

MCFC North Stand

Concrete Specification

NSE-BHE-NS-ZZ-SP-S-0001

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7 February 2023

Revision P01

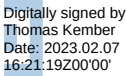
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date **07/02/23**

approved **Tom Kember**

signature  

date **07/02/23**

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References

Other BH document references
Structural Preface Documents
Stage 3 Report
Material Detailed Specifications
Structural Steel Specification
Structural Concrete Specification
Other Documents
Movement and Tolerance report
Dynamics report
Bowl Precast Concrete Performance Specification

Standard	
<i>NSCS Standard Specification</i>	<i>National Structural Concrete Specification for Building Construction (NSCS) 4th Edition</i>
<i>BS EN 1990</i>	<i>Basis of Structural Design</i>
<i>BS EN 1991</i>	<i>Eurocode 1: Actions on Structures</i>
<i>BS EN 1992</i>	<i>Eurocode 2: Design of Concrete Structures</i>
<i>IStructE</i>	<i>Dynamic performance requirements for permanent grandstands subject to crowd action – Recommendations for management, design and assessment</i>
<i>Department for Culture, Media and Sport</i>	<i>Guide to Safety at Sports Grounds (The Green Guide)</i>
<i>TR43</i>	<i>Post-tensioned concrete floors – Design Handbook</i>
<i>BS EN 13670</i>	<i>Execution of Concrete Structures</i>
<i>Good Practice in the Selection of Construction Materials</i>	<i>Ove Arup & Partners for the British Council for Offices and the British Property Federation</i>
<i>Building Research Establishment Digest</i>	
<i>Environmental Protection (Controls or Injurious Substances) (No.2) Regulations 1993</i>	
<i>BS 6089</i>	<i>Assessment of in-situ compressive strength in structures and pre-cast concrete components</i>
<i>BS EN 12878</i>	<i>Specification for pigments for Portland cement and Portland cement products</i>
<i>BS EN 480</i>	<i>Admixtures for concrete, mortar and Grout. Test methods. Determination of setting time</i>
<i>BS EN 934</i>	<i>Admixtures for concrete, mortar and grout. Common requirements</i>
<i>BS EN 8102</i>	<i>Code of practice for protection of below ground structures against water from the ground</i>
<i>BS 8500</i>	<i>Concrete. Complementary British Standard to BS EN 206-1. Specification for constituent materials and concrete</i>
<i>BS EN 206</i>	<i>Concrete. Specification, performance, production and conformity</i>
<i>CIRIA C766</i>	<i>Control of cracking caused by restrained deformation in Concrete</i>

NSCS Project Specification

Scope and references

This specification is for in-situ and pre-cast concrete structures forming part of the works on the North Stand Extension, as outlined on Buro Happold structural engineering drawings. This specification may not be used for other structures.

This specification has been issued in advance for the Site Improvement Works package, details of the concrete requirements for other works are work in progress and will be developed further in the conclusion of Stage 3 and in Stage 4.

For architectural concrete items defined on the architect's drawings, see the Architectural specification.

This specification must be read in conjunction with other employer's requirements and contract documents.

Note that "CA" in the NSCS should be read as "Main Contractor" to suit the design and build procurement method.

1. The specification for the (concrete) structure shall be the National Structural Concrete Specification for Building Construction (NSCS) 4th Edition
2. The NSCS Project Specification is provided by the Employer and identifies the appropriate information specific to the structure over and above that stated in NSCS Standard Specification. Clauses in the Standard Specification may be modified by information given in the Project Specification.

This specification has been written in conjunction with the NSCS and the numbering of sections within the document will therefore follow this.

Information to be supplied TO the Constructor

P1.1 General Information

P1.1.1 Project Contacts

Project name	MCFC North Stand
Project ref	053810
Address	Ethiad Stadium, Ethiad Campus, Manchester, M11 3FF

Employer

Name	Manchester City Football Club		
Address	Ethiad Stadium, Ethiad Campus, Manchester, M11 3FF		
Contact name	TBC		
Telephone		E-mail	

Principal Contractor

Name	TBC		
Address	TBC		
Contact name	TBC		
Telephone		E-mail	

Engineer

Name	Buro Happold		
Address	Buro Happold Limited, 230 Lower Bristol Road, Bath, BA2 3DQ		
Contact name	Luis Ferreira		
Telephone	01225 320600	E-mail	Luis.ferreira@burohappold.com

Contract Administrator (CA)

Name	TBC		
Address			
Contact name			
Telephone		E-mail	

Other named parties to the Contract:

Architect	Populous
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P1.1.2 Description of the Project Works

This specification covers the concrete elements for the Etihad Stadium North Stand Extension apart from the bowl pre-cast elements. A description of the project works can be found within the project Stage 3 design report and Buro Happold structural drawings, which should be read in conjunction with this report.

P1.1.3 Construction Planning Requirements:

The Constructor should notify the CA if any discrepancy is identified between the Contract Documents and the Specification.

Where details of the site conditions are provided, such as underground services, overhead cables, adjacent buildings and site obstructions, they are given to assist the Constructor in their tender stage planning. The Constructor should always confirm the accuracy of this information when on site, before starting work.

General

Refer to Preliminaries and other Contract documents for information required for construction planning.

P1.2 Design

P1.2.1 General

The design has been carried out in accordance with BS EN 1990, BS EN 1991 and BS EN 1992. Any design by the Constructor is to be carried out in accordance with these codes and the design data given in this specification.

Further documents and guidance notes to be used in the design of stadiums are listed below:

- *IStructE* - Dynamic performance requirements for permanent grandstands subject to crowd action – Recommendations for management, design and assessment
- *Department for Culture, Media and Sport* - Guide to Safety at Sports Grounds (The Green Guide)

Reference must also be made to the Stage 3 design report, which includes the Basis of Design.

