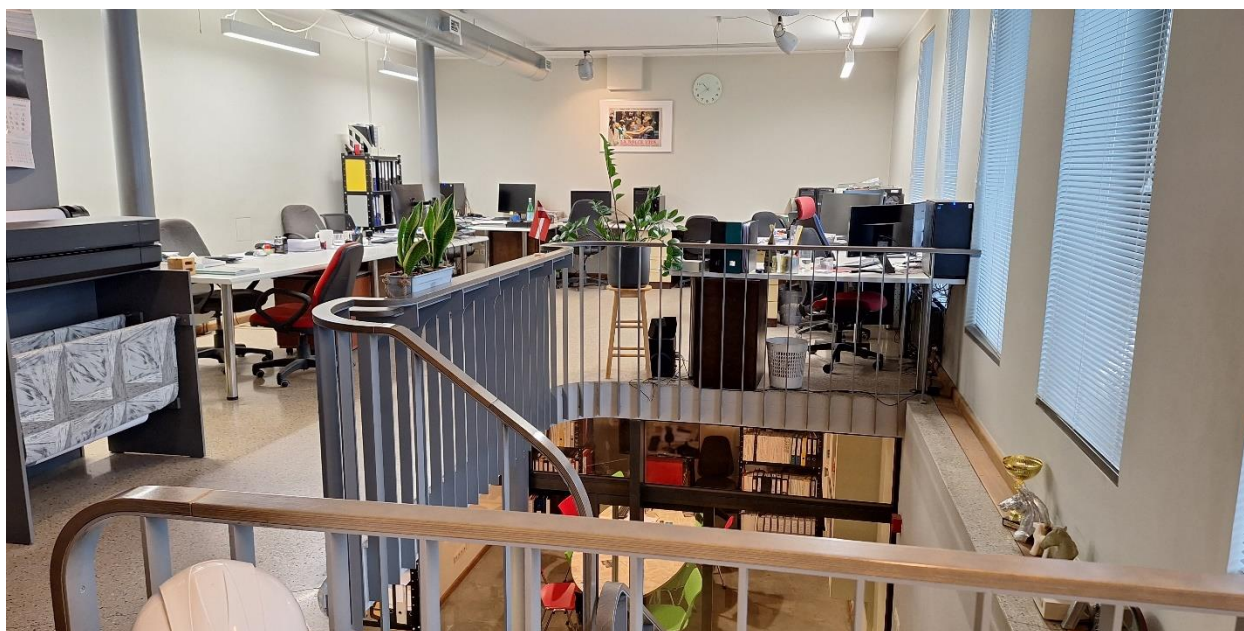


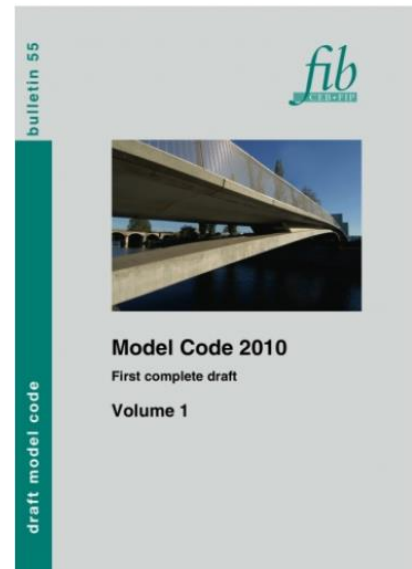
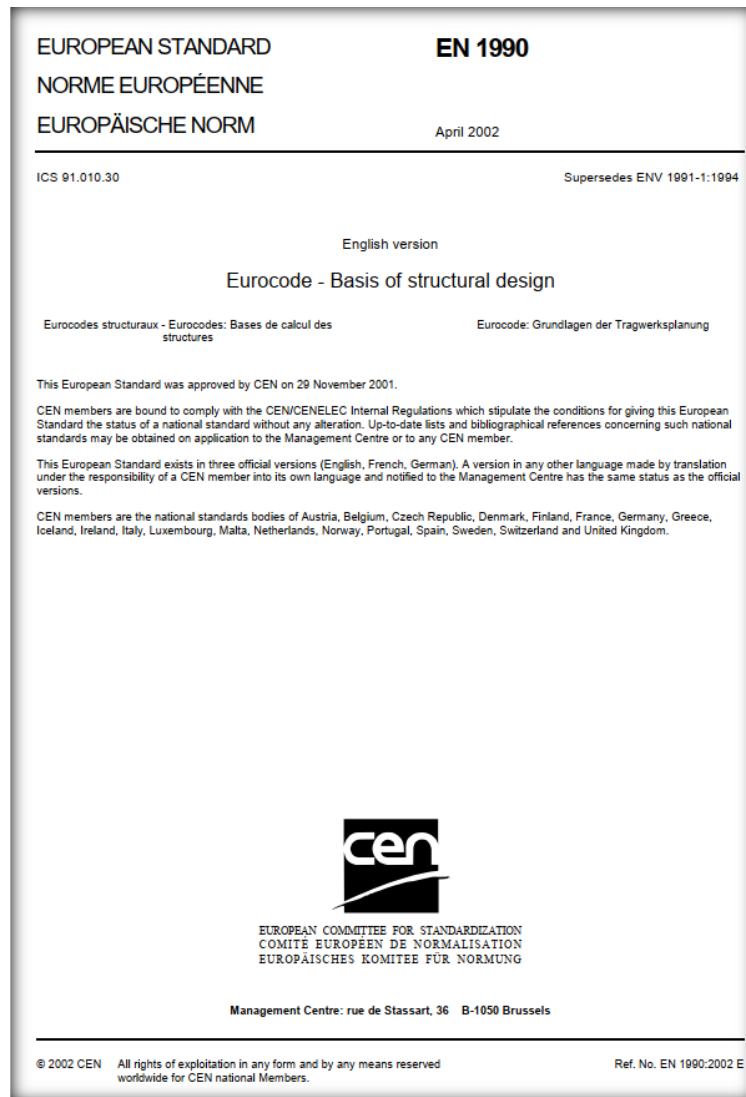
We are a team of civil engineers specializing in the design of building structures and providing related consultations. We specialize in the preparation of full-cycle structural solutions, starting from sketch solutions and ending with working drawings for construction design and supervision during construction.

"IG Kurbads" engineers group was founded in 2000 and since has successfully realized structural solutions for many complex projects in Latvia and worldwide.

Our team has the potential to solve most complex structural challenges, which is confirmed by the work we have done, as well as the qualifications of our team. The team is led by Doctor of Engineering Normunds Tirāns, includes four engineers with Master's of Engineering degree, and four engineers who are certified to take responsibility for structural solutions in Latvia. More information at our webpage – www.ig-kurbads.lv.



Calculations and design is carried out in accordance with the requirements of Eurocodes, considering both local requirements and the best practices that are known to us.



(2) The general assumptions of EN 1990 are :

- the choice of the structural system and the design of the structure is made by appropriately qualified and experienced personnel;
- execution is carried out by personnel having the appropriate skill and experience;

We offer design according to the stages defined in EN 16310: 2013, the explanation of the stages is given below.

#) Initial consultations / assessment of initial dimensions and loads – conceptual structural design according to EN 16310 stage 2.1.

Stage where building plans are developed, presenting various options and solutions on a planning scale, with the objective to determine the overall form and schematic layout of the building to be built within the designated area.

Additional surveys and site investigations, such as site and geotechnical surveys, may be necessary at this stage. These surveys aim to provide the client and the design team with crucial information about site conditions and the condition of existing buildings/structures.

