Multi-storey precast concrete structures in Romania. Project examples

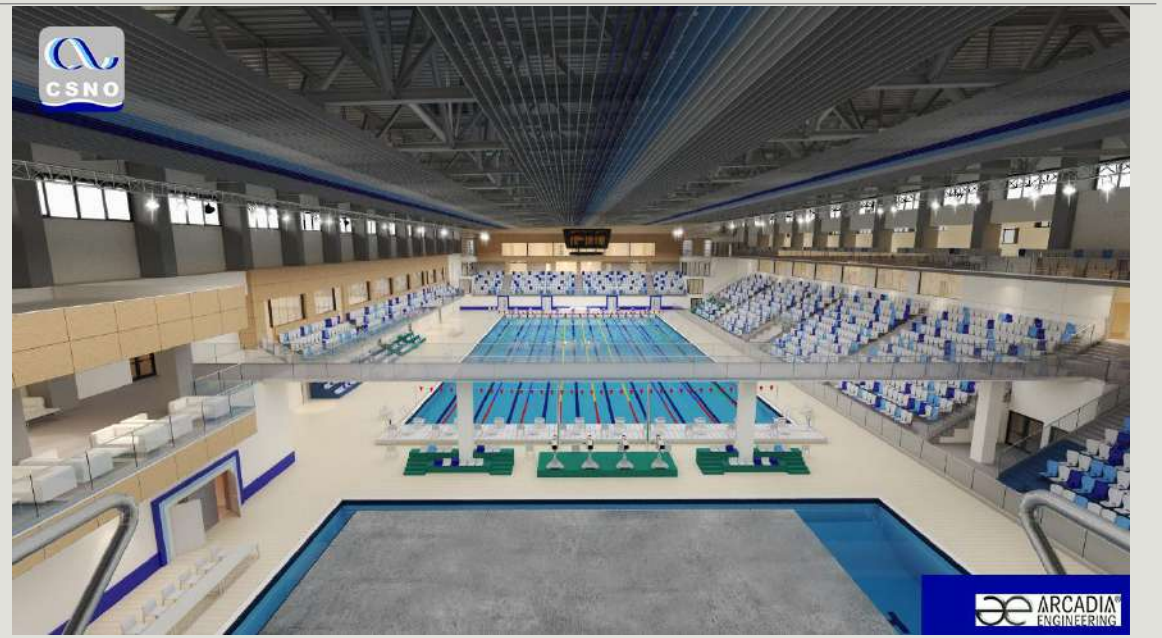
Projects presented

1. COMPLEX SPORTIV DE NATATIE – OTOPENI
2. MEGAMALL
3. THE BRIDGE

1. COMPLEX SPORTIV DE NATATIE – OTOPENI

CHARACTERISTICS

- Mixed precast- cast in situ moment frame
- Large span roof (approx. 55m)
- 3 floors
- Seats capacity: approx. 2800 persons
- Total built surface: 20.153 sqm
- Ground built surface: 9.582 sqm
- Max. height: 20,6 m



- Beneficiary: CNI
- General Contractor: MBS Group
- General Designer: Arcadia Engineering
- Structural Designer: Arcadia Engineering

1. COMPLEX SPORTIV DE NATATIE – OTOPENI

REQUIREMENTS

- precision in execution
- appearance
- fast construction
- balanced cost
- easiness in construction
- reduced labour force

1. COMPLEX SPORTIV DE NATATIE – OTOPENI

MIXED PRECAST – CAST IN SITU SOLUTION

1. COMPLEX SPORTIV DE NATATIE – OTOPENI

MOMENT FRAME STRUCTURE

1. COMPLEX SPORTIV DE NATATIE – OTOPENI

PRECAST COLUMNS –MOMENT FIXED CONNECTION

1. COMPLEX SPORTIV DE NATATIE – OTOPENI

SPLICE SLEEVES INSIDE COLUMNS

1. COMPLEX SPORTIV DE NATATIE – OTOPENI

CAST IN SITU RIGID JOINT- MOMENT FRAMES

1. COMPLEX SPORTIV DE NATATIE – OTOPENI

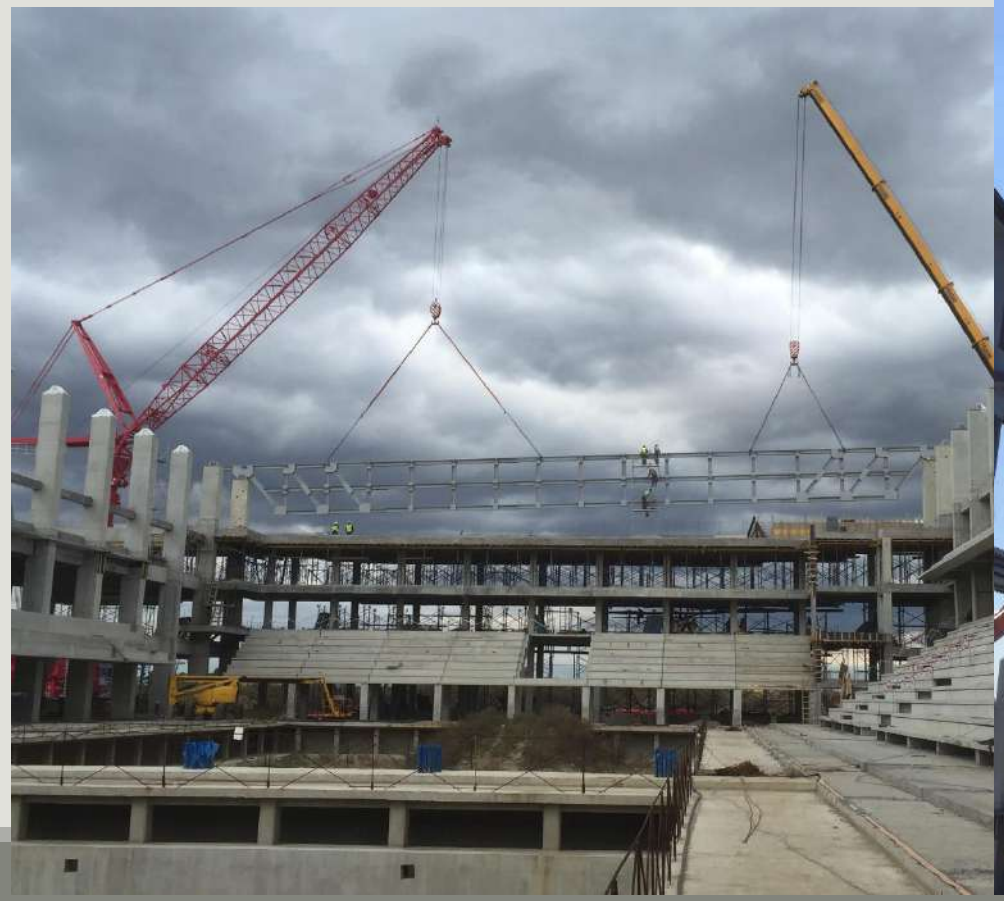
CAST IN SITU RIGID JOINT

1. COMPLEX SPORTIV DE NATATIE – OTOPENI

PRECISION IN EXECUTION

1. COMPLEX SPORTIV DE NATATIE – OTOPENI

PRECISION IN EXECUTION



1. COMPLEX SPORTIV DE NATATIE – OTOPENI

PRECISION IN EXECUTION

1. COMPLEX SPORTIV DE NATATIE – OTOPENI

OVERVIEW – ACTUAL SITUATION

1. COMPLEX SPORTIV DE NATATIE – OTOPENI

OVERVIEWS

2. MEGAMALL

CHARACTERISTICS

- Precast- moment frame
- Several intermediate cast-in-situ slabs
- 4 precast buildings; **2G+2(3)F** floors
- 1 cast in situ parching; 2B + 6F
- 8.5 X 8.5 and 8.5 X 17m grid
- Total surface: over 200.000 sqm
- Ground surface: 31.910 sqm
- Length: 225-266 m; width: 72-106 m
- Max. height: 28 m
- Design + execution : 11 months! (execution 9 months)

- Beneficiary: NEPI
- General Contractor: Bog'Art
- General Designer: HBRO
- Structural Designer: Arcadia Engineering

2. MEGAMALL

REQUIREMENTS

- FAST CONSTRUCTION!!!