Concrete primary precast and in-situ structures are designed by **Error! Reference source not found.**'s Engineer (BuroHappold). Please note that any proprietary precast elements will be designed by the Main Contractor and performance specified by Buro Happold.

Concrete secondary structures - Bowl Precast - are designed by *The Bowl Precast Package Sub-Contractor*.

Concrete secondary structures – other sundry elements – are designed by *The Main Contractor*.

Concrete secondary structures – precast stairs – are designed by *The Main Contractor*.

P1.2.1.1 Temporary works design responsibility

The design of all temporary works and stability of the whole structure in the temporary state is the responsibility of the Constructor, with the exception of the interim roof and forestay load transfer steelwork shown on the structural engineer's drawings.

Formwork shall be designed to be sufficiently rigid to maintain its position, shape and profile so that the final concrete structure is within the limits of the dimensioning tolerances specified.

P1.2.1.2 Builders work in connection (BWIC) with other trades

- The contractor shall complete the design of all Builders Work in connection with below ground services.
- The contractor shall complete the design of all Builders Work in connection (BWIC) with other systems and services, including holes and openings.
- The contractor shall complete the design of all Builders Work in connection with landscaping and external works including:
 - Foundations to hard landscaping (cycle racks, signage, lighting, water features etc.)
 - external works retaining walls
 - ramps and steps

P1.2.2 Loading

Refer to BH loading drawings and Stage 3 report for detailed information on loading, including wind loading, cladding loading and surcharge allowances.

P1.2.3 Other Design Data (TBC)

Design data	Buried Substructure elements including RC piles, pile caps, ground beams, wall bases etc.	Internal Non- conditioned: Concourse slabs generally (TBC)	Internal Conditioned: Internal composite slabs (TBC)
Fire rating	N/A	60 minutes	60 minutes
Exposure Class	XC2 + DC2 (TBC pending SI results)	XC3	XC1
Design life (years)	50 years	50 years	50 years
Maintenance/ replacement assumptions	NA	Inspect at 20 years and 10 year intervals thereafter. Maintain as required	Inspect at 20 years and 10 year intervals thereafter. Maintain as required
Nominal cover, C_{nom} [mm] (must be taken in conjunction with below)	75mm where cast against ground 50mm where cast on blinding or on sides/top	35mm	35mm
Minimum kg/m ³ cement content	Refer to P1.8.2	Refer to P1.8.2	Refer to P1.8.2
Maximum water/cement ratio	Refer to P1.8.2	Refer to P1.8.2	Refer to P1.8.2
Above is governed by			

P1.2.4 Special Requirements for Composite Structures

For the composite concrete slabs on metal decking, information relating to requirements for the concrete are included in this specification. In addition, refer to:

- **Structural drawings for details of composite floor slabs on metal decking.**

P1.3 Drawings and Calculations

Table omitted

P1.4 Execution Management

P1.4.1 Execution Class

The following parts of the structure are to be constructed in accordance with Execution Class 3:

All primary reinforced concrete shown on the structural drawings is to be Execution Class 3 in accordance with BS EN 13670:2009. Any secondary reinforced concrete not defined on the structural drawings is to be Execution Class 2.

P1.4.2 Execution Documentation

The following documentation is required:

Information	When required Number of working days before construction with updates as requested unless noted		Format/Notes P = Paper E = Electronic B = Both	
	Default	Project	Default	Project
Contractor's Quality Assurance Certification	At tender		Paper	E
SpeCC registration or equivalent	As requested		Paper	E
Detailed construction programme	20		Paper	E
Falsework and formwork: design	20		Calculations & drawings	E
Falsework and formwork: pre-concreting cleanliness	As requested		Paper	E
Reinforcement: source and supplier	20		Paper	E
Reinforcement: Certification	20		Paper	E
Reinforcement: pre-concreting location	As requested		Paper	E
Spacers	As requested		Paper	E
Couplers: source and supplier	20		Paper	E
Couplers: Certification	20		Paper	E
Continuity strips: source and supplier	20		Paper	E
Continuity strips: Certification	20		Paper	E
Post tensioning work:				
Certification	20	NA	Paper	-
Specific quality plan	20	NA	Paper	-
Other information	As CI P1.11.3	NA	Paper	-
Concrete: readymix plant details	20		Paper	E
Concrete: readymix producers' certification	20		Paper	E
Concrete: delivery ticket	As requested		Paper	E
Concreting: method statement and pour sequence for each section of the work	5		Paper	E
Pre-cast concrete	As Table P1.10		Paper	-
As built geometry: setting out and dimensions	10 working days after the construction is complete at each level		Paper	E
As built geometry: reinforcement cover	As requested		Cover meter survey	E

Information	When required Number of working days before construction with updates as requested unless noted		Format/Notes P = Paper E = Electronic B = Both	
	Default	Project	Default	Project
Environmental certification and responsible sourcing documentation where required: relating to reinforcement, aggregate, cementitious materials, formwork and concrete supply	20		Paper	E

P1.4.3 Approvals Timing

The timings given in NSCS Standard Specification apply to all approvals except as noted below.

