CONSTANT
STRUCTURAL DESIGN

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STRUCTURAL SPECIFICATION

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PRELIMINARY CLAUSES

GENERAL

1 Do not scale drawings. The Contractor is to check all dimensions on site before carrying out works

2 This specification is to be read in conjunction with the Architect's, Services Engineer's and all other Specialist's drawings and Specifications to verify layout, setting out, finishes etc. Any discrepancies are to be brought to the attention of the Contract Administrator (CA) prior to construction.

3 The Contractor must ensure that the Architect/Contract Administrator has agreed all necessary Party Wall notices prior to carrying out works under, on or adjacent to a Party Wall.

4 The Contractor is to ensure that the Building Control Officer and Structural Engineer are notified to carry out inspections of any structural work prior to covering up with finishes.

5 Do not cut any holes or chases through any structural members.

6 All specified products are to be installed/built in strict accordance with manufacturer's recommendations.

7 No substitution of designed elements or specified products is permitted.

8 Drawings, specifications and any other documentation will be issued electronically only.

9 Drawings and other documents will only be issued in .pdf format. No other file types will be issued (i.e. dwg, dxf, dgn, etc. files will not be issued).

10 Should the contractor, or any sub-contractors, believe that any elements of the work on structural engineers' drawings or specification will provide buildability difficulties as indicated, they must state clearly, at tender stage, their concerns along with specific reasons for it. They must also propose more buildable alternatives for consideration that do not compromise the architecture or overall structure of the work. Any claims or objections based on buildability issues that are raised after tender will not be considered.

11 The Contractor is to inform the Architect and Structural Engineer if the existing fabric, including foundations, is opened up and found to be inadequate, unsuitable to support the proposed works, or at variance from the details shown on the drawings.

12 Items noted on the drawings to be exposed or verified on site are to be exposed by the Contractor for inspection by the Structural Engineer at the earliest opportunity.

13 In the event of any conflicts on the drawings (including between the drawings of different consultants), the contract must seek clarification at tender stage as to which condition is correct. If clarification is not sought at tender stage, it will be assumed that the contractor has priced the most expensive condition, so no additional costs can be claimed in relation to the conflict.

14 The main contractor is to supply, and keep on site for the duration of the works, PPE for at least two representatives from the project structural engineer's firm. This is to consist of, at minimum, hard hats, protective site boots (sizes will be provided upon request), high visibility vests and high visibility jackets. Any additional equipment required due to the nature of the site and work being carried out is also to be provided. All of this equipment is to be clean and new for this project and to be kept secure on site.

STABILITY AND TEMPORARY WORKS

1 The Contractor is entirely responsible for maintaining the stability and structural integrity of all existing and proposed structures, within and adjacent to, the works from the date for possession/commencement of the site until practical completion of the works.

2 The Contractor shall produce a full method statement and temporary works proposals prior to commencement of any works on site.

3 The Contractor shall design, install and maintain all necessary temporary works and shall advise the CA and structural engineer, at least 14 days before commencement of the works, of his proposals for temporary supports and sequence of construction for the works. These proposals shall be supported by design calculations if requested.

4 The contractor is to engage a specialist temporary works engineer to design their temporary works and assist in the preparation of their method statement, sequence of works, etc.

5 All loads required to design the temporary works and associated elements will be determined by the contractor and their temporary works engineer. Neither these, nor any other calculations, will be supplied by Constant Structural Design.

TOLERANCES

1 All tolerances are to be agreed with the Architect/CA, and the Contractor will be responsible for ensuring that sufficient tolerances are provided and integrated throughout all elements of the works.

2 The Contractor is to take account of tolerances detailed elsewhere in the drawings and specifications when complying with the above clause.

MATERIALS AND WORKMANSHIP

1 All articles, materials and goods shall be new and of good quality, suitable or the required purpose and shall conform to the appropriate, current Eurocode, British Standards (if still applicable) or other applicable standard and Building Regulation where such exists. Where references to the above are made it shall be inferred that the latest edition applies, together with subsequent amendments, unless otherwise specified.

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CONTRACTOR DESIGNED PORTIONS

In addition to any CDP items listed by the architect, project manager or any other member of the design team, the contractor shall assume and maintain design responsibility for the following elements:

1 Temporary Works: All temporary works as outlined above.

2 Steel Connection Design: Design and detailing of steel connections unless already detailed on the structural engineer's drawings.