- Reduced costs

- Precision in execution

- Easiness in construction

2. MEGAMALL

PARTICULARITIES

- Cast-in-situ concrete for basements during precasting the elements of the upper structure

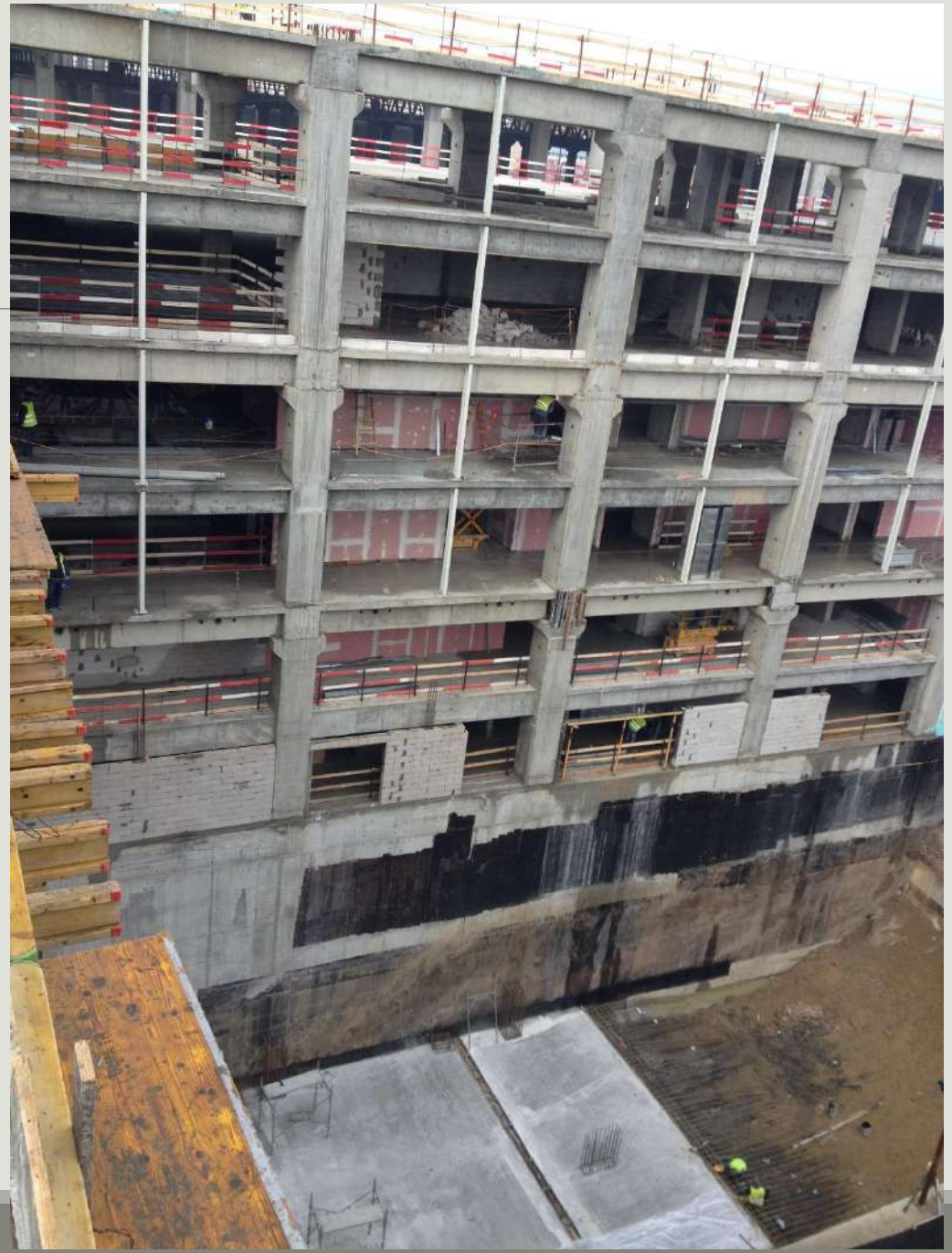
- As many similar precasting elements; cast-in-situ frames added after erection of the precast elements

- Cast-in-situ for the structural elements that were not on the critical path of construction

- Reduced no. of columns at the last floor (cinema and food court) resulting in large spans for the roof; steel trusses for large parts of the roof