Standard Specification clause ref.	Item	Requirements Before or after as appropriate. Working days unless stated	
		Default	Project
4.1.2.1	Material test results	10	
4.2.1	Quality plan	5	
4.3.3	Notice to CA for concrete pour inspection	1	
4.3.3	Before prestressing work starts	1	
4.3.3	Before covering up or backfilling	5	
4.3.3	For water-resisting construction to allow joint inspections	5	
4.3.4	Response by CA to request for modifications	5	
4.3.7	Copies of test results	3 No.	
4.3.8	Proposal and response time for work rectification	5 & 5	
6.2.1	Notice to CA for site changes to reinforcement	1	
7.1.1.4	Extension calculations for post-tensioning tendons	10	
7.3.1.1	Notice to CA for site changes to post-tensioning tendons	1	
7.4.1	Grouting records	5	
8.1.2.1	Concrete non-conformity	24 hours	
8.2.1.3	Method of fixing kickerless shutters	5	
8.2.1.4	Premature cessation of a pour	2 hours	
9.1.2	Precast connection details	15	
9.5.3	Proposals for cutting standard precast products	5	
5.8.1.2	Increase in pour sizes		10
8.1.1.3	Concrete records and Mix design		10
8.2.2.1	Cold weather concreting method statements		10
8.3.4	Alternative curing periods		10

P1.4.4 Inspection

Items not defined in table 1 of BS EN 13670 shall be inspected as follows:

N/A

Additional third party inspection, carried out by (TBC) is required of the following parts of the structure:

N/A

P1.4.5 Documents

The following **special documentation** is required:

Submission and Approval Programme Submit a programme outlining proposed dates for Constructor submissions, making allowance for the approval times in P1.4.3. The Designer may refuse to review drawings and schedules not previously identified on the Submission and Approval programme.
--

Requirements for **responsible sourcing** documentation:

TBC at Stage 4

P1.4.6 As Built Geometry

The **overall concrete** dimension shall be checked:

List of requirements	Frequency
Type and frequency of checks as necessary to meet the requirements of BS EN 13670 for the execution class.	As recommended in BS EN 13670. Checking intervals to be chosen such that corrective action is not made more complex by subsequent construction.

The **cover to reinforcement** shall be checked:

List of requirements	Frequency
Type and frequency of checks as necessary to meet the requirements of BS EN 13670 for the execution class.	Slabs - Four zones per storey, 1m x 1m zone to be checked - Two of these to be mid-way between radial grids, at midspan of secondary beams - Two of these to be at mid-way between radial grids directly above a secondary beam location

P1.4.7 Curing Class

List where curing classes other than 2 shall be used:

Class	Location
	Not applicable

P1.4.8 Protection

The following special protection is required:

Prevent damage to concrete, including:

- Surfaces generally: From indentation and physical damage.
- Surfaces to be exposed in the finished work: From dirt, rust marks and other disfiguration.
- Immature concrete: From thermal shock, physical shock, overloading, movement and vibration.

P1.5 Materials

P1.5.1 Reinforcement

Stainless steel reinforcement shall be used in the following locations:

Not applicable

Epoxy coated steel reinforcement shall be used in the following locations:

Not applicable.

Anchorage and couplers shall be:

To Constructor's specification. Include details as part of reinforcement drawings submission for Engineer's acceptance.

Fibres shall be used as follows:

Type of fibres	Location & dosage
TBC	

Requirements for **responsible sourcing** of reinforcement:

The fabricator, and mill supplying the reinforcement, shall be certified either through the Eco-Reinforcement scheme operated by BRE Global, or the 'Sustainable Reinforcing Steel Scheme' operated by CARES, or other third-party accredited scheme that follows the principles of BS8902.

P1.5.2 Timber

Requirement for **responsible sourcing** of timber or timber products:

100% of timber to be certified sustainably sourced by CPET recognised schemes.

P1.5.3 Other Materials

Materials not permitted:

In addition to the requirements of the NSCS Standard Specification, no materials listed in the following publications as being deleterious to health, safety or the integrity of the building are to be used in, or incorporated into, any temporary or permanent part of the works.

- "Good Practice in the Selection of Construction Materials" prepared by Ove Arup & Partners for the British Council for Offices and the British Property Federation
- British or European Standards or Codes of Practice (or equivalent standards or requirements)
- Building Research Establishment Digest.

The following materials are specifically precluded from all specifications pertaining to works carried out under this contract:-

- A. High alumina cement or concrete.
- B. Woodwool slabs as permanent shuttering.
- C. Calcium chloride in admixtures for use in reinforced concrete.
- D. Asbestos in any form.
- E. Sea dredged aggregates for use in reinforced concrete unless otherwise instructed by the client.
- F. Calcium silicate bricks.
- G. Urea formaldehyde.
- H. Materials which are generally composed of mineral fibres either man-made or naturally occurring (typically rockwool or slagwool), with a thickness of three microns or less and a length of two hundred microns or less, not sealed or otherwise stabilised to ensure prevention of fibre migration
- I. lead or any materials containing lead which may be ingested, inhaled or absorbed, except where copper alloy fitting containing lead are specifically required in drinking water pipework by any relevant statutory requirements
- J. calcium silicate bricks or tiles;
- K. vermiculite, unless established as fibre-free;
- L. cadmium or products containing cadmium as defined in the Environmental Protection (Controls of Injurious Substances) (No.2) Regulations 1993 and any future statutory modification or re-enactment thereof;
- M. timber treated with pentachlorophenol;
- N. polytetrafluorethylene (known as PTFE) except where used as non-stick sealing within valves or as an isolating tape;
- O. materials which emit radon gas;
- P. chlorofluorocarbons (known as CFC's) including any CFC based insulation;
- Q. halon gas, especially within fixed fire control systems;
- R. timber which is NOT obtained from managed regulated sustainable sources; and other substances generally known to be deleterious at the time of specification, including but without limitation substances which have been referred to by the Building Research Establishment as being hazardous to health and safety or to the durability of the property in the particular circumstances in which they are used.
- S. other substances generally known to be deleterious at the time of specification, including but without limitation substances which have been referred to by the Building Research Establishment as being hazardous to health and safety or to the durability of the property in the particular circumstances in which they are used.