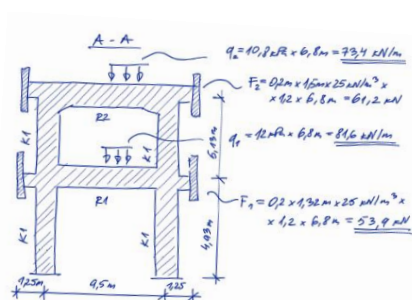
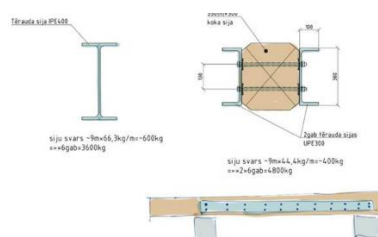
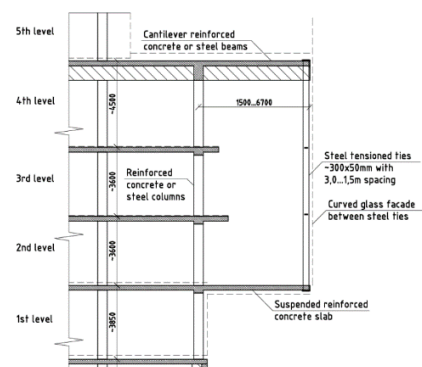
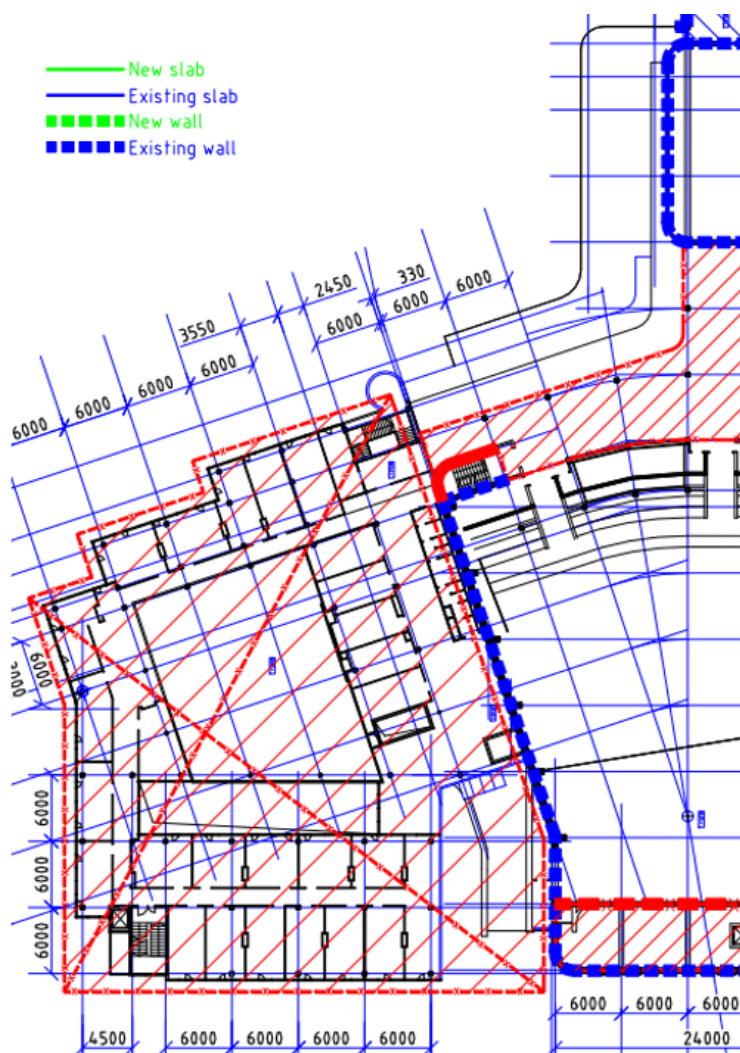
KLĪPA SIENĀM $H = 4.5 \text{ m}$

$$b = 380 \text{ mm} \Rightarrow q = 4.5 \text{ m} \cdot 15 \text{ kN/m}^2 \cdot 0.38 \text{ m} = 25.9 \text{ kN/m}$$

$$b = 510 \text{ mm} \Rightarrow q = 1 \cdot 0.51 \text{ m} = 4.13 \text{ kN/m}$$

$$b = 280 \text{ mm} \Rightarrow q = 1 \cdot 0.28 \text{ m} = 20.8 \text{ kN/m}$$

*) VĪSĀR SIENU BIEŽUMS $b = 580 \text{ mm}$,
JA PĀRŠĒCUMĀ NAV NORĀDĪTS CITĀDI.

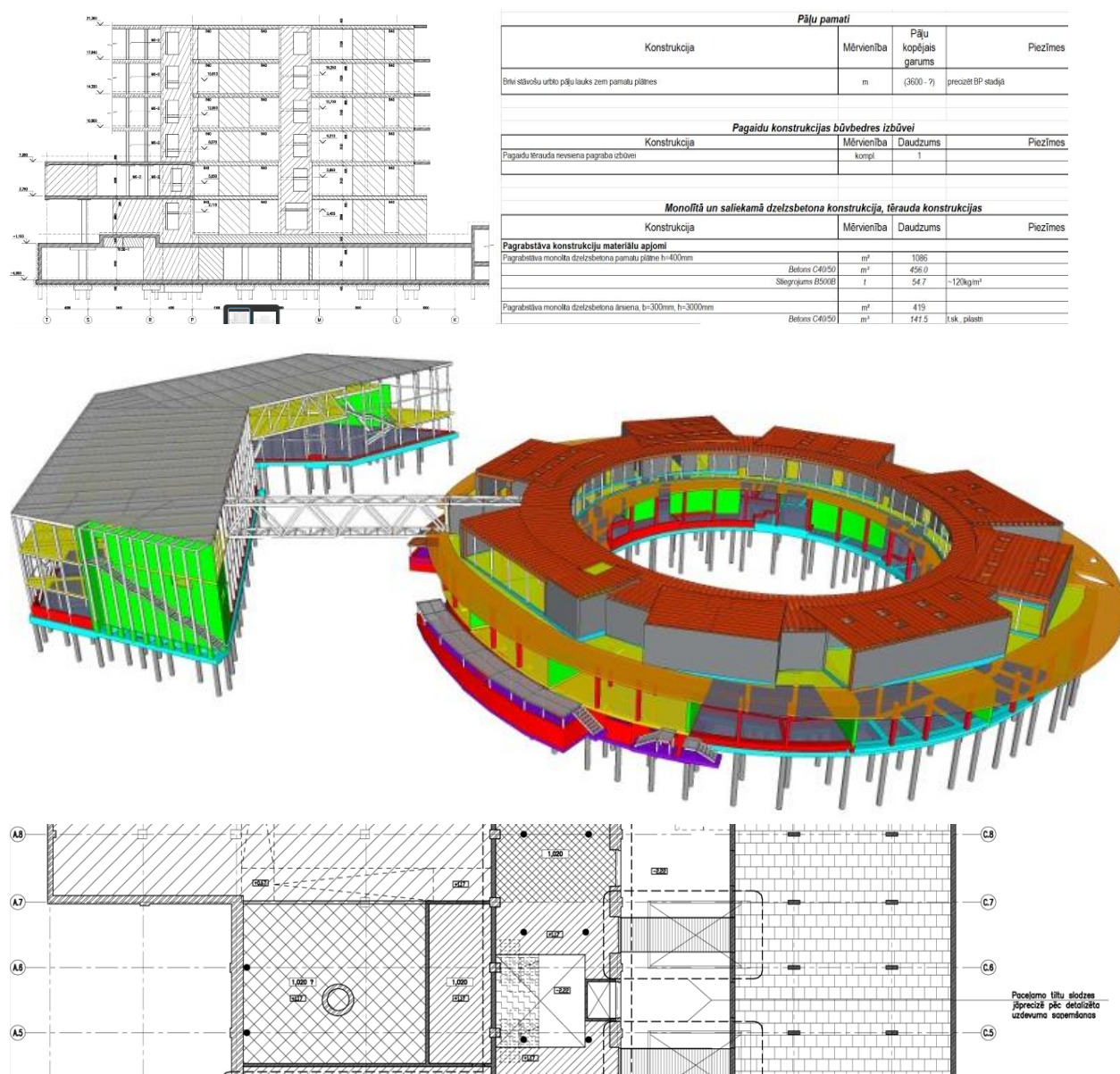


#) Preliminary design according to EN 16310 stage 2.2

At this stage, detailed calculations of building structures are conducted to the extent that dimensions of the building structures can be established. This allows the customer to perform an initial cost assessment of the building structures.