2. MEGAMALL

PRECAST MOMENT FRAME



2. MEGAMALL

STRUCTURAL SYSTEM – PRECAST COLUMNS – MOMENT CONNECTIONS

2. MEGAMALL

FACTORY PRECASTING - SPLICE SLEEVES INSIDE COLUMNS

2. MEGAMALL

FACTORY PRECASTING - SPLICE SLEEVES INSIDE COLUMNS

2. MEGAMALL

PRECAST MOMENT MAIN BEAMS

2. MEGAMALL

PRECAST PINNED SECONDARY BEAMS – PRECAST SLABS

2. MEGAMALL

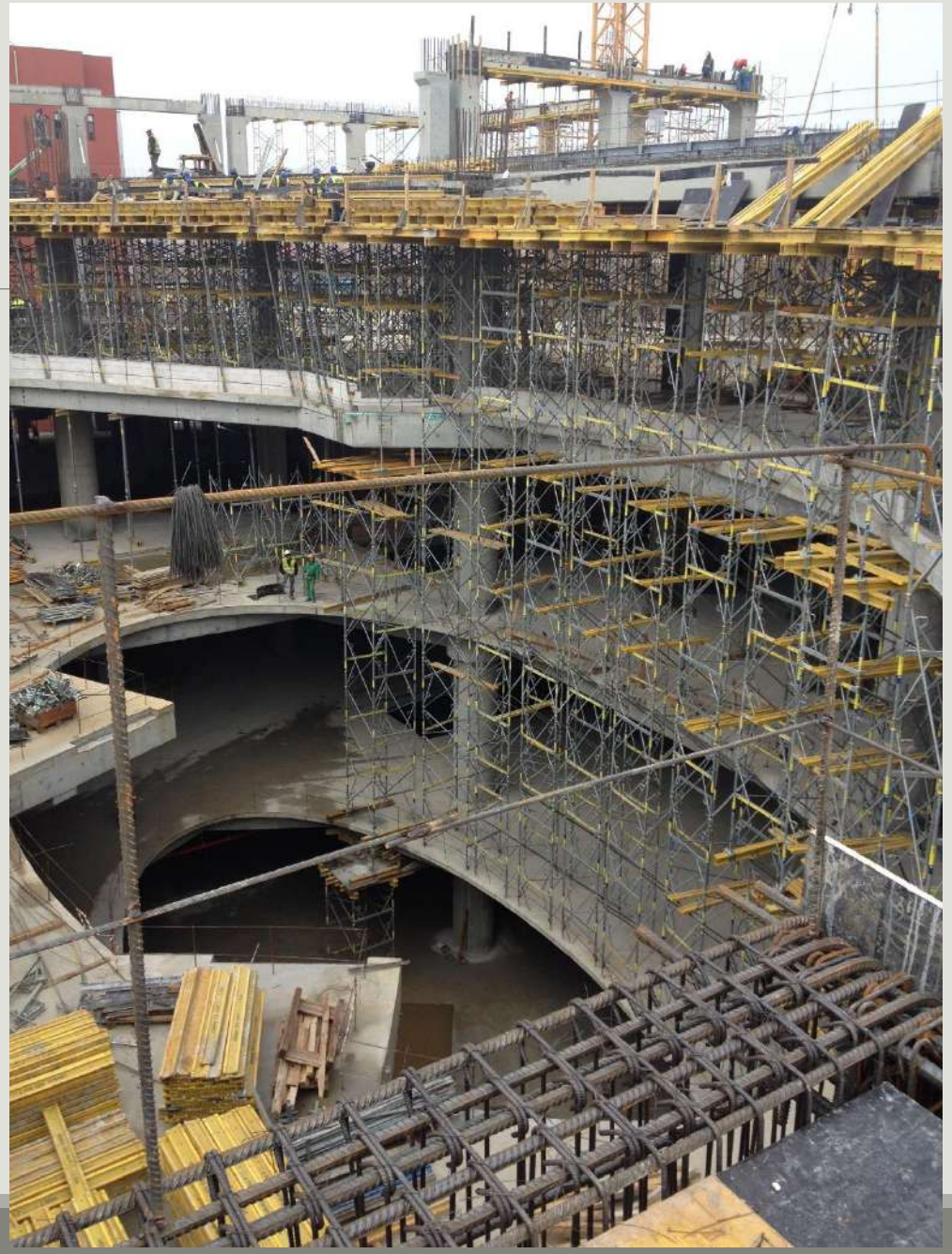
RIGID JOINT CONNECTION

2. MEGAMALL

CAST IN SITU JOINT AND SLAB TOPPING

2. MEGAMALL

CAST IN SITU FOR NON SIMETRIC AREAS – ATRIUMS



2. MEGAMALL

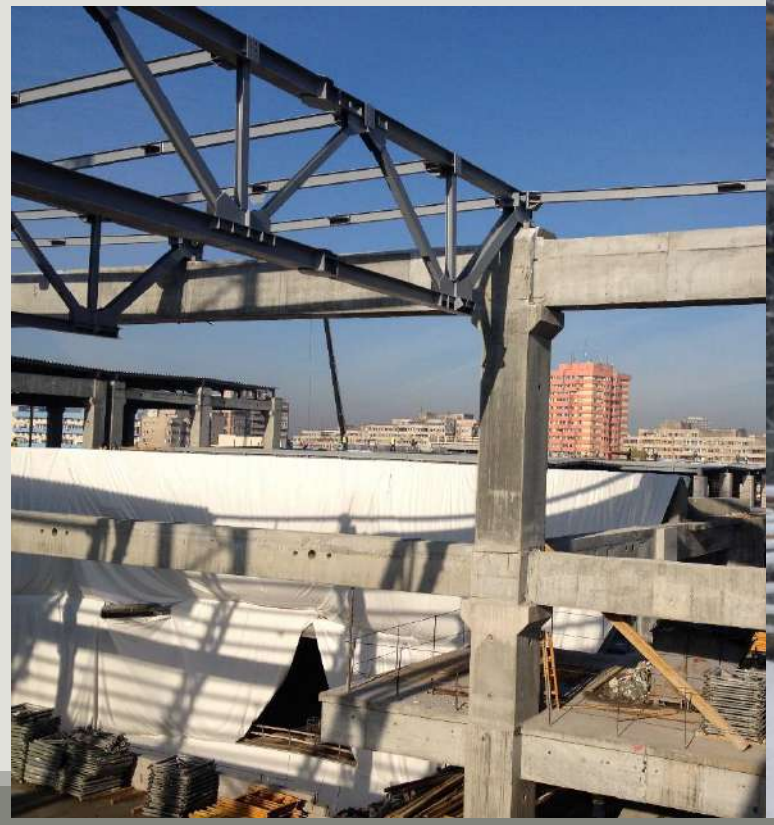
CAST IN SITU FOR SECONDARY FRAMES– STAIRS

2. MEGAMALL

LARGE SPAN ROOF - CINEMA

2. MEGAMALL

LARGE SPAN ROOF - CINEMA



2. MEGAMALL

LARGE SPAN ROOF

2. MEGAMALL

LARGE SPAN ROOF - PARKING

2. MEGAMALL

LARGE SPAN ROOF – FOOD COURT

2. MEGAMALL

LARGE SPAN ROOF – PRECAST

2. MEGAMALL

OVERVIEWS

2. MEGAMALL

OVERVIEWS

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OVERVIEWS

3. THE BRIDGE

CHARACTERISTICS

- Core wall - moment frame structural system
- Precast moment frames; cast in situ core walls
- 2B+GF+M+10F+TH floors
- Total surface: 51.547 sqm
- Ground surface: 3.451 sqm
- Max. height: 52m

- Beneficiary: Forte Partners
- General Contractor: Bog’Art
- General Designer: Bog’Art
- Structural Designer: Arcadia Engineering