The Constructor is required to ensure that all efforts be made, and using the best information available to him that these substances are not incorporated into the works. In the event that he is unwilling or unable to comply with these requirements he is to inform the CA in writing in sufficient time for consultations to be finished and alternatives to be considered.

Materials requiring special consideration:

In addition to the requirements of the NSCS Standard Specification, refer to the latest edition of the publication "Good Practice in the Selection of Construction Materials" (current at the time of specification and/or use of any materials or substances) prepared by Ove Arup & Partners for the British Council for Offices and the British Property Federation.

Items supplied by the Employer:

TBC

Requirement for **responsible sourcing** of materials:

All building materials (other than reinforcement and timber for which responsible sourcing standards are specified in P1.5.1 and P1.5.2) should be responsibly sourced in accordance with BES 6001 to meet the 'Excellent' standard.

List of materials to be supplied under **Constructor-specified supply**:

Coordinate the embedment of pre-set foundation bolts (holding down bolts) with other trades as necessary. Coordinate with cast-in requirements for cladding trades, including thermal isolators, balustrade items at slab edges and any cast-in channels or fixings. Coordinate the embedment of cast-in services with building services contractors. All components in connections with cast-in containment.

P1.6 Project Requirements

Enter variations from NSCS Standard Specification

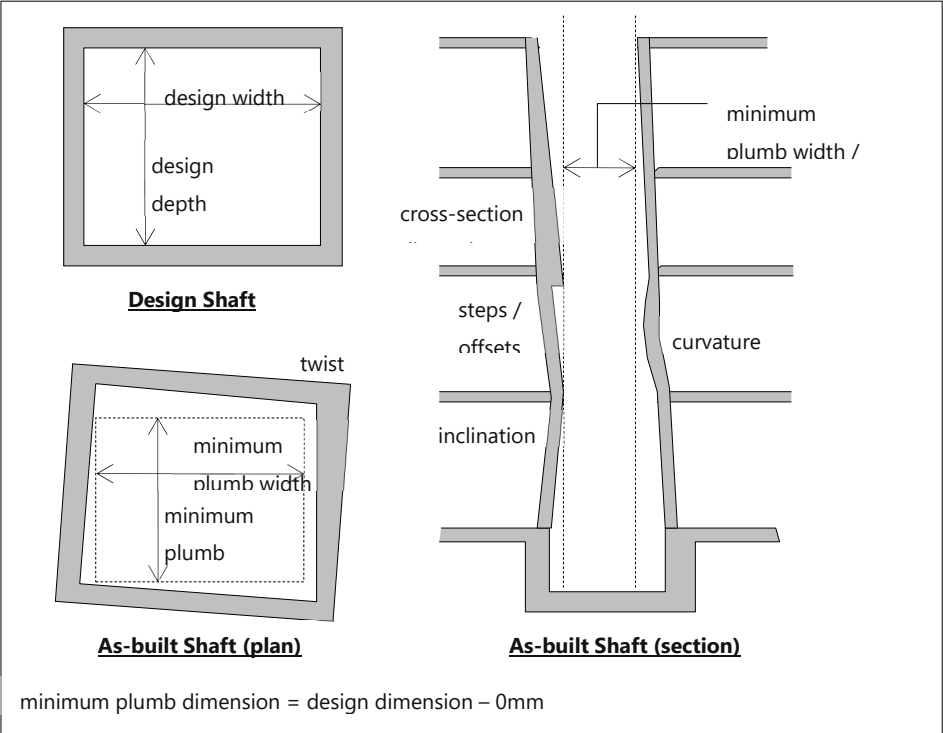
Standard Spec Clause ref	Change	Description
4.2.5.1	New	The constructor must provide locations of all temporary openings for any temporary works (such as pumps or cranes) and coordinated these to suit the structural and architectural design.
5.3	Modified	Replace the clause with the following: 5.3 Release Agents Release agents shall be chosen to suit the method of construction and the finishes required, and shall take note of the requirements of following trades. They shall not be adversely affected by the weather. To be materials marketed as release agents and one of the following: • Cream emulsion (not to be used where they may be subject to freezing) • Neat oil with surfactant added • Chemical release agent. Release agents must be stored and used strictly in accordance with the manufacturer's instructions. Use the same type and make throughout the entire area of any one finish. Use the minimum amount necessary to obtain a clear release and prevent excessive local collection. Prevent release agent touching the reinforcement, hardened concrete, other materials not part of the form face and permanent forms.
5.4.1	Modified	Add the following: Submit proposals for maintaining stability of excavated faces and preventing contamination of concrete by loose soil.
5.4.2	Modified	Replace the clause with the following: 5.4.2 Cleanliness At the time of placing, formwork (including metal decking) shall be clear of all debris, tie wire clippings, fastenings, water, snow and ice before concrete is placed.
5.4.3	New	5.4.3.1 Under-slab polythene damp proof membrane / gas and vapour membrane To be confirmed following receipt of full Stage II Ground Investigation report. 5.4.3.2 Sub-structure formwork and under-slab insulation Cut all edges, and around penetrations and downstands neatly and accurately. Lay tightly butted and fully supported on firm, even substrate. Stiffen vertical faces as necessary to act as shutter. Protect formwork/ insulation surfaces from indentation by spacers and other items. Seal all joints in formwork/ insulation and with edge structure and penetrations to prevent penetration of concrete. Restrain formwork/ insulation against movement during concrete placement.
5.4.4	New	5.4.4 Joints in Forms Construct formwork, including joints in form linings and between forms and completed work, to prevent loss of grout, using seals when necessary. Secure formwork tight against adjacent concrete to prevent formation of steps. Joints in panels to be regular, orthogonal and either vertical or horizontal unless otherwise specified.
5.8.1	Modified	Add the following: Geometry Produce drawings showing the layout of construction joints and agree their location with the CA. Joints are to be positioned so as not to weaken the structure. Pour size limits and joints • Joints to be arranged to minimise the occurrence of shrinkage cracks.