Detailing of drawings is comparable to BIM LOD-300 detailing.

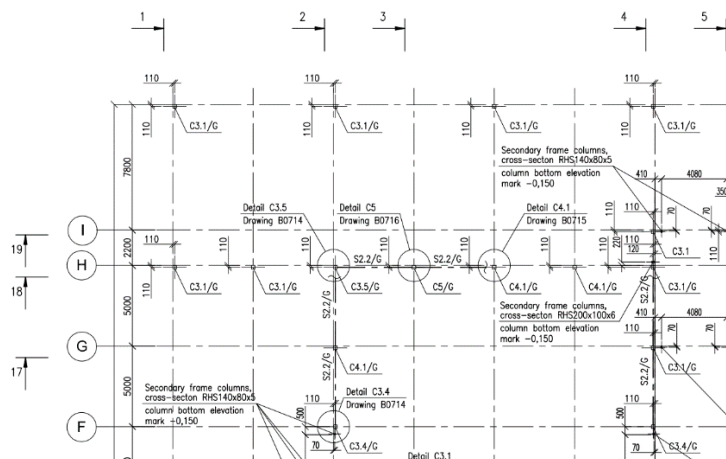
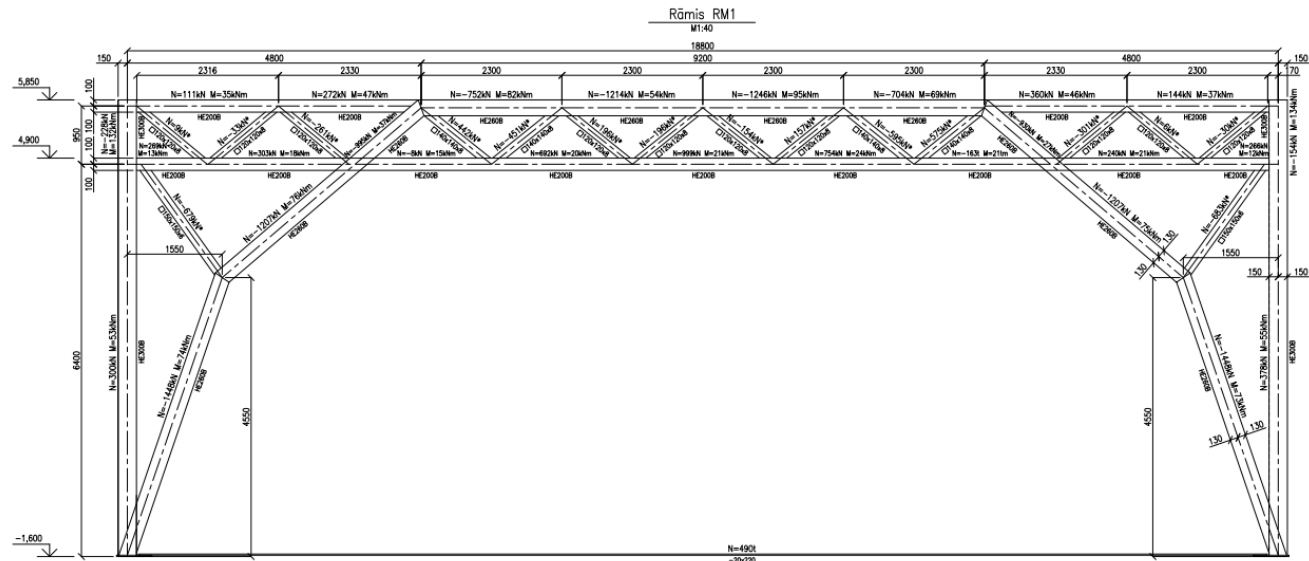
Structural layouts and material options are carefully considered during this phase, resulting in a consistent design task for the subsequent technical design stage.



#) Technical design according to EN 16310 stage 2.3

Stage where the structure is specified in detail, enabling the determination of implementation costs and/or the selection of a contractor. The “specifications” encompass comprehensive drawings and written descriptions.

In this design stage all cross-sections and main load-bearing details are solved, and it is confirmed through the calculation report. In Latvia, after this stage, the construction design may be handed over for preparation of construction, and it is permissible to start the development and implementation of subsequent working drawings.



Label	Cross section	Steel	Support reactions		
			N_{Ed}, kN^*	V_{Ed}, kN	M_{Ed}, kNm
C1.1	I HE320A	S355J2	-907	81	-
C1.2	I HE320A	S355J2	-537	260	-
C2.1	I HE220A	S355J2	-509	26	-
C2.2	I HE220A	S355J2	-631	697	-
C2.3	I HE220A	S355J2	-456	113	-
C3.1	□ 220x220x6	S355J2	-587	55	-
C3.2	□ 220x220x6	S355J2	-86	274	-
C3.3	□ 220x220x6	S355J2	-408	457	-
C3.4	□ 220x220x6	S355J2	-239	111	-
C3.5	□ 220x220x6	S355J2	-378	216	-
C4.1	□ 220x220x8	S355J2	-475	59	-
C4.2	□ 220x220x8	S355J2	-367	82	-
C5	□ 220x220x10	S355J2	-474	56	-
C6	□ 150x150x5	S355J2	-130	-	-

#) Calculation report

A comprehensive and transparent calculation report is presented to the customer, containing the following details:

- compilation of initial data;
- description of calculation schemes and FEM calculation models;
- summarized results of static calculations;
- summarized load bearing capacities and utilization ratios of structural elements;
- connection calculations and other structure-specific analyses.

The calculation report justifies the constructive solutions, as well as the utilization ratios – providing valuable information for engineers to make informed decisions on various operational construction matters during the construction process.

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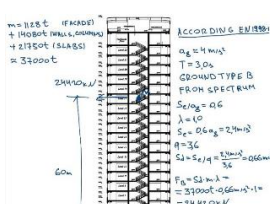
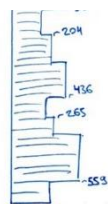
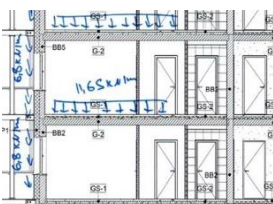


Table 4.1 Steel member verification summary for ULS load combinations 1-24

Element properties			FEM design forces and moments						Design forces, moments used				Steel element calculation results						
FEM No	label	Cross-section	Design length Lx, m	Design length Ly, m	Load combination No	Strong axis			Weak axis			Strong axis		Weak axis		Strength	Buckling		
						Axial force N, kN	Bending moment My, kNm	Shear force Qy, kN	Bending moment Mz, kNm	Shear force Qz, kN	Axial force N, kN	Bending moment My, kNm	Shear force Qy, kN	Bending moment Mz, kNm	Shear force Qz, kN		Load-bearing capacity used, %	Stress, MPa	Load-bearing capacity used y-y, %
30	C1	HEA 200	3.7	3.7	13	-147	9.9	4.8	20.8	-29.1	176	11.8	5.8	24.9	-34.9	70%	250	82%	85%
133	B1	HEA 200	4.2	1.0	9	-444	2.5	-28.3	1.6	-4.2	533	26.6	-34.0	1.9	-5.1	51%	182	62%	57%
259	B2	IPE 180	5.7	0.1	7	-14	31.8	0.0	0.0	0.0	16	38.2	0.0	0.0	0.0	75%	268	76%	75%