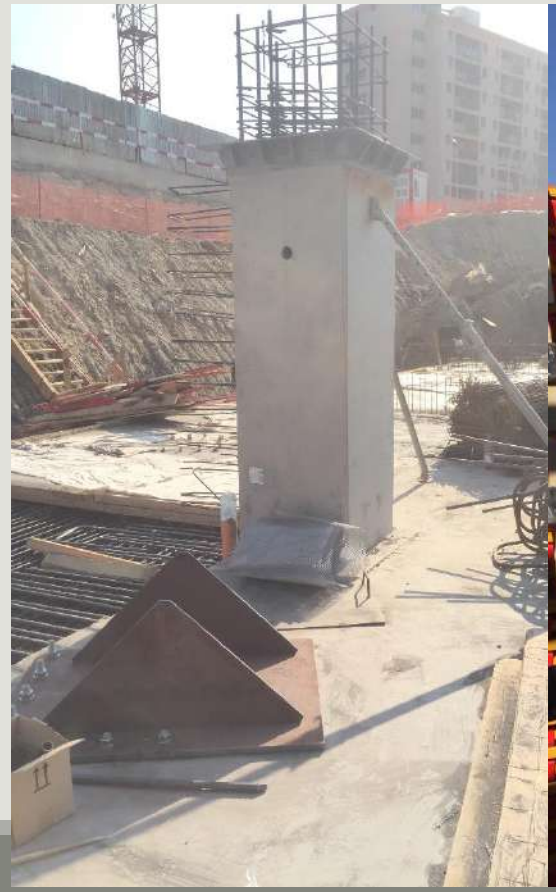
3. THE BRIDGE

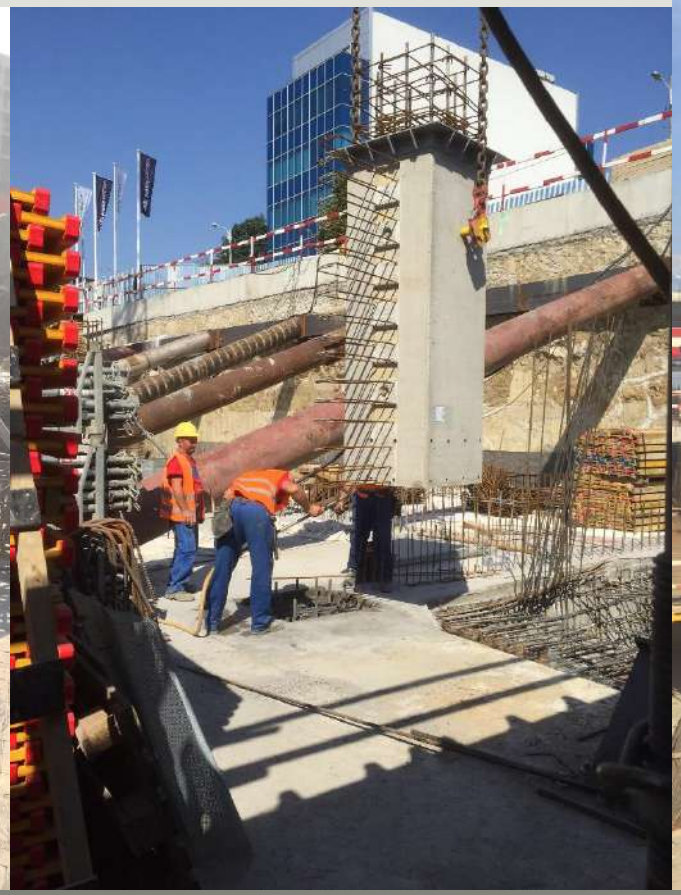
REQUIREMENTS

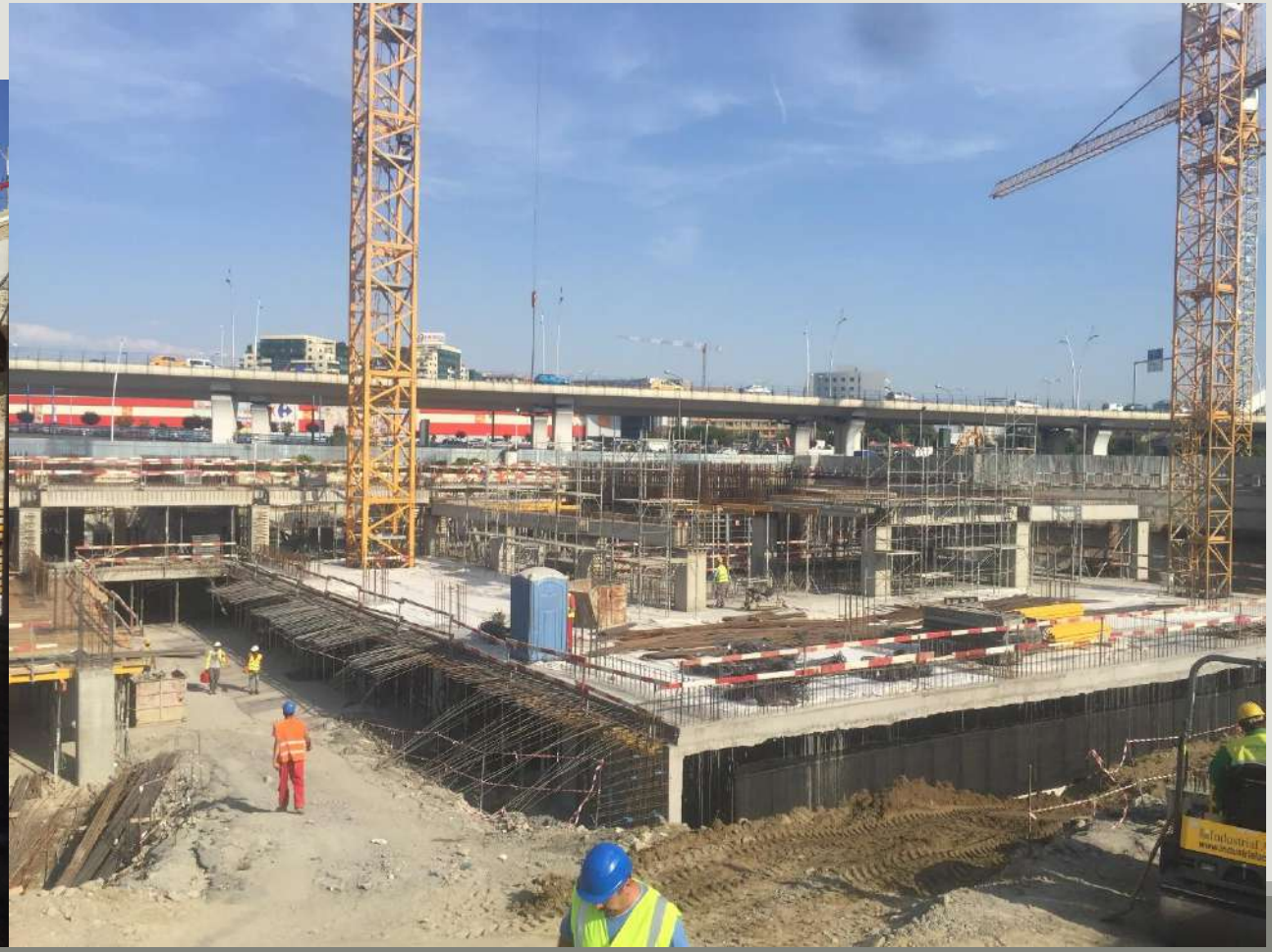
- FAST CONSTRUCTION!
- precision in execution
- balanced cost
- easiness in construction
- repeatability
- reduced weight of precast elements
- no vertical propping of beams during erection
- connection between precast frame and independent cast in situ core walls