		- Except for watertight concrete the maximum size of pour to be 15m length and 200m² in area, the ratio of the length of the sides is not to exceed 1:1.5. - For watertight concrete the maximum pour to be 7m length and 50m² area, the ratio of the length of the sides is not to exceed 1:1.5. For walls no pour is to exceed 4m height and 7m length. Joint layouts to be coordinated with aesthetic requirements and submitted for review. Position and form joints accurately, straight, well-aligned and truly vertical or horizontal or parallel with setting out lines of the building.
5.8.1.1	New	5.8.1.1 Increasing pour size Pour sizes may be increased from limits in 5.8.1 provided that the CA approves of: - Constructor's method statement fully defining the proposal - Constructor's concrete curing regime, designed to eliminate plastic shrinkage cracking - Constructor's calculations demonstrating that dry shrinkage cracking is limited to crack width of 0.3mm (or 0.2mm for water-resisting concrete) - Forces, calculated and submitted by the Constructor, which are induced in the existing structural elements - Constructor's plans to make good any shrinkage cracking that does occur The Contractor ensures that a concrete pour can be completed and finished without infringing restrictions on hours of working. Any costs or programme implications arising from these provisions will be absorbed by the Contractor. Pour sizes increased above those in 5.8.1 are deemed as Constructor's Alternatives and the cost of investigating and approving (even if not approved) shall be met by the Constructor.
5.8.1.2	New	5.8.1.2 Stop-ends All construction joints other than horizontal to be formed against proper stop-ends which are notched around the reinforcement, substantially grout-tight and fixed vertically unless otherwise directed. Reinforcement not to be displaced or bent.
6.1.1.1.	Modified	Replace the clause with the following: 6.1.1.1 Standards All reinforcement shall comply with the requirements of BS4483 and BS8666 as appropriate All reinforcing bars in accordance with BS4449 shall be Grade B500B. All fabric reinforcement in accordance with BS4483 shall be Grade B500A.
6.2.1	Modified	Add the following: Steel fixer to be present during concreting.
8.1.1.2	Modified	Add the following: Sulphate content of mixes: - The total sulphate content of the constituents of each mix arising from all sources and expressed as SO₃ must not exceed 4% by weight of the cement in the mix - Submit certification and calculations to demonstrate compliance to the CA Aggregates prone to alkali-silica reaction: - Submit evidence that the service records of the proposed cement/aggregate combinations extend over at least 5 years and do not include any instances of alkali/silica reaction - If the CA is not satisfied with such evidence, or in its absence, concrete mixes must be made with: EITHER - Cement with a certified average acid soluble alkali level less than 0.6% equivalent Na₂O OR - A total alkali content in accordance with BRE Digest 330, Part 2, Table1 OR - A combination of not less than 50% PFA with OPC

		- Specified concrete mixes which comply with any of these alternatives must not be changed without approval. Mixes containing a combination of GGBS or PFA with OPC must be obtained from a plant which holds a current Certificate of Accreditation under the Quality Scheme for Ready Mixed Concrete Admixtures - Use only if specified or approved. The following details of admixtures or cement containing additives to be submitted for approval: - Brand name and manufacturers literature - Proposed dosage and detrimental effects, if any, of under and over-dosage. - Chloride content - Method of adding to the concrete mix - Pigments for colouring cement and concrete are to comply with BS EN 12878 'Specification for pigments for Portland cement and Portland cement products' - Accelerators, retarders, water reducing admixtures and combinations of these are to comply with BS EN 480 and BS EN 934 - No substances containing chlorides are to be added to reinforced concrete Other approved admixtures are to be used strictly in accordance with the manufacturer's instructions.
8.1.1.4	Modified	Replace the clause with the following: 8.1.1.4 Site addition of water to ready-mixed concrete No extra water to be added after the concrete has left the depot.
8.1.2.1	Modified	Add the following text: Maintain complete correlated records of all testing including: - concrete designation - Sampling, site tests, and identification numbers of specimens tested in the laboratory - Location of the parts of the structure represented by each sample - Location in the structure of the batch from which each sample is taken. Submit three copies of all test reports within one day of completion of each test and maintain a complete set on site, available for inspection.
8.1.2.6	New	8.1.2.6 Failures If a concrete sample fails to achieve specified criteria or to pass specified tests, inform the CA without delay and submit: - Confirmation of the validity of the test results - Proposals for further tests to assess the strength of the concrete in the structure, as set out in BS 6089 - Proposals for rectification. Obtain approval of all such evidence and proposals before proceeding. The CA may issue instructions for the work to be stopped or delayed until reasons for the failure have been established, and the possible consequences assessed. Wherever the specified sampling, testing and compliance procedures show that a concrete mix is not in accordance with the specification (even if the work is eventually accepted), and measures are taken to help in establishing whether or not the work is acceptable, such measures: - will be at the expense of the Constructor - will not be considered as grounds for extension of time. Keep separately the pieces of each cube which fail to meet the conformity requirements for individual results for a period to be agreed with the engineer.
8.1.5	Modified	Add the text: Each mix must be obtained from only one source unless otherwise approved. All the constituents for each mix to be added at the manufacturer's depot unless otherwise agreed with CA. No extra water or other material to be added after the concrete has left the depot. Each load to be accompanied by a delivery note stamped with the time of mixing and stating the consignee, concrete, grade and quantities of all materials in the mix including water and additives. Not more than one hour to elapse between the time of mixing and the time of discharge. Retain all delivery notes for inspection for the duration of the contract.