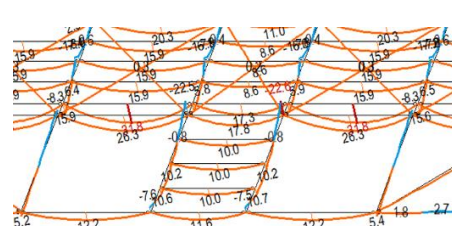
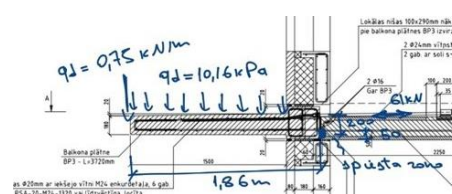


Figure 4.7. Bending moment diagram (M, kNm) for LC1



3,72m plank balcons:
Balconsam:
 $M_{ed} = 10,16 \text{ kPa} \cdot 3,72 \text{ m} \cdot (1,86 \text{ m})^2 / 2 + 0,75 \text{ kN/m} \cdot 3,72 \text{ m} \cdot 1,86 \text{ m} + 2 \cdot 0,75 \text{ kN/m} \cdot (1,86 \text{ m})^2 / 2 = 73,2 \text{ kNm}$

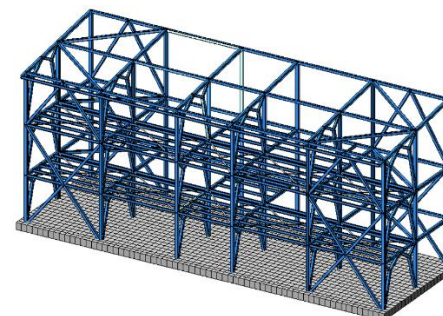
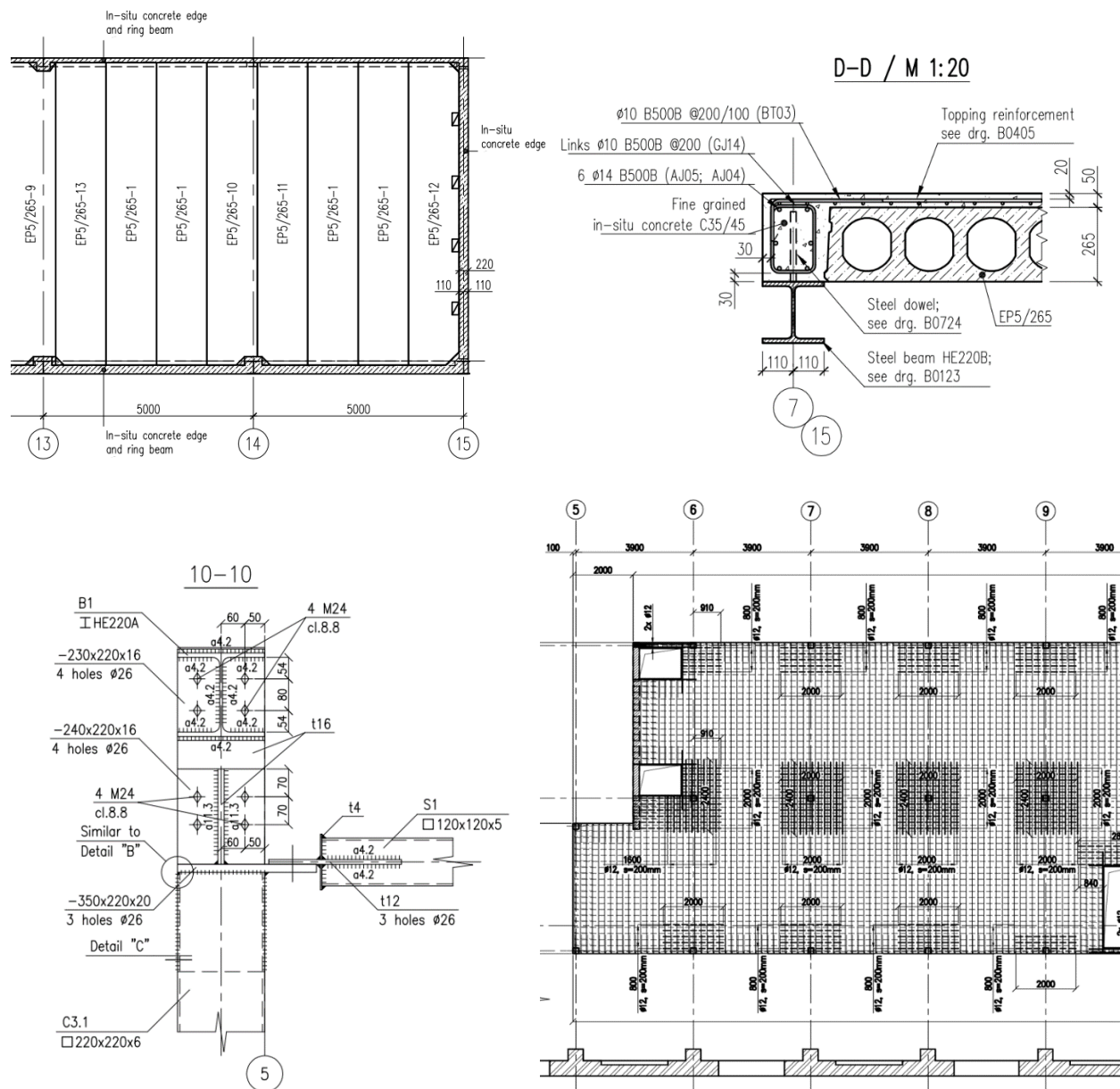


Figure 4.2. 3D rendering of FEM model main load-bearing parts

#) Working drawings according to EN 16310 stage 2.4,

This stage includes a comprehensive description of the structural solutions, so that construction and installation of prefabricated structures can take place.

Note! Shop drawings usually are produced by Construction Contractors (the responsibility for developing production drawings is delegated to manufacturers based on their technological specifications), but we offer manufacturers *.ifc models external checking.



#) 3D BIM modeling

Usually our 3D BIM models are prepared using the powerful "Tekla Structures" software, known for its compatibility with other BIM programs through the use of *.ifc files. We provide both *.ifc files and original files as needed.