3. THE BRIDGE

PRECAST STRUCTURE INCLUDES BASEMENT IN ORDER TO INCREASE SPEED





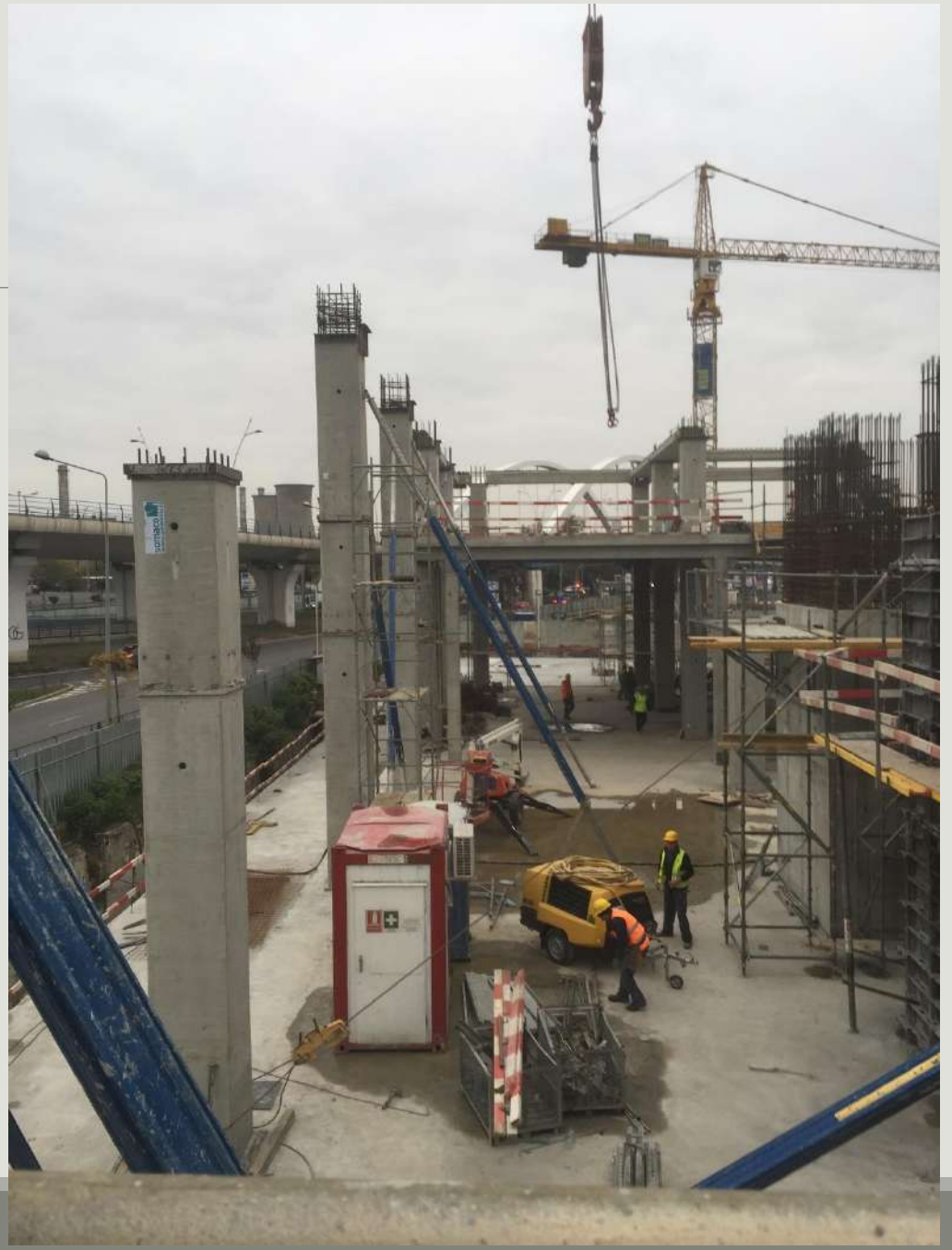


3. THE BRIDGE

BASEMENT PRECAST MOMENT FRAME STRUCTURE – CONNECTED WITH CAST IN SITU WALLS (LATER STAGE)

3. THE BRIDGE

PRECAST COLUMNS –MOMENT FIXED CONNECTION (SPLICE SLEEVE)



3. THE BRIDGE

FACTORY PRECASTING - SPLICE SLEEVES INSIDE COLUMNS

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PRECAST PRETENSIONED MOMENT MAIN BEAMS

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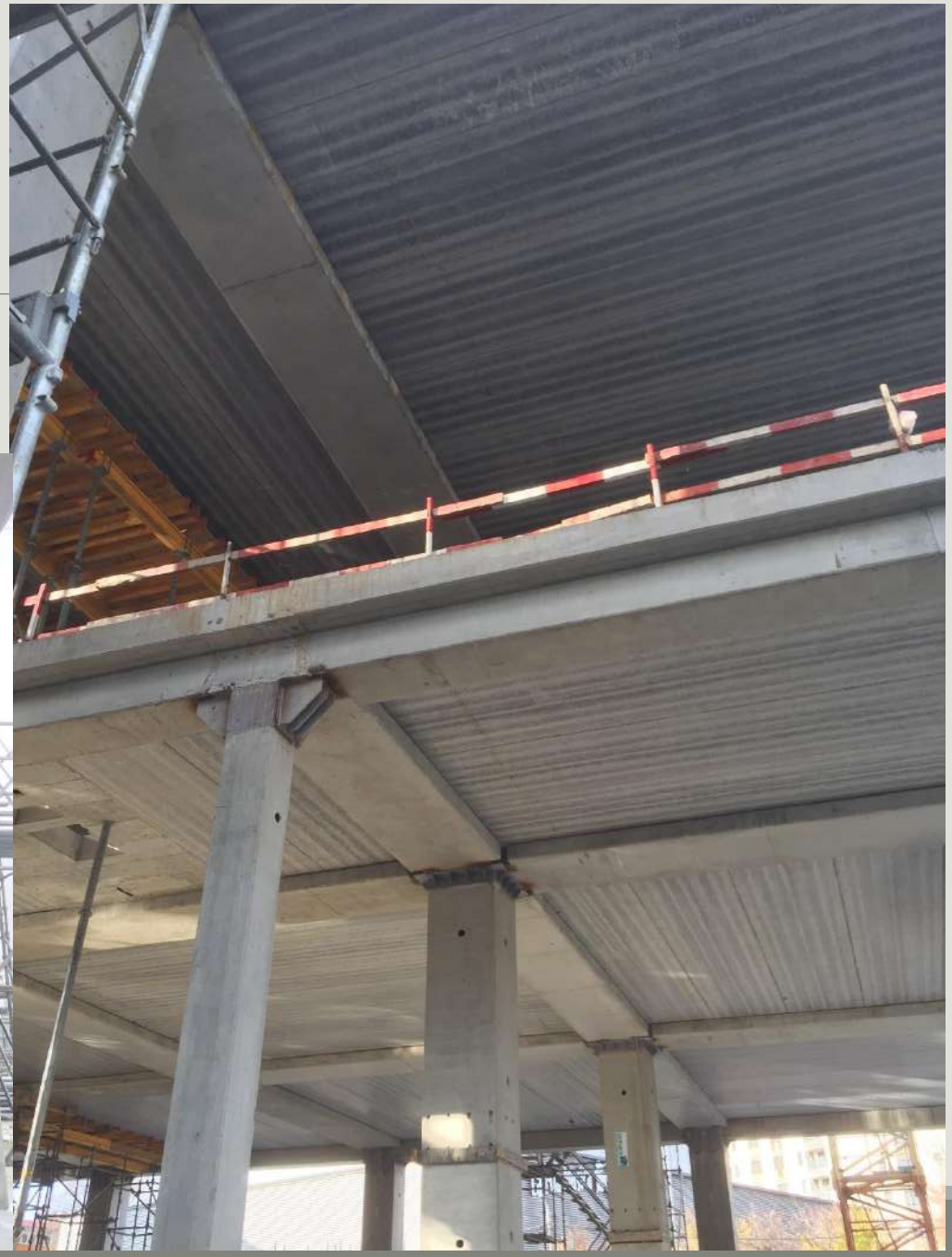
FACTORY PRECASTING - PRECAST PRETENSIONED BEAMS