8.2.1.1	Modified	Replace the clause with the following: 8.2.1.1 Placing Compaction shall be carried out without causing damage or displacement of the formwork, reinforcement, tendons, ducts, anchorages, inserts, etc. Start compacting as soon as there is sufficient concrete within the formwork to immerse the vibrator. Compacting to continue during the placing operation so that there is never a large volume of un-compacted concrete in the formwork. Fully compact concrete to full depth (until air bubbles cease to appear on the top surface), especially around reinforcement, cast-in accessories, corners of formwork and joints. Ensure amalgamation with previous batches but do not damage adjacent partially hardened concrete. All internal vibrators to be of a diameter appropriate to the works. Do not use external vibrators. Maintain sufficient numbers and types of vibrator to suit pouring rate, consistency and location of concrete Inspect fresh concrete closely and continuously wherever settlement cracking is likely to occur (including the top of deep sections and at significant changes in the depth of concrete sections) during the first few hours after placing and whilst concrete is still capable of being fluidized by the vibrator. Re-vibrate concrete where cracks are observed.
8.2.1.2	Modified	Replace the clause with the following: 8.2.1.2 Compaction Compaction shall be carried out without causing damage or displacement of the formwork, reinforcement, tendons, ducts, anchorages, inserts, etc. Start compacting as soon as there is sufficient concrete within the formwork to immerse the vibrator. Compacting to continue during the placing operation so that there is never a large volume of un-compacted concrete in the formwork. Fully compact concrete to full depth (until air bubbles cease to appear on the top surface), especially around reinforcement, cast-in accessories, corners of formwork and joints. Ensure amalgamation with previous batches but do not damage adjacent partially hardened concrete. All internal vibrators to be of a diameter appropriate to the works. Do not use external vibrators. Maintain sufficient numbers and types of vibrator to suit pouring rate, consistency and location of concrete Inspect fresh concrete closely and continuously wherever settlement cracking is likely to occur (including the top of deep sections and at significant changes in the depth of concrete sections) during the first few hours after placing and whilst concrete is still capable of being fluidized by the vibrator. Re-vibrate concrete where cracks are observed.
8.2.1.3	Modified	Replace the clause with the following: 8.2.1.3 Kickers Where kickers are used, they shall be made with concrete of the same strength as that used in the wall or column. Kickers must not protrude above the level of floor finishes where exposed columns and walls are required. In these cases kickers should not be used if floor finishes are less than 125mm thick. Where kickerless construction is used provide details of the proposed method of securing and sealing the column and wall shutters at floor joints to the CA for agreement.
8.2.2.1	Modified	Replace the clause with the following: 8.2.2.1 Cold Weather For concreting in cold weather, air temperature below 5°C, agree in advance with the CA any changes to the cement, admixtures or concrete temperature to prevent freezing of the concrete, to limit extended stiffening times and to maintain the required concrete strength development. Do not place concrete against frozen or frost covered surfaces
8.2.2.3	New	8.2.2.3 Generally Where possible, prevent coincidence of maximum heat gain from cement hydration with high air temperature and/ or solar gain. Submit proposals for protecting concrete when predicted ambient temperatures indicate risk of concrete freezing or overheating.

8.3.3	New	8.3.3 Prevention of surface evaporation Prevent surface evaporation from concrete throughout the curing period by: - Retaining formwork in position and, if necessary, covering exposed surfaces immediately after striking - Covering top surfaces of fresh concrete immediately after completion of placing and compacting each bay, removing covering only to permit any finishing operations and replacing immediately thereafter - Maintain surface temperature above 5°C throughout the periods specified below or four days, whichever is the longer Maintain detailed records of location and timing of casting of individual batches, removal of formwork and removal of coverings. Keep on site for inspection.
8.3.4	New	8.3.4 Curing periods Surfaces which will be exposed to frost, and wearing surfaces of floors and pavements, regardless of weather conditions not less than 10 days. Other structural concrete surfaces not less than 5 days. These periods may be relaxed if the constructor can propose, to the CA's satisfaction, an alternative curing regime. Refer to NSCS guidance section 8.3.1 and BS EN 13670 Annex F.
8.4.2	Modified	Replace the clause with: 8.4.2 Water-resisting construction If the work fails to meet the specified grade; - Tests and investigations are to be carried out, as agreed with the CA, to help identify the cause or causes of leakage - Carry out remedial work by pressure grouting, waterproof rendering or other approved means necessary to make the work watertight - On completion of the remedial work repeat the specified test for water tightness Payment for such investigations, remedial work and additional tests may be withheld if, and to the extent that, the cause of leakage was the Constructor's failure to comply with the specification, drawings or other instructions.
8.5.1	Modified	Add the following text: Should cracks occur that are wider than the critical crack width, survey the frequency and extent of such cracks and investigate cause and report findings together with recommendations for rectification.
10.1	Modified	Add the following text: Checking intervals to be chosen such that corrective action is not made more complex by subsequent construction. Corrective action will be at the expense of the Constructor and will not be grounds for an extension of time.
10.1.7	New	10.1.7 Coordination between trades and checking - Ensure that there is an adequate exchange of information with and between all trades, suppliers and others employed by the Employer with regard to the sizes of components and locations - Check dimensions of all components after delivery to site and inform the CA of any departure from permissible deviations and tolerances. Where tighter tolerances are specified elsewhere in the documentation (i.e. in the Preliminaries, in other Sections of the Specification or on Drawings) then those tolerances take precedence.
10.2.2	Modified	Replace the clause with: 10.2.2 Level Level of ground floor slabs without screed finishes to be constructed to meet the requirements of FM 3 properties E & F as defined by Technical Report 34 published by the Concrete Society (4th Edition). Level of ground floor slabs with screed finishes to be constructed to meet the requirements of FM 4 properties E & F as defined by Technical Report 34 published by the Concrete Society (4th Edition).
10.6.5	Modified	Add the following text: Permitted deviation in level between any two points 6m apart to be +/-5mm.