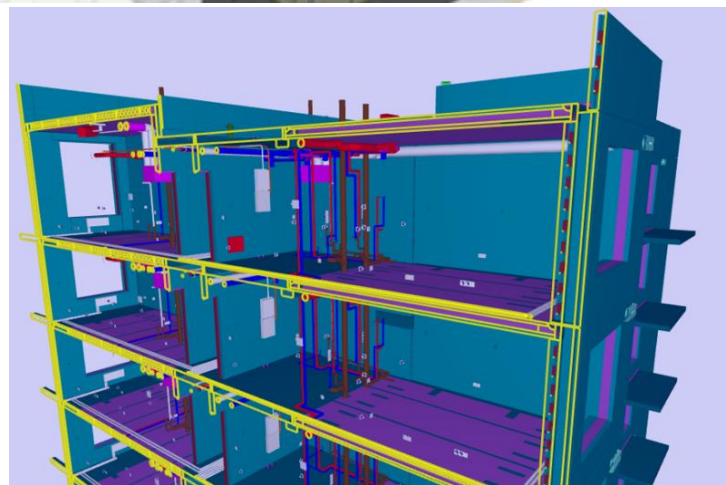
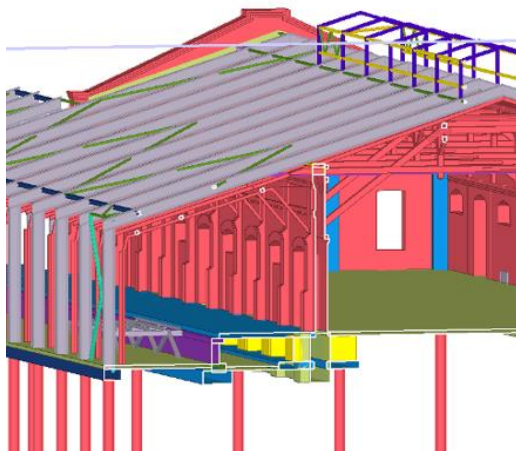
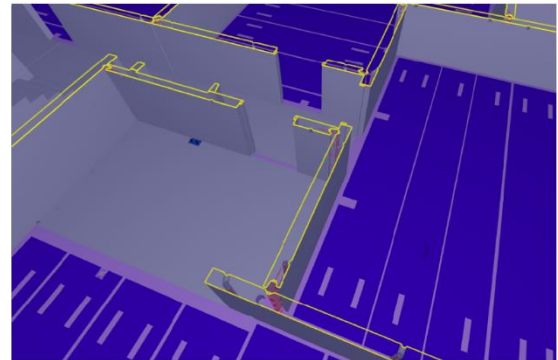
Usually we offer construction modeling for our designed structures up to LOD 300 detailing level and recast concrete structures up to LOD 350 level.

Instead of working drawing development, we are willing to carry out structural modeling up to LOD 400, but the level of detailing requires clarification and a separate agreement.

A Model Production Delivery Table

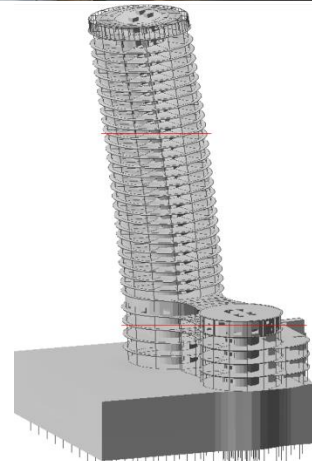
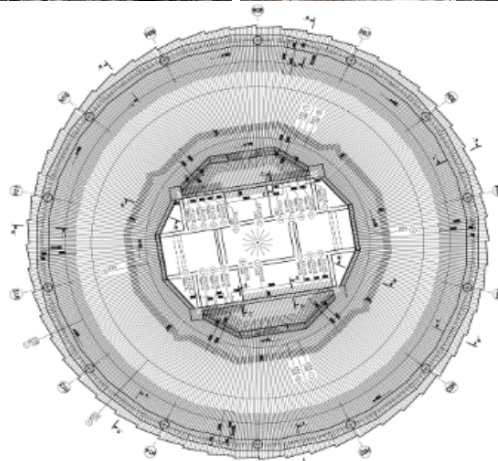
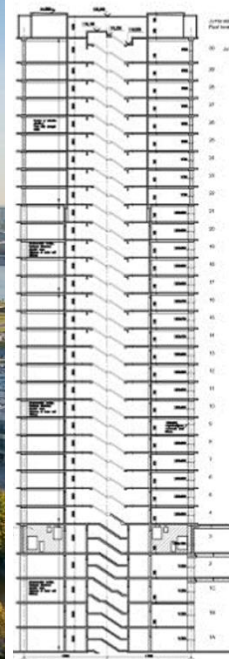
UK
LOD/LOI 1 = LOD 200
LOD/LOI 2 = LOD 300
LOD/LOI 3 = LOD 350
LOD/LOI 4 = LOD 400

		Consultants/ Design Team				Design Team Contract
		KONCEP TS	MBP	BP	Derba (assum)	
		RIBA Stage 2	RIBA Stage 3	RIBA Stage 4	RIBA Stage 5	
Assets	Assets	Function Type	LOD/ LOI	LOD/ LOI	LOD/ LOI	LOD/ LOI
All Arch. El.	Excluding ICL defined Elements	N/ A	1	2/3	3	3
All Str. El.	Excluding ICL defined Elements	N/ A	1	2	2	4
ICL Defined Structural Elements	Prefabricated Concrete Elements	N/ A	1	2	3	4
All MEP El.	Excluding ICL defined Elements	N/ A	1	2	3	3

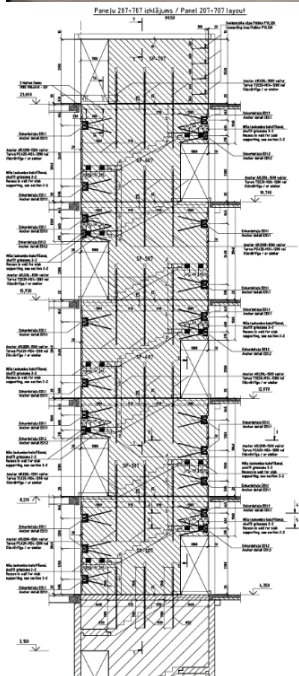


“Zunda Towers”, Riga, Latvia – structural solutions by “IG Kurbads”

A pair of skyscrapers in Riga, still tallest building in Latvia

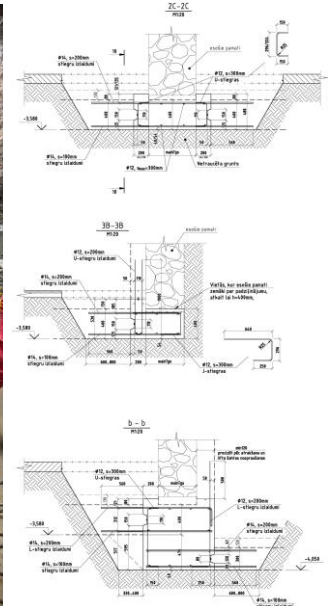
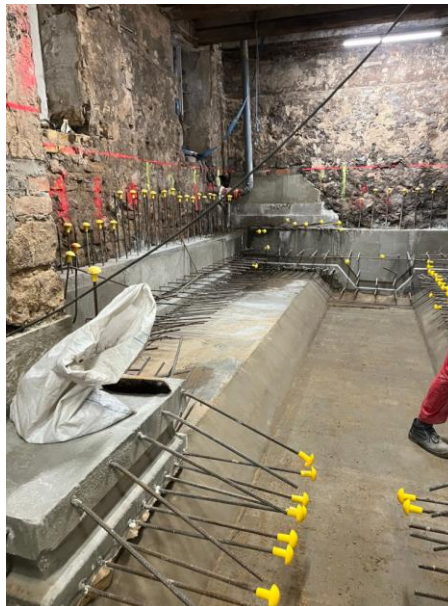
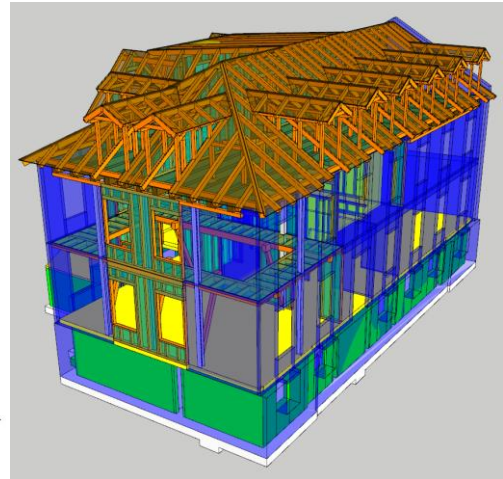


“Gustavs” business center in Riga – structural solutions by “IG Kurbads”

