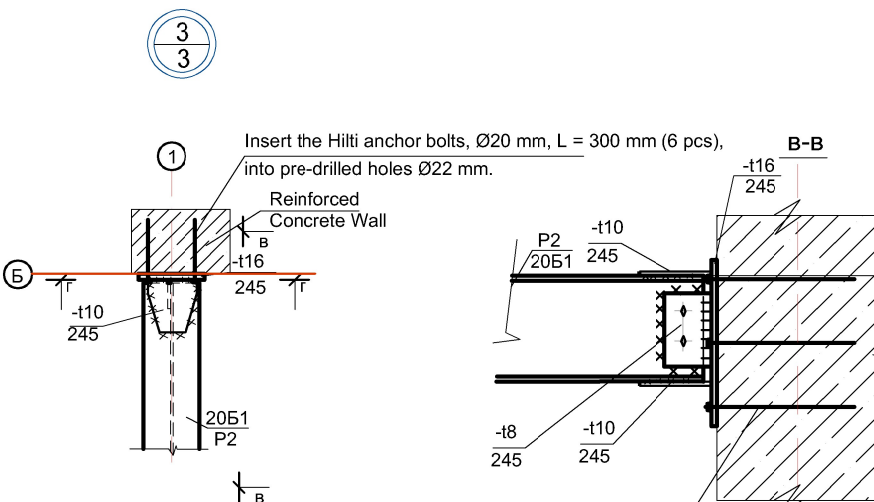
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