203.201 BUILDING COMPONENTS, BUILDING SHELL, SUPERSTRUCTURE

This document contains requirements for superstructure elements for a hospital building and is in alignment with the UniFormat II, Level 2 classification - B10. The document is subdivided into the following parts per the UniFormat II, Level 3 classifications.

UNIFORMAT II classification						MoP
Level 1 Major Elements		Level 2 Group Elements		Level 3 Individual Elements		Document Number
B	Substructure	B10	Super-structure	B1010	Floor Construction	203.201
				B1020	Roof Construction	

ELEMENT B1010, FLOOR CONSTRUCTION. Includes general design requirements for elevated floor slabs. Specific items of note include:

1. Design requirements
2. Concrete materials
3. Curing
4. Contract document requirements
5. Testing and Inspections

ELEMENT B1020, ROOF CONSTRUCTION. Includes general design requirements for roof decks. Specific items of note include:

1. Insurance Requirements
2. Design Requirements

ELEMENT B1010, FLOOR CONSTRUCTION

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PART 1 - GENERAL

1.01 OVERVIEW

A. Includes elevated floor slabs, metal floor decks, concrete, and associated structural framing.

PART 2 - DESIGN CRITERIA

2.01 GENERAL

A. Minimum live load design criteria for elevated slabs. Always coordinate project specific structural requirements with structural engineer.

Office areas, assembly, public spaces, stairs, patient/clinical areas	100 psf live load plus partition loads at columns, girders, floor slabs and beams. 2000 lbs. concentrated load at any 6.25 sf within a structural bay. Increase capacity as required for specific equipment.
Laboratories and Laboratory support areas	125 psf. Increase capacity as required for specific equipment.
Mechanical rooms, mechanical penthouse levels, electric and telecommunication rooms	150 psf. Increase capacity as required for specific equipment.
High-density storage	150 psf.
Loading dock, receiving	250 psf.

B. The use of supplemental cementitious materials as directed by the structural engineer of record and in accordance with ACI 301 and ACI 318 is acceptable as long as strength, and appearance of finished materials are not compromised.

C. Curing. The process in which interior concrete slabs cure plays an integral role in the performance of the finished floor material, especially with respect to adhesion. Slabs typically need to slowly cure in order to minimize cracking and maximize strength. Prevailing industry methods have utilized an applied chemical compound curing method to slow the rate of evaporation, however these chemicals void most flooring manufacturer's warranties since this has the potential to change the chemical composition of the concrete surface. While some exceptions will occur, it is the requirement of all BJC Planning, Design & Construction projects to cure interior

slabs which will receive floor finishes by a water-cure method. In addition, sufficient time shall be provided in the construction schedule to allow the concrete to dry to a level that is acceptable to the flooring manufacturer's requirements AND to the flooring standards defined in this Manual of Practice.

1. If applied chemical curing compounds are used, contractor will be required to prepare substrates according to flooring manufacturer's requirements. This may include mechanical scarifying and grinding of the concrete surface.

Coordinate concrete slab curing methods with finished flooring manufacturer. Chemical applications may need to be mechanically removed in order for flooring installer to accept the substrate.

2.02 CONCRETE

A. Air content of trowel-finished floors shall not exceed 3 percent as recommended by ACI 302.1R

B. Submit curing method of concrete slab to receive finished flooring prior to

1. Show full schedule impact for selected curing process. Include milestone dates for fully enclosed (watrertight) and start-up of building's mechanical systems.
2. Provide finish flooring manufacturer's letter of acceptance for selected curing process.

C. Compressive strength of concrete at 28 days shall be 4,000 psi, minimum. Structural Engineer of record to provide design and calculations to meet project specific requirements.

D. Maximum water-cementitious materials ratio for concrete slabs shall be 0.45.

E. Normal weight concrete materials. Use the following cementitious materials, of the same type, brand, and source, throughout project.

1. Cementitious materials.

a. Portland cement shall meet the minimum criteria established in ASTM C 150. Type I is intended for general construction applications. Other Types II through V will be considered on a project basis.

1) Fly ash is permitted in accordance with ASTM C 618, Class C. (Class C is most common in the St. Louis region. Fly ash produced from the burning of younger lignite or subbituminous coal, in addition to having pozzolanic properties, also has some self-cementing properties. In the presence of water, Class C fly ash will harden and gain strength over time. Class C fly ash generally contains more than 20% lime (CaO). Unlike Class F, self-cementing Class C fly ash does not require an activator. Alkali and sulfate (SO_4) contents are generally higher in Class C fly ashes.)

b. Where concrete will be significantly exposed and where coloration of the concrete is an important design consideration, limit or avoid use of fly ash.
c. Ground granulated blast-furnace slag is permitted in accordance with ASTM C 989, Grade 100 or 120. No ground granulated blast furnace slag from plant co-fired with hazardous or medical waste or tire-derived fuel.
d. Use of other supplementary cementitious materials shall be approved in writing by the Owner.

2. Aggregate.

a. Normal-weight aggregates shall comply with ASTM C 33, graded (severe weather region). Important to provide a well-graded aggregate mix for quality.

1) Maximum coarse aggregate size Portland cement shall meet the minimum criteria established in ASTM C 150.

a) Coarse aggregate size shall not exceed 1-1/2" nominal.
b) Fine aggregate shall be free of materials with deleterious reactivity to alkali in cement. Use Meramec sand only.

Fine aggregates shall be lignite free and shall be specified as Meramec sand ONLY.

b. Lightweight aggregates shall be in accordance with ASTM C 330, maximum 1 inch nominal aggregate size.