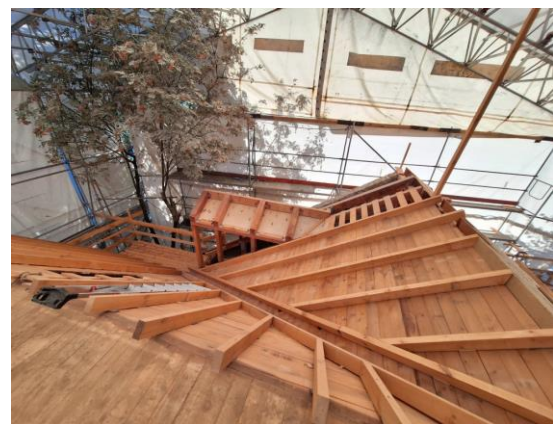
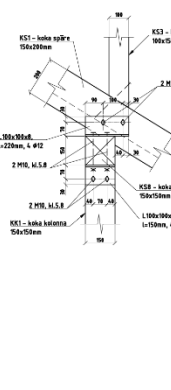
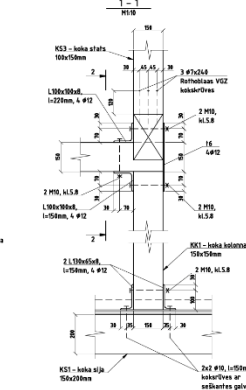
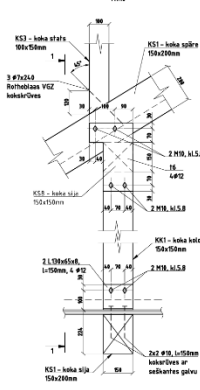


Blaumaņa str. 19, Riga, Latvia – structural solutions by “IG Kurbads”

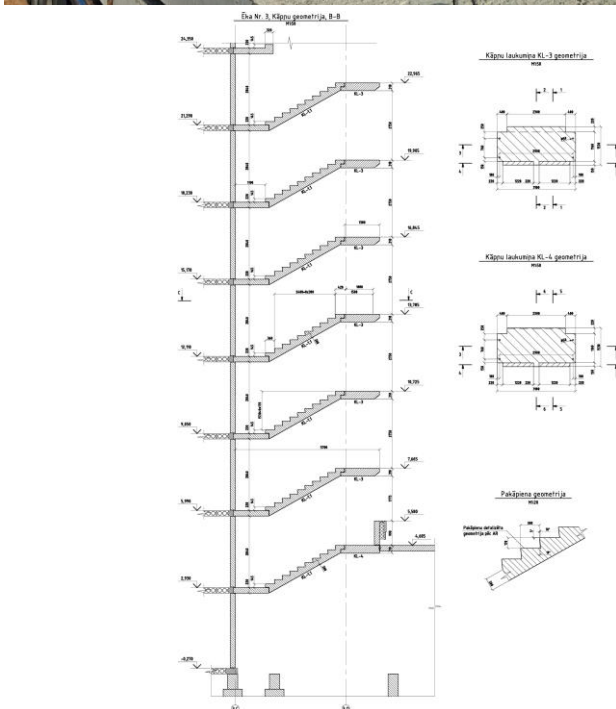
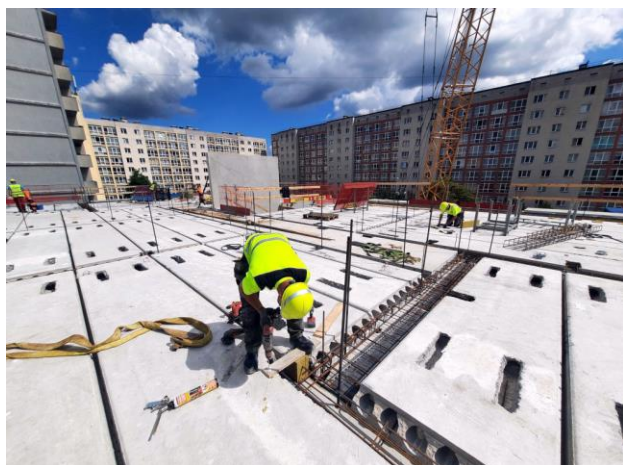
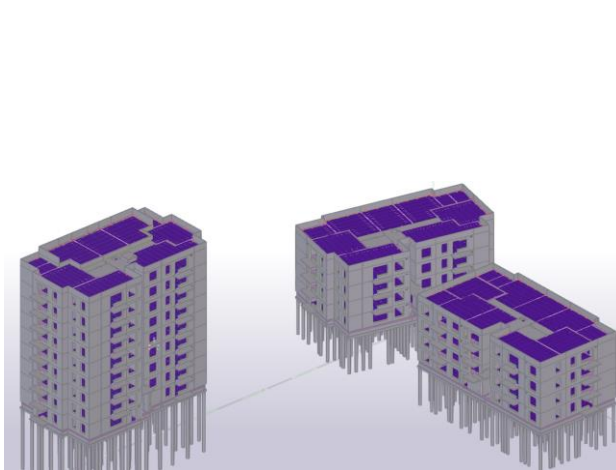
Historical building complex reconstruction with basement deepening



Raksturīgais mezgls S1
Izstrādājums K11 izstrādājums un izstrādājums K11 un
izstrādājums K11 izstrādājums un izstrādājums K11
M1.10

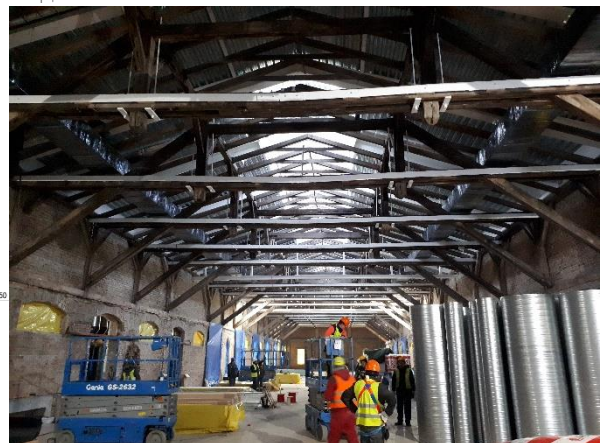
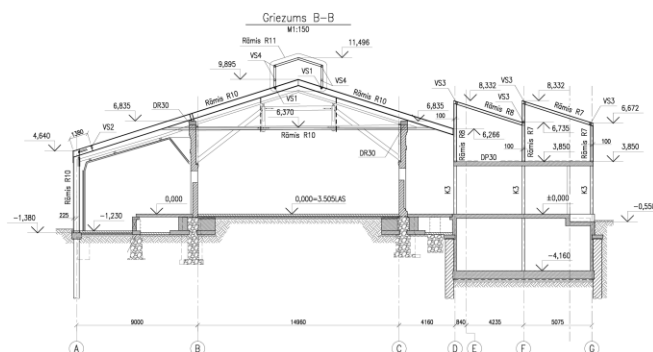
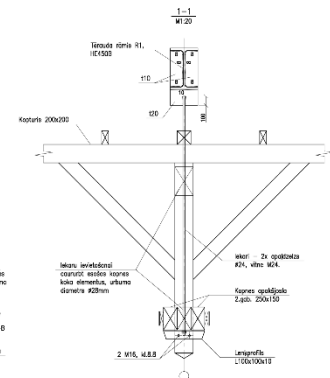
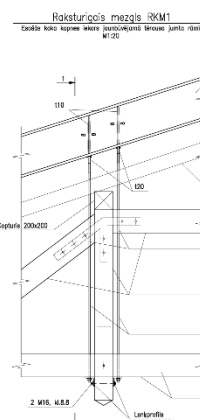
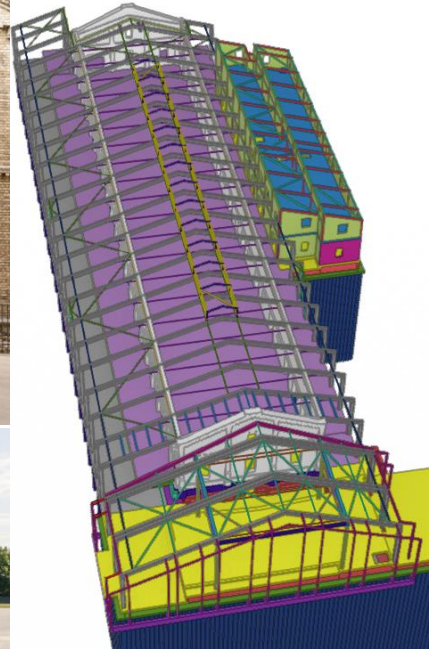
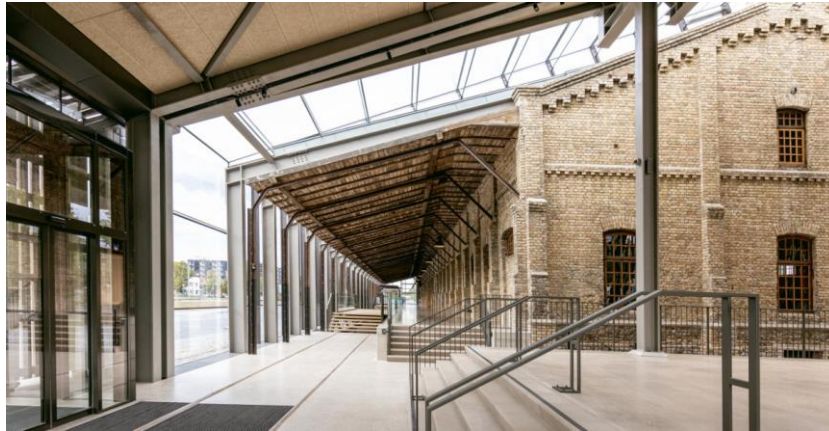