10.9.1	Modified	Add the following text: 10.9.1 Flatness Suspended floor slabs are to be constructed to meet the requirements of Class SR3 as defined by BS8204-1:2003+A1:2009. Generally, formed and unformed concrete surfaces are to meet the requirements for Ordinary finishes. Sudden irregularities are not to be permitted.
10.13	New	Lift Shafts The design width shown on the structural drawings is the same as the minimum plumb width required by the lift manufacturers. The tolerance on the design width and depth of the shaft is to be taken as +25 / - 0 (i.e. the lift shaft must be constructed to achieve at least the clear width and depth shown on the structural drawings).  Design Shaft As-built Shaft (plan) As-built Shaft (section) minimum plumb dimension = design dimension – 0mm The lift pit base is to be constructed with a tolerance on concrete level of +0 / -25 (i.e. the lift pit base must be no higher than the level given on the structural drawings, but can be 25mm lower).

P1.7 Water-resisting Construction

P1.7.1 Detail

The Constructor will be responsible for the detailed design of water-resisting construction.
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P1.7.2 Crack Widths

These should be limited to	0.3mm generally. This will be reduced to 0.2mm for water resisting concrete
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P1.8 Concrete

P1.8.1 Designated concrete

(Section omitted)

P1.8.2 Designed Concrete

To be in accordance with BS 8500–2 and BS EN 206–1

Concrete to be Normal Weight

The Contractor should endeavour to **minimise embodied carbon** with reinforced concrete design. The following steps are seen as a minimum:

- It shall be assumed that the reinforced concrete will be formed generally to a blend of grades (refer to tables below for details).
- Reinforcement shall be Type 2 deformed bars with a yield strength of 500N/mm².
- 50% of cement to be replaced by Ground Granulated Blast-furnace Slag to limit embodied carbon. The Contractor should endeavour to minimise embodied carbon with reinforced concrete design.
- Concrete to be normal weight (i.e. not 'lightweight' concrete); dense and well compacted (i.e. no honeycombing or significant voids shall be permitted in the as-struck finish).
- Suitable admixtures may be used only if agreed with BuroHappold.
- All cast-in-place concrete shall be ready mixed concrete, batched off-site in a specialist production facility generally as defined in BS EN 206.

	Requirements	Defaults	Project			
1	Concrete reference		Mix00 Foundations (inc. pilecaps, ground beams – exc. piles)	Mix01 Ground floor concrete (inc. ground bearing slabs)	Mix02 Composite Slabs: Internal, Non- conditioned (semi-external composite slabs)	Mix03 Composite Slabs: Internal, Conditioned (internal composite slabs)
2	Strength class		C32/40 (TBC)	C32/40 (TBC)	C32/40	C28/35
3	Maximum water-cement ratio		0.55 (TBC)	0.55 (TBC)	0.55	0.70
4	Minimum cement content kg/m ³		320 (TBC)	320 (TBC)	300	240
5	DC-Class where appropriate		DC-2 (TBC)	DC-2 (TBC)	N/A	N/A
6	Permitted cement types - See BS 8500-1:2015+A2:2019, Cl. 4.3.2, Note 3		IIIB+SR (minimum 75% cement replacement)	IIIB+SR (minimum 75% cement replacement)	All in Table A.6 except IVB-P, IVB-Q, IVB-V	All in Table A.6 except CEM I
7	Maximum aggregate size (mm) - Enter 10, 14, 20 or 40	20	20	20	20	20
8	Chloride class (a value must be entered unless CI 0,40 is acceptable)	CI 0,40				

	Requirements	Defaults	Project			
9	Target density/density class (for lightweight and heavyweight concrete)	N/A				
10	Consistence class S1, S2, S3, S4		S3	S3	S3	S3
11	Method of placing concrete		Pump/Hopper	Pump/Hopper	Pump/Hopper	Pump/Hopper
12	Requirement for finishing concrete	See P1.9	See P1.9	See P1.9	See P1.9	See P1.9
13	Type and dosage of fibres	See P1.5.1	-	-	-	-
14	Use of RA conforming to BS 8500-2:2015+A2:2019, Cl. 4.3, permitted? If YES: enter requirements for:	Yes	Yes	Yes	Yes	Yes
	Maximum acid-soluble sulphate, method for determination of the chloride content classification with respect to ASR, method for determination of alkali content., any limitations on use in concrete, e.g. exposure classes, maximum mass fractions etc (Enter details in P1.13)	RCA permitted to 20% mass fraction	RCA permitted to 20% mass fraction	RCA permitted to 20% mass fraction	RCA permitted to 20% mass fraction	RCA permitted to 20% mass fraction
15	Special requirements for aggregates	None	No sea dredged aggs	No sea dredged aggs	No sea dredged aggs	No sea dredged aggs
16	Minimum air content, or other requirements to resist freeze-thaw attack	None				
17	Special requirements for temperature of fresh concrete	None	See 8.3	See 8.3	See 8.3	See 8.3
18	Special requirements for strength development	None	See 8.3	See 8.3	See 8.3	See 8.3
19	Special requirements for heat development during hydration	None	See 8.3	See 8.3	See 8.3	See 8.3
20	Special requirements for retarded stiffening	None				
21	Special requirements for resistance to water penetration	None				
22	Special requirements for resistance to abrasion	None	Refer to P1.9.2 for info.	Refer to P1.9.2 for info.	Refer to P1.9.2 for info.	Refer to P1.9.2 for info.
23	Requirements for tensile splitting strength	None				
24	Additional technical requirements See BS 8500-1: 2015+A2:2019, Cl. 4.3.3 sections n & m	None				
25	Identity Strength testing required? (If Yes then details to be added into P1.13)	None	Yes	Yes	Yes	Yes
26	Identity Consistence testing required? (If Yes then details to be added into P1.13)	None	Yes	Yes	Yes	Yes