3 Steel Fabrication Drawings: Complete detailing of steel connections and prepare a full set of fabrication drawings.

4 Intumescent paint: If not specified by the Architect, the contractor must establish the appropriate thickness of intumescent paint required to provide the required period of fire resistance. The period of resistance should be obtained from the architect or building control for each element.

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EXCAVATION, FILLING & FOUNDATIONS

1 Before beginning any excavation the Contractor must ensure that they have located any live services in the neighbourhood of the intended excavation.

2 No excavation within 3 metres of an existing foundation is to be taken below the level of the existing foundation unless a method statement, prepared by the contractor's specialist temporary works engineer, has been agreed in writing with the Party Wall Surveyor.

3 The Contractor must not excavate below the level of the underside of a Party Wall foundation within 3 metres, or undermine the bearing of a Party Wall foundation within a 45 degree line from the edge of the base within 6 metres until all necessary Party Wall awards are in place and method statements have been agreed.

4 The Engineer and Building Control Officer shall be given the opportunity of examining all excavations, filling and hardcore before they are concreted or covered up. The Contractor shall give at least 48 hours' notice of when excavations will be ready for inspection. If a good foundation bearing is not obtained at the level shown, the Engineer is to be informed.

5 Excavations shall not be left exposed longer than necessary in order to avoid deterioration from the weather or other causes, and if necessary they should be temporarily protected. In clay formations the excavations shall not be left exposed for more than 24 hours. If the formation deteriorates it shall be cleaned out and reformed to the Building Control Officer/CA/Engineer's satisfaction before any concrete is placed.

6 If the Building Control Officer requests amendments to the foundations or if the conditions differ from those noted above, the CA, Architect and Structural Engineer are to be notified immediately. The Contractor shall not proceed without receiving instructions from the Architect.

7 The contractor is to ensure that all excavations remain stable at all times. If temporary measures are required to ensure this the contractor must ensure they are designed and installed in line with their temporary works engineer's requirements.

8 The Engineer is to be informed immediately if any significant change in strata occurs.

9 Hardcore to be granular material, free from excessive dust, well graded, all pieces less than 75 mm in any direction, minimum 10% fines value of 50 kN when tested in a soaked condition to BS 812-111, and in any one layer only one of the following:
- Crushed rock (other than argillaceous rock) or quarry waste with not more binding material than is required to help hold the stone together.
- Crushed concrete, crushed brick or tile, free from plaster, timber and metal.
- Crushed non-expansive slag.
- Gravel or hoggin with not more clay content than is required to bind the material together, and with no large lumps of clay.
- Well-burned non-plastic colliery shale.
- Natural sand or gravel.
- Filling: Spread and level in 150 mm maximum layers. Thoroughly compact each layer.

10 Foundations are to be cast symmetrically about piers, walls, etc.

11 Excess excavation wider than required to be infilled with Hardcore as above.

12 Excess excavation deeper than required to be filled with designated mix FND 2 concrete.

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CONCRETE

1 Materials and workmanship are to comply generally the appropriate, current Eurocode, British Standards (if still applicable) or other applicable standard and Building Regulation where such exists.

2 Concrete for all new elements is to be grade RC40 to BS 8500 and BS EN 206-1 with CEM1 OPC to BS EN 197 and 20mm max aggregate. Unless noted otherwise on structural engineer's drawings.

3 Concrete for new foundations, ground beams, retaining walls, ground slabs and all other elements in contact with the ground are to use sulphate resisting cement. Unless noted otherwise on structural engineer's drawings.

4 Ready mixed concrete must be obtained from a plant which holds a current Certificate of Accreditation under the Quality Scheme for Ready Mixed Concrete.

5 Site-mixed concrete may only be used when agreement in writing from the Engineer has been obtained by the contractor. An agreed pre-batched and bagged proprietary concrete must be used unless an alternative site batched concrete has been agreed with the Engineer.

6 Do not place concrete when the ambient air temperature is less than 5 degrees Celsius or when the ambient temperature will drop below 5 degrees Celsius within the 5 days immediately after of the pour.

7 All holes shall be formed and all inserts cast in at the time of pouring concrete. No part of the concrete works shall be drilled or cut away without the approval of the Structural Engineer.