1) Note: lightweight aggregates are inherently more porous and therefore have the ability to hold more water which can be released into the concrete during curing. This water can contribute to increasing the dry time of the slabs and should be considered when determining construction schedules and curing processes.

3. Water shall meet the requirements of ASTM C 94/C 94M, and potable.

a. Use chilled water or ice for hot weather conditions
b. Use heated water for cold weather applications.

4. Admixtures.

a. Use of chloride-containing admixtures is strongly discouraged because of their detrimental effects on embedded reinforcement and the possible degradation of concrete structures.
b. Air-entraining admixtures may be permitted where increased resistance to freze/thaw is important.
c. Chemical admixtures will be permitted upon approval by the PD&C project manager. The following types are identified in ASTM C 494.

1) Type A: Water-reducing admixtures.
2) Type B: Retarding admixtures.

3) Type C: Accelerating admixtures.
4) Type D: Water-reducing and retarding admixtures.
5) Type E: Water-reducing and accelerating admixtures.
6) Type F: High-range, water-reducing admixtures.
7) Type G: High-range, water-reducing and retarding admixtures

F. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

G. Use of fly ash, pozzolan, ground-granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, is acceptable as long as the supplementary material does not exceed 40 percent of the Portland cement.

H. The addition of job site water to the concrete mix will not be permitted unless specifically approved in writing by the Structural Engineer and Architect of record.

I. Floor flatness and floor levelness requirements for projects shall consider the type of flooring to be installed. In some instances, the intended use of the space (surgery, imaging, laboratory, etc.) may require more stringent tolerances. Architect and Structural Engineer shall coordinate the requirements. The following minimum values for floor flatness and levelness shall be followed for elevated concrete slabs.

	Specified Overall Values for floor flatness (F) and levelness (L)	Minimum Local Values (MLV) for floor flatness (F) and levelness (L)
Areas to receive resilient and/or thinset flooring	F(F) 35 F(L) 25	F(F) 24 F(L) 17
Other areas with common floor coverings	F(F) 25 F(L) 20	F(F) 17 F(L) 15
Non-critical areas - mech. elec. room, storage, etc.	F(F) 20 F(L) 15	F(F) 15 F(L) 10

2.03 SLAB REINFORCEMENT

A. Concrete slab shall include welded wire reinforcement as specified by the architect and/or structural engineer.

B. Synthetic macro and micro-fiber are not permitted unless approved in writing by BJC Director of Design and Corporate Architect.

PART 3 - SPECIAL CONTRACT DOCUMENT REQUIREMENTS

3.01 GENERAL

A. Refer to specification requirements for concrete curing. Use of chemical curing compounds, including dissipating type may require additional removal and floor prep procedures.

B. Refer to specifications for moisture testing requirements including alkalinity, relative humidity and calcium chloride.

C. Identify and clearly dimension all recessed slab areas on drawings.

D. Identify conditions requiring additional slab thickness and/or additional reinforcing.

E. Identify associated fire-rated assemblies on drawings.

F. Coordinate all slab penetrations. Indicate and dimension on drawings.

PART 4 - PRODUCTS

4.01 GENERAL

A. Concrete mixture shall be free of materials containing lignite.

End of B1010 – Floor Construction

ELEMENT B1020 – ROOF CONSTRUCTION

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PART 1 - GENERAL

1.01 OVERVIEW

A. Includes metal roof decks, slabs, and associated structural framing.

B. Roof Construction, along with Roof Covering, forms the complete roofing system approach. BJC HealthCare's insurance provider has conditions that will direct the Project requirements. Coordinate roofing selections with FM Global. Refer to RoofNav program for list of pre-approved roofing systems.

PART 2 - DESIGN CRITERIA

2.01 GENERAL

A. Slope to drain may be achieved through use of sloped structure, or use of flat structure in combination with tapered insulation. Both options should be carefully evaluated. Regardless of the insulation type selected, its overall thickness at building perimeter must be factored in to the attainment of the required forty two inch (42") parapet height, as measured from finished roof surface adjacent to parapet.

B. Roof structure shall be designed to accommodate tie-offs. Where top of parapet exceeds 90 feet above grade, provide tie-offs and davit bases.

PART 3 - SPECIAL CONTRACT DOCUMENT REQUIREMENTS

3.01 GENERAL

A. Identify conditions requiring additional slab thickness and/or additional reinforcing.

B. Identify associated fire-rated assemblies on drawings.

C. Coordinate all slab penetrations. Indicate and dimension on drawings.

PART 4 - PRODUCTS

4.01 GENERAL

A. Not applicable.

End of B1020 – Roof Construction

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RESPONSIBILITY MATRIX

The following matrix identifies those individuals, roles or departments responsible for maintaining the accuracy of the information and those responsible for providing input. Refer to Preface for detailed explanation.

	BJC HealthCare													Hospital/Entity				
	PD&C						Clinical Asset Management (CAM)	Risk Management	Real Estate	Ergonomics	Infection Prevention (IP)	Info Systems, Data, Telecom (IS)	Other:	Standards Review Committee	Facilities Engineering	Housekeeping	Security	Other:
	Corporate Architect	Corporate Engineer	Director of Planning	Director of Design	Director of Construction	Other:												
Primary Authorship	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Secondary Authorship	☐	☒	☐	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

DOCUMENT REVISION HISTORY

The following able indicates the date the document originated and any subsequent revisions.

203.201 – Building Shell, Superstructure		
Issue	Description of Issue	Prepared by
2012 v1	Original Issue	G. Zipfel
2012 v2	Miscellaneous Review/Clarifications	G. Zipfel/B. Temple
2016 v1	reissued	G. Zipfel
2018 v1	Combined documents and renamed as 203.201	G. Zipfel