Baltinavas str. 17, Riga, Latvia – structural solutions by “IG Kurbads”



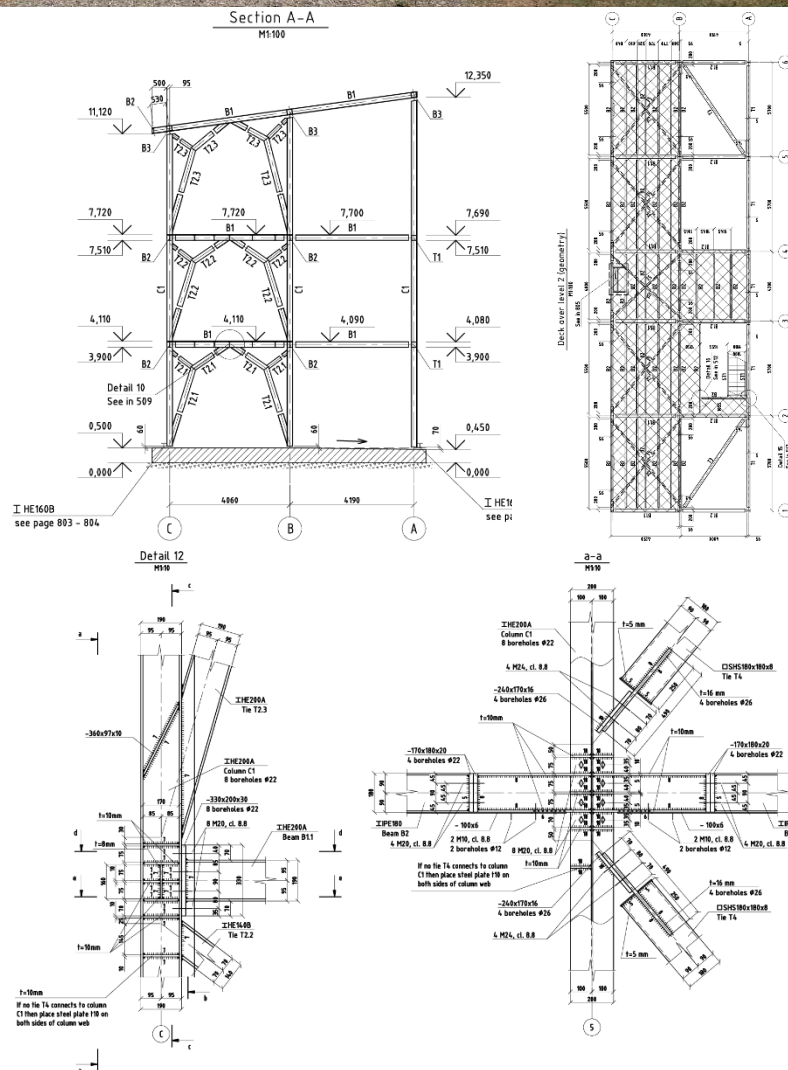
“Hanzas perons”, Riga, Latvia – structural solutions by “IG Kurbads”

Historical warehouse reconstruction to modern multifunctional hall with additional underground levels



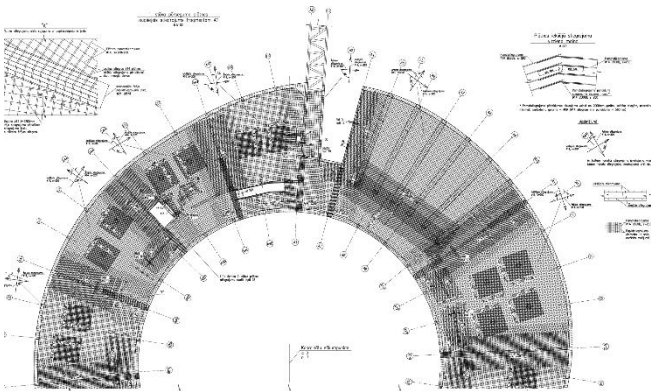
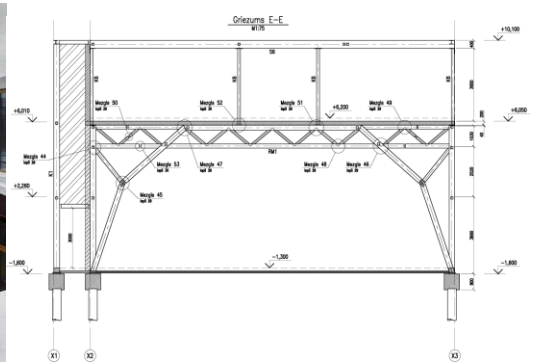
Data center in Georgia – structural solutions by “IG Kurbads”

Modular air cooling 9.6 MW data center in seismic region



Exupery International School – structural solutions by “IG Kurbads”

Project realized from idea to operating school in 13 months



Expo 2015 pavilion, Milan, Italy – structural solutions by “IG Kurbads”



4.2. Seismic analysis results

Seismic analysis results returned comparable results to basic seismic method.