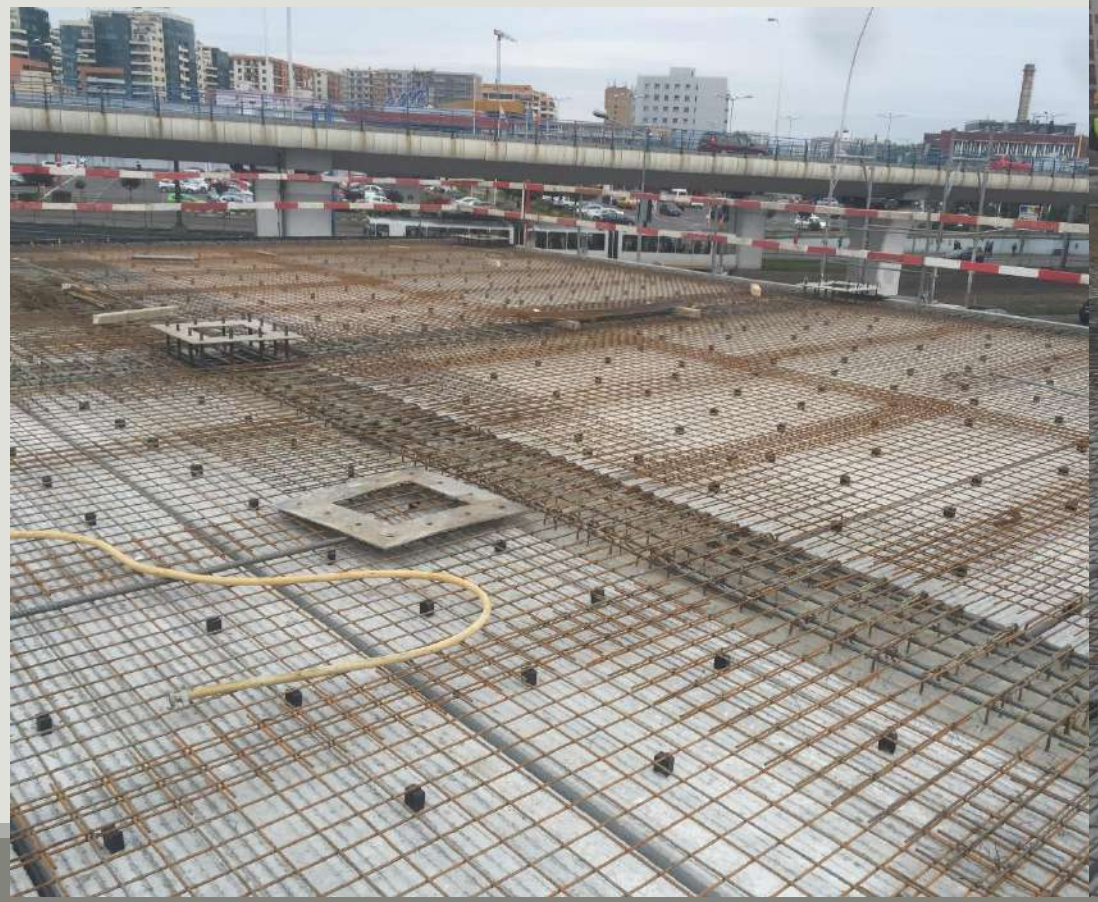
3. THE BRIDGE

PRECAST HOLLOW CORE SLABS - CHESS ARRANGEMENT



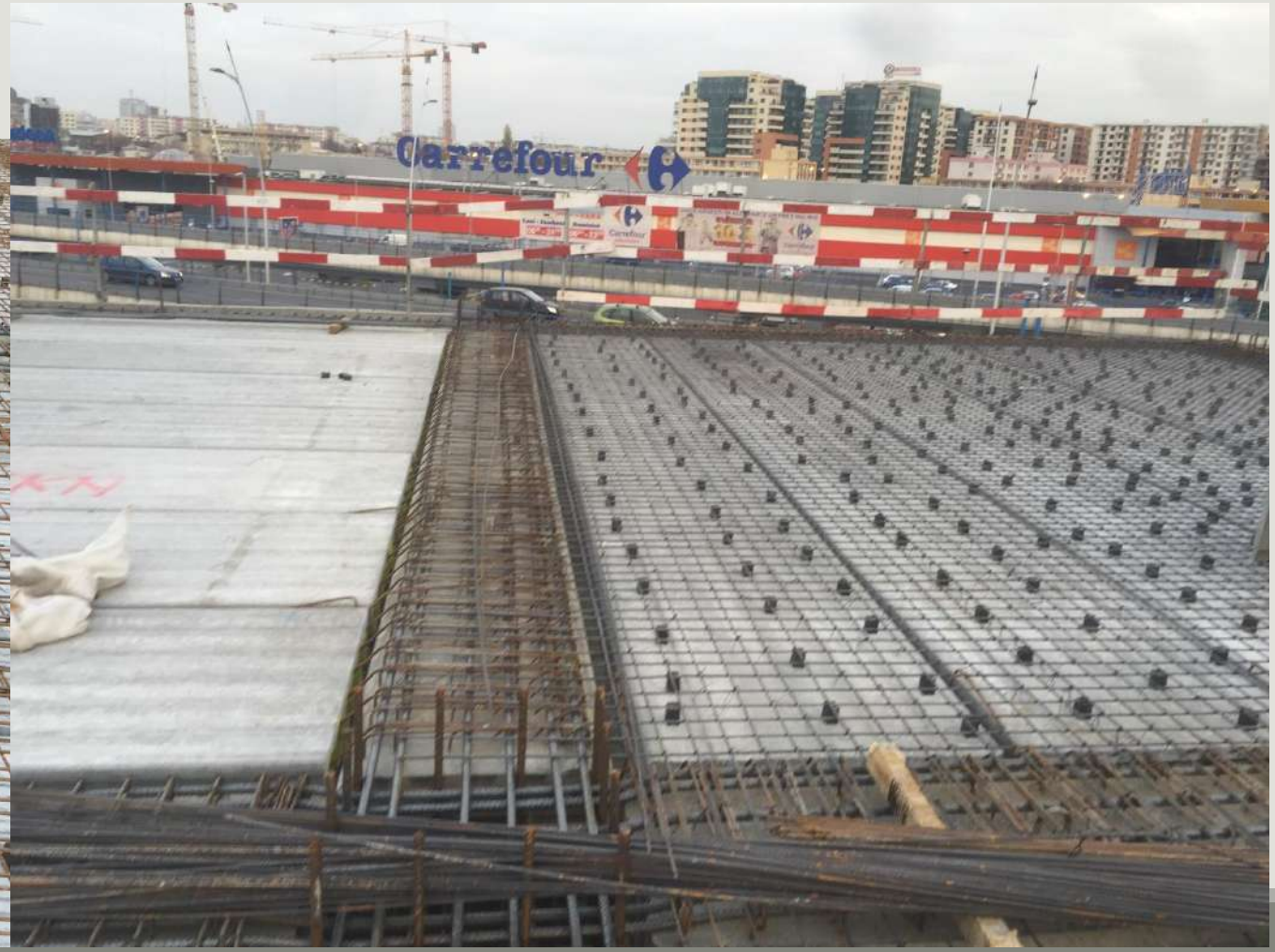
3. THE BRIDGE

CAST IN SITU 10CM SLAB OVER THE HCS



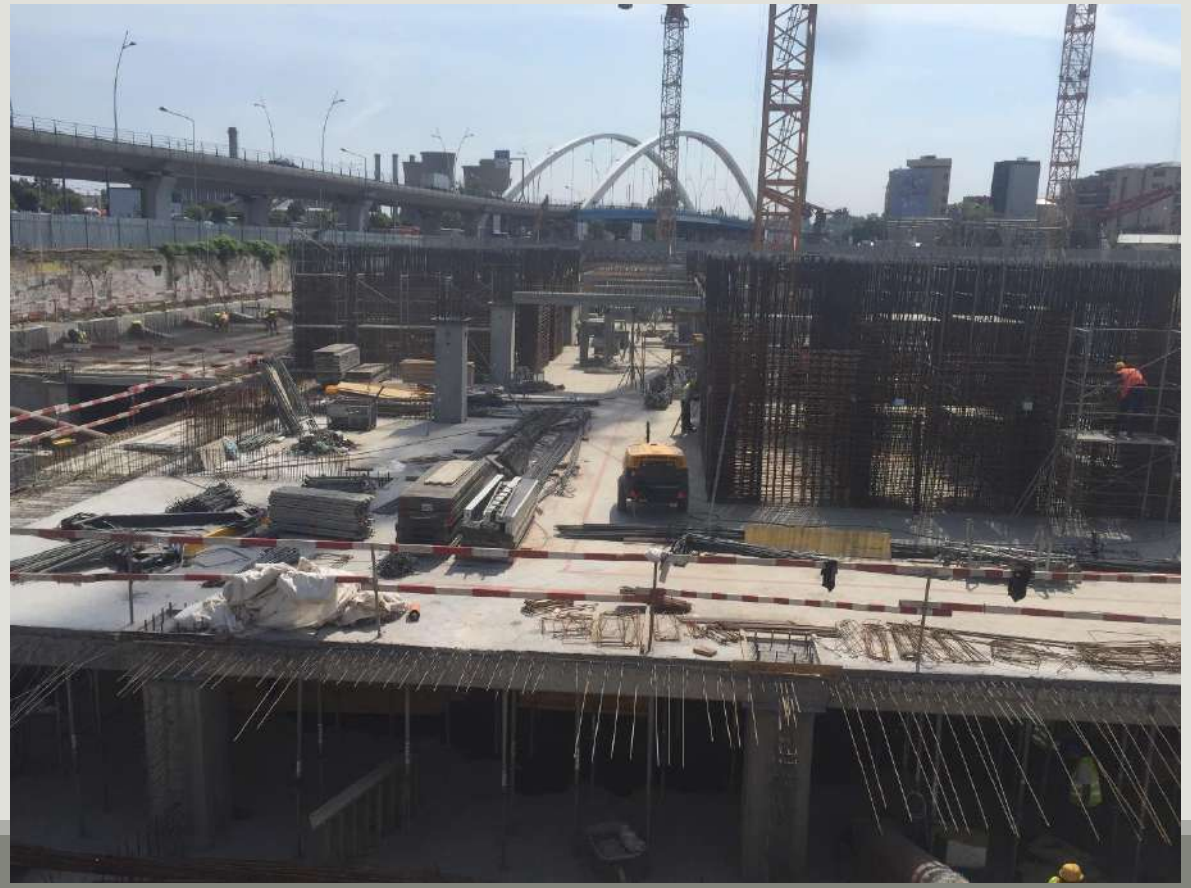
3. THE BRIDGE

RIGID-MOMENT JOINT



3. THE BRIDGE

CAST IN SITU CORE WALL



3. THE BRIDGE

CAST IN SITU CORE WALL