	Requirements	Defaults	Project			
27	Other properties Identity testing required? (If Yes then details to be added into P1.13)	None	-	-	-	-
Notes: 1. All sections of the specification must be completed before it is passed to the producer. The person sending the final specification to the producer must send copies of the document to all other parties (CA, Engineer, Employer as appropriate) who have contributed to the specification. 2. Where 'None' is entered in the table this is a default value to ensure that the specification is complete. All those involved in completing the specification need to check if 'None' is appropriate. 3. Guidance on specification of designed concrete can be found in BS 8500-1: 2015+A2:2019, Section 4.3. 4. Maximum 10mm aggregate size to be considered where embedded plates are present. This requirement is to be confirmed following confirmation of the proprietary steel to concrete connection system.						

P1.8.3 Prescribed Concrete

To be in accordance with BS 8500 -2 and BS EN 206-1.

Prescribed concrete not specified – table omitted

P1.8.4 Standardised Prescribed Concrete

Prescribed concrete not specified – table omitted

P1.8.5 Proprietary Concrete

To be in accordance with BS 8500 -2 and BS EN 206-1.

Proprietary concrete not specified – table omitted

P1.9 Surface Finishes

P1.9.1 Reference Panels

The Ordinary and Plain Formed Reference Panels for this project are at:

Refer to the Architect's specification.

P1.9.2 Special Finishes

Special Finishes (other than formed or unformed, Basic and Ordinary finishes) are required as follows:

Refer to the Architect's specification.

P1.10 Precast Concrete

This is information to be provided by the precast concrete manufacturer prior to commencement of works:

Structural design calculation of precast concrete elements to be submitted to the PC & the Engineer for information (including reinforcement detail, reinforcement placement drawings, connection details).

Table omitted

P1.11 Pre-stressed Concrete Construction

The requirements for the pre-stressed construction are:

Not applicable – section omitted

P1.12 Deflection Allowances

P1.12.1 To Be Used in Calculating Formwork Pre-Camber

Location	Design deflection
N/A	

P1.12.2 Design Pre-Camber Required for Precast Concrete Elements

Location	Design deflection
N/A	

P1.13 Further Information

Further information to expand data given in CI P1.1 to P1.12

Clause ref.	Additional Information
P1.3	Definition of 'period before construction' is defined for reinforced concrete as the period before the concrete element in question is to be constructed, as shown on the principal contractor's approved programme and for precast concrete, as the period before the precast element is manufactured.
P1.4.2	Add the following item to the "Execution documentation" table: Information: Submission and Approval programme When Required: No more than 2 weeks after contract. Format / Notes: Electronic
P1.4.4	Coordinate reinforcement detailing and installation, basement waterproofing detailing and concrete placement with requirements of lightning protection system.
P1.7.1	General: All waterproofing membranes and ancillary materials shall be from the same manufacturer to ensure compatibility for the full system. The manufacturer shall provide a fully compatible system with compliant performance (including robust detailing) for any combined pre- and post-applied system.
P1.8.2/3/4/5	Sampling rate for identity testing First 40 samples: One sample per mix for each 20m ³ cast or four samples for each day that the mix is used, whichever is the greater. Remainder: One sample per mix for each 50m ³ cast or one sample for each day that the mix is used, whichever is the greater.

Information to be supplied BY the Constructor

Required at tender stage unless noted, with updated information issued for construction

P2.1 General Information

Project Contacts

Project name			
Project ref.			
Address:			
Telephone		E-mail	

Constructor

Name			
Address			
Contact Name			
Telephone		E-mail	
SpeCC Registration Required		SpeCC Registration Number	

Designer

Name			
Telephone		E-mail	

Temporary Works Coordinator

Name			
Telephone		E-mail	

Other Specialist Contractors to be used by Constructor:

Name			
Telephone		E-mail	

P2.2 Design

Details of any Constructor-designed structure as defined in Table P1.3

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P2.3 Drawings and Calculations

Details of any proposed variation of values in Cl. P1.4 and other specification changes:

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P2.4 Execution Management

P2.4.1 Construction Planning

An information requirement schedule, based on the construction programme and this Specification is to be issued to the CA within two weeks of Constructor being appointed.

P2.4.2 Other Execution Management Proposals by Constructor:

Details of any other proposals for execution management from the Contractor

TBC

P2.5 Materials

Details of any alternative materials, or material sources, proposed by Constructor:

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P2.6 Project Requirements

Details of any proposals for alternative specification or workmanship from the Constructor:

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P2.7 Water Resisting Construction

The Constructor will be responsible for the detailed design of water-resisting construction. Refer to Buro Happold's Waterproofing Performance Specification for further information.

P2.8 Concrete and Concreting

Any proposed concrete specification variations, in addition to the Constructor's input to the tables in section P1.8

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P2.9 Further Information

Further information to expand data given in sections P2.1 to P2.8

Clause ref.	Additional Information

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