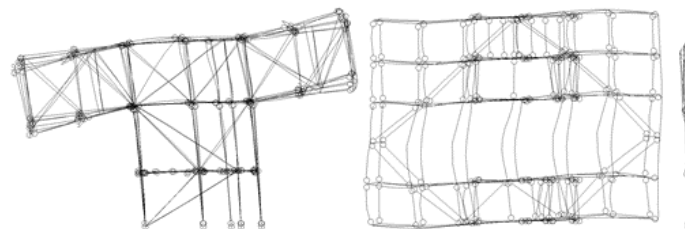
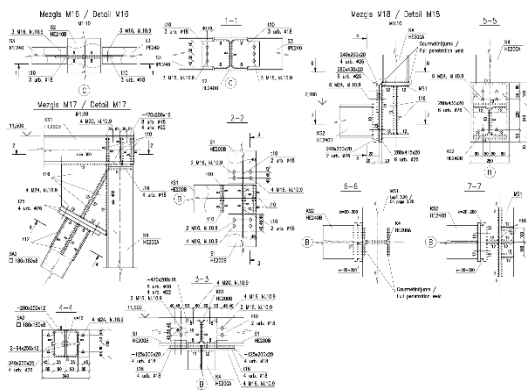
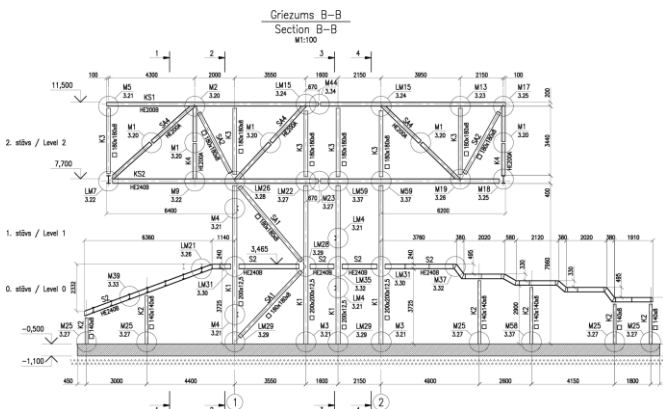


Figure 4.4. Modal shape for seismic load E1/E2 (Mode 3: $T=$

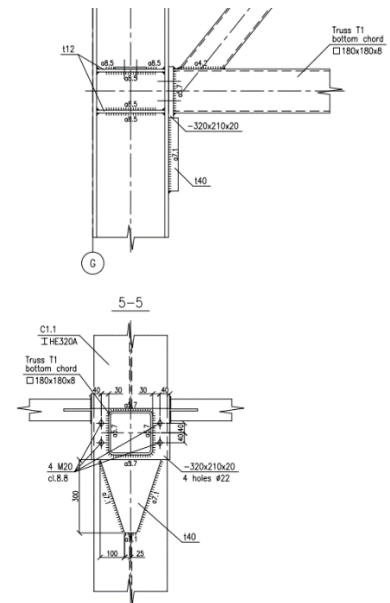
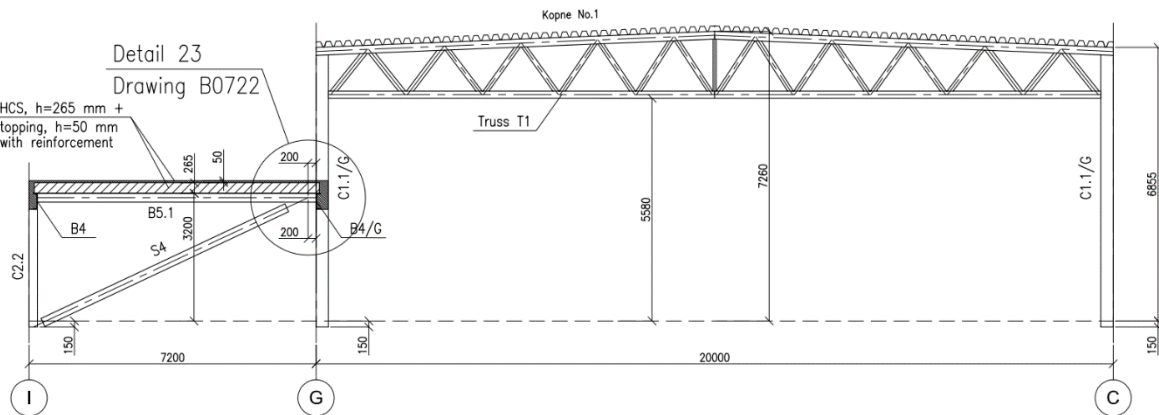


...unfortunately, the construction was stopped after the foundations were built

Industrial building in Norway – structural solutions by “IG Kurbads”

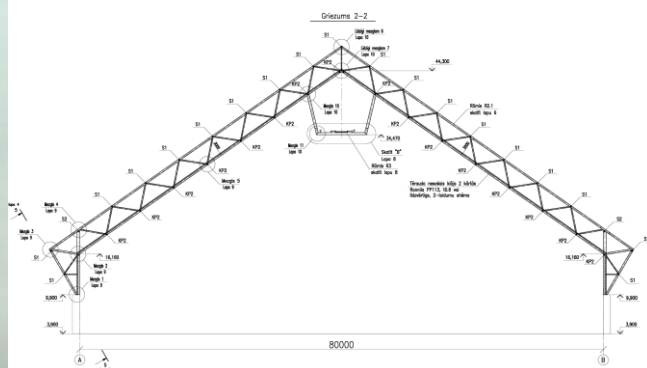
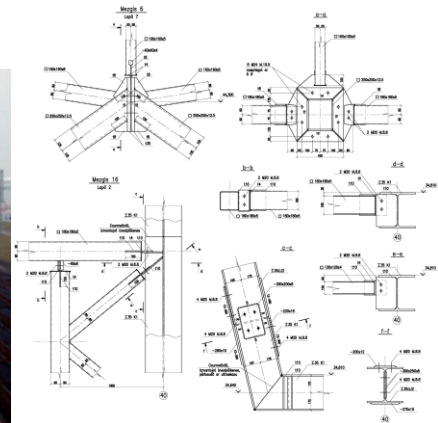


Section 8-8



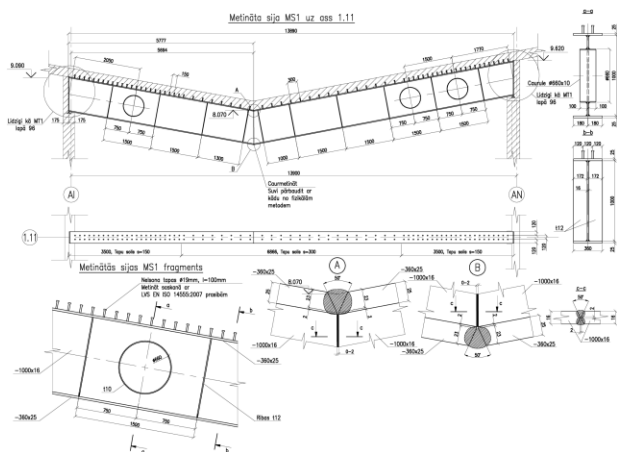
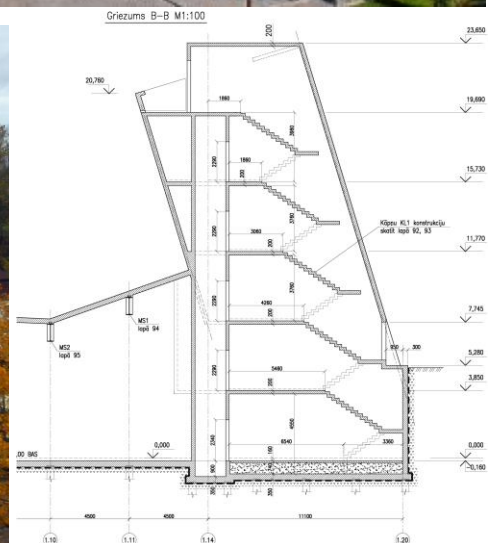
Coal storehouse, Ventspils – structural solutions by “IG Kurbads”

Steel constructions with span 80m and length of the building 300m



“Zeimuļš”, Rezekne, Latvia – structural solutions by “IG Kurbads”

Building with randomly sloping roof, partly dug into existing nearby hill



The New Riga Theatre – structural solutions by “IG Kurbads”

Existing theatre building reconstruction and new building construction in narrow condition respecting many theatre specific technological requirements.