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PRECAST MOMENT FRAME – CAST IN SITU CORE WALL CONNECTION

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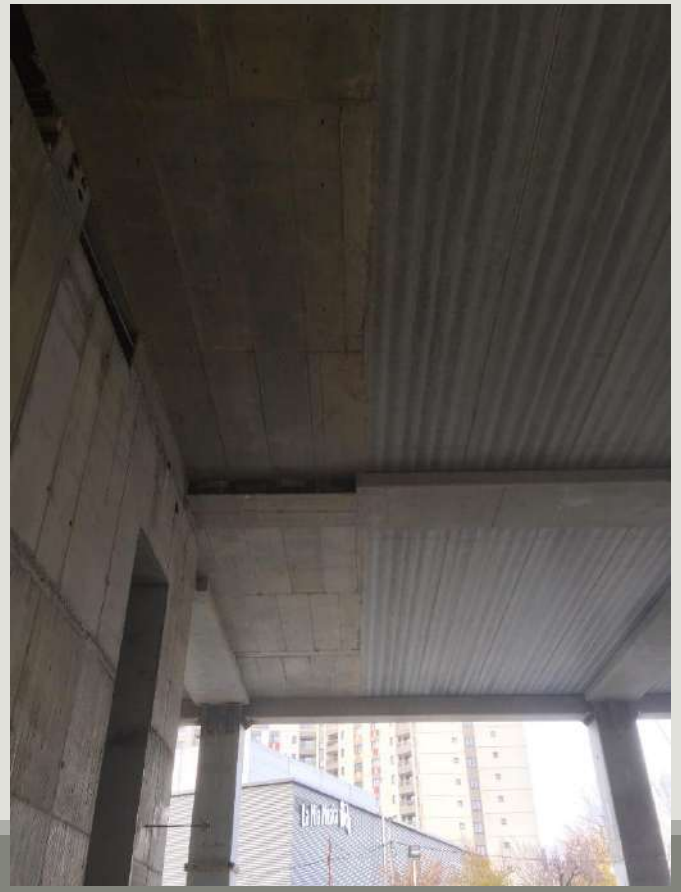

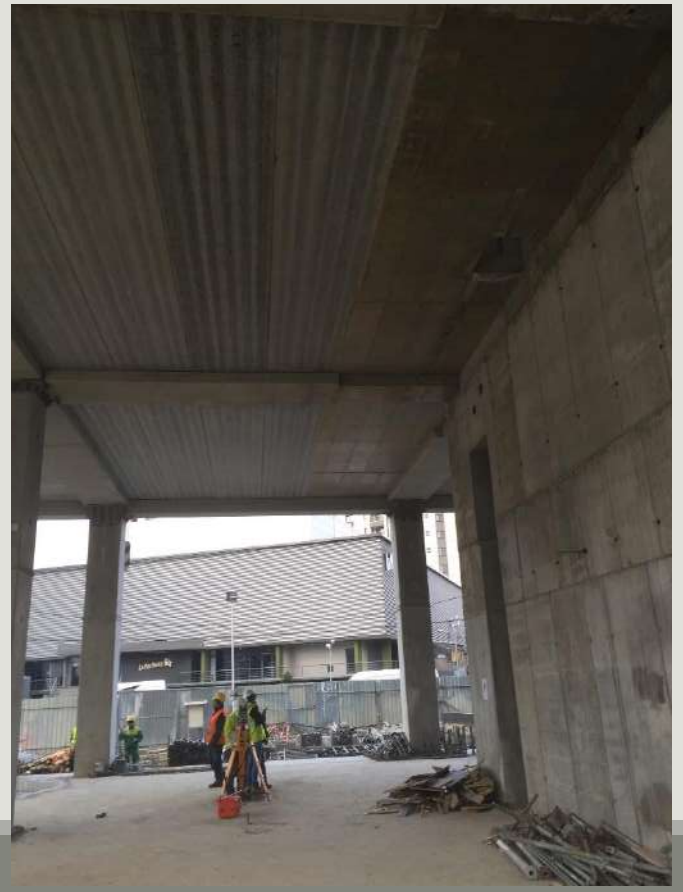

3. THE BRIDGE

OTHER DATA

- Design taking into consideration reduced capacity of the cranes (less than 8 t/element)

- Precast elements erected in winter season (temperatures below freezing)

- Steel capitels for columns in order to increase the speed of factory production

- Design of structural elements to avoid vertical supports

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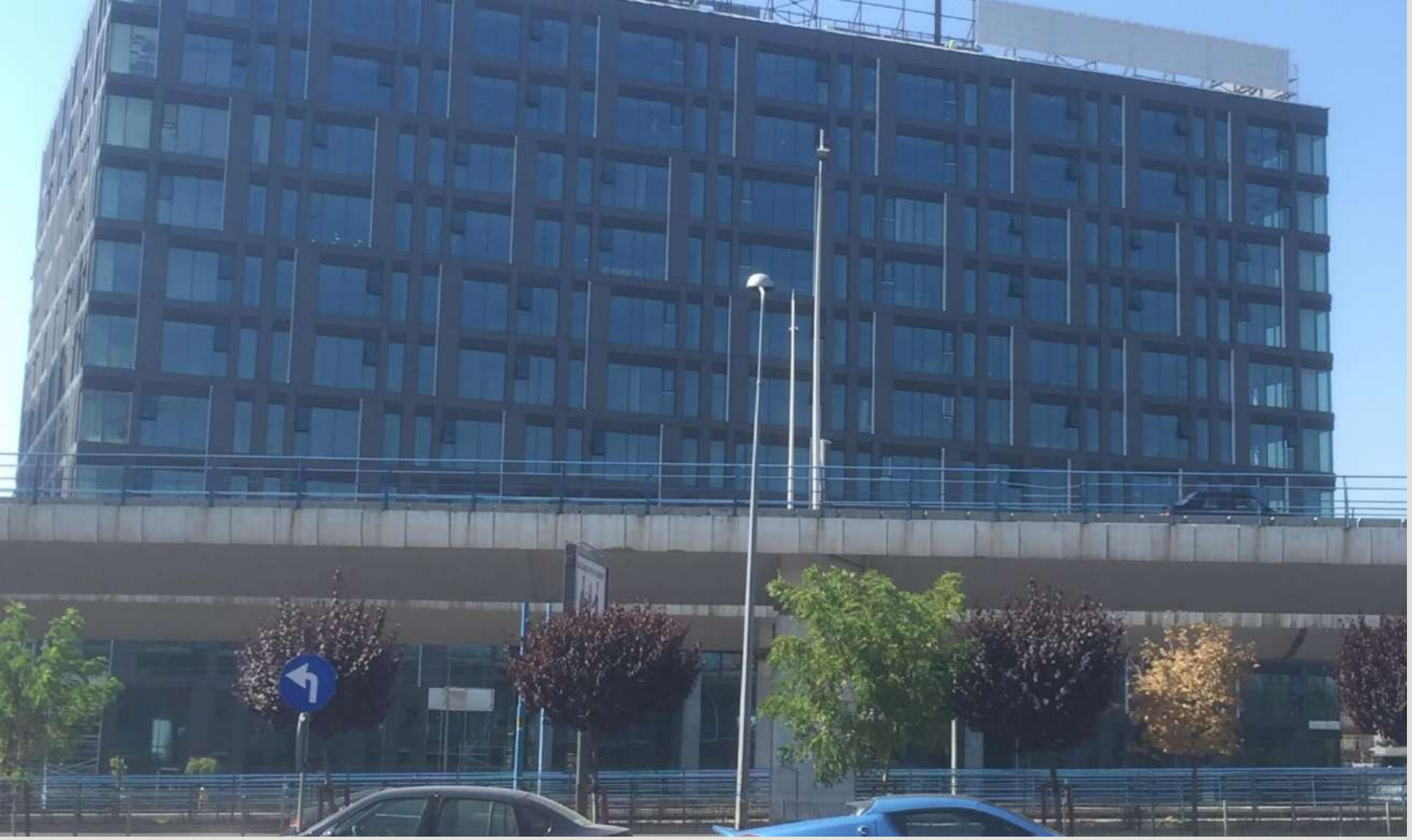

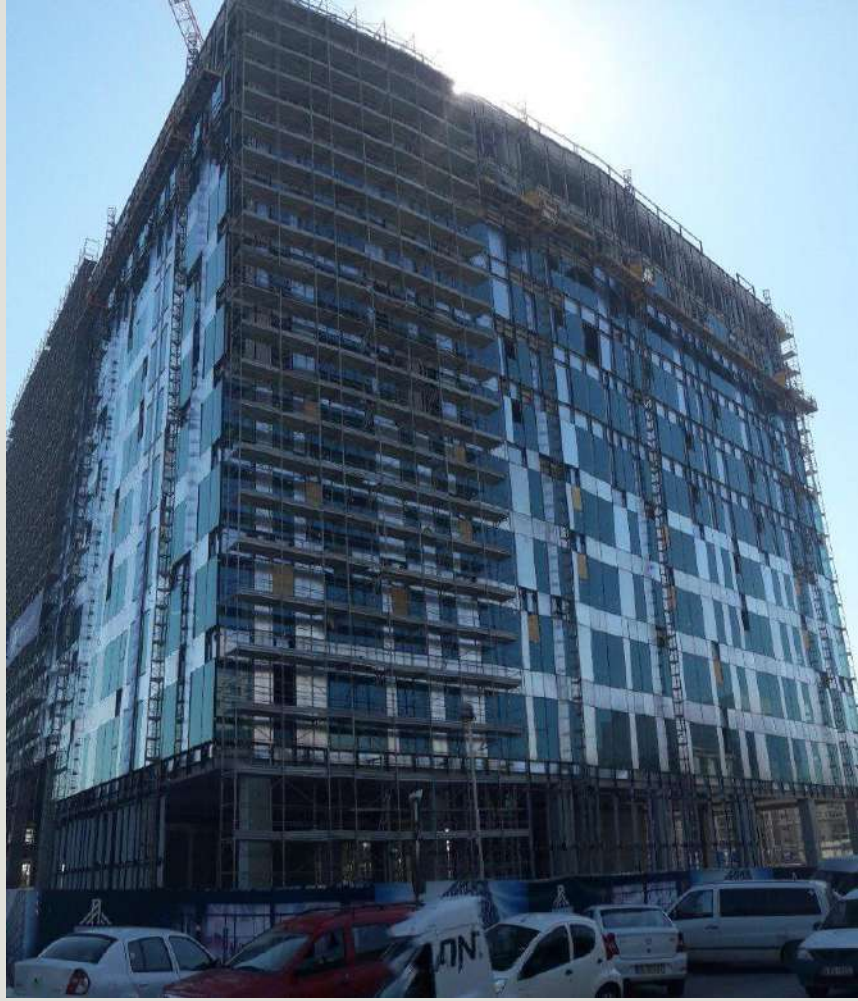

3. THE BRIDGE

OVERVIEWS

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CONSTRUCTION EVOLUTION