8 All new ground bearing slabs to have 50mm blinding on 150 well compacted hardcore below.

9 Curing
- The Contractor is to provide suitable curing for all concrete elements to comply with the requirements of BS 8110-1:1997 table 6.1, or Eurocode Equivalent.
- Prevent evaporation from all surfaces of concrete throughout the curing period below.
- Retain formwork in position and, where necessary to satisfy curing period, cover surfaces immediately after striking.
- Top surfaces: Cover immediately after placing and compacting. If covering is removed for finishing operations, replace it immediately afterwards.
- Surface temperature: Maintain above 5°C throughout the specified curing period or four days, whichever is longer.

10 Minimum curing periods in days:

Conditions	Concrete made using CEM1; SRPC (BS 4027); IIA	Concrete made using IIB; IIIA; IIIB; IVB
Drying winds or dry, sunny weather	80/(t+10)	140/(t+10)
Intermediate conditions	60/(t+10)	80/(t+10)

Damp weather, protected from sun and wind	No special requirements	No special requirements
‘t’ is the average air temperature in degrees Celsius during the curing period		

- Curing periods for concretes using admixtures and concrete surfaces which, in the finished building, will be exposed; wearing surface floors and pavements; water resistant concrete: Submit proposals.

11 Finish

All concrete surfaces are to have a plain smooth finish with the following:

- Even with panels arranged in a regular pattern as a feature of the surface
- Permissible deviation of surfaces:
  - Sudden irregularities (maximum): 5 mm.
  - Gradual irregularities when measured from the underside of a 1 m straightedge, placed anywhere on surface (maximum): 5 mm.
- Variations in colour:
  - Permitted: Those caused by impermeable form linings.
  - Not permitted: Discoloration caused by contamination or grout leakage.
- Surface blemishes:
  - Permitted: Blowholes less than 10 mm in diameter and at an agreed frequency.
  - Not permitted: Voids, honeycombing, segregation and other large defects.
- Formwork tie holes: In a regular pattern and filled with matching mortar.

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TIMBER

1 The contractor is to have all existing timber, including joists, rafters, studs, lintels, built in joist ends, wall plates, etc. are to be checked for rot (wet and dry) and infestation, by a specialist company.

2 Timber found to have rot or infestation is to be treated/repaired/replaced in accordance with recommendations from the specialist company.

3 New timber in the works is to be selected structural timber not inferior to European Redwood/Whitewood grade C24 to BS EN 338:2009, unless noted otherwise on drawings.

4 New timber in the works is to be vacuum impregnated with preservative to BS EN 1995-1-1 and BS EN 351-1 and the manufacturer's recommendations. Cut ends are to be thoroughly treated with brush applied coats of appropriate preservative before fixing. All preservatives are to be to the Architect's approval.

5 Structural timbers may only be drilled or cut for services with written permission from the Structural Engineer. Drill holes and notches in joists to be in accordance with NHBC Standards Chapter 6.4-S9 and BS EN 1995-1-1.

6 Sizes of new structural timbers noted on drawings are sawn basic sizes.

7 Joist hangers, straps, connectors etc. shall be purpose made and of the manufacture or performance stated on the drawings. If not specified otherwise on drawings all joist hangers to be Expamet Maxi Speedy and all straps to be Expamet HD Straps.

8 All timber connectors, screws, nails, joist hangers, steel straps etc. are to be galvanised or sheradised. All such items are to be fixed in accordance with the manufacturer’s recommendations, unless shown otherwise on the drawings.

9 Skew screwing should generally be carried out using 3.5mm diameter x 75mm long minimum drywall screws.

10 Where sections of floor or roof are separated by a steel beam install 1250mm long 30 x 5mm straps at 800mm c/c for continuity.

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STEELWORK

1 All workmanship is to comply with BS EN 1993-1-1 and BS EN 1090-2 and the latest edition of the National Structural Steelwork Specification (NSSS) for Building Construction, and all clauses, including appendices are deemed to be part of this specification.

2 All structural steel sections are to be minimum Grade S355 to the applicable code from the following list; BS 4-1:2005, BS EN 10210-2:2006, BS EN 10025-2:2004.

3 All bolts are to be grade 8.8 Black Bolts to BS 4190 unless noted otherwise on the structural drawings.

4 Site welding shall not be permitted.

5 Setting out dimensions are to be obtained from the Architect's drawings. The steelwork fabricator shall obtain all necessary dimensions from site.

6 The contractor is to carry out a full site survey to establish the lengths of all steel members connecting to existing structure prior to preparation of fabrication drawings.

7 No splices are permitted in any elements.

8 All welding is to comply with BS EN 1011 Parts 1 & 2. All welds are to be 6mm fillet welds or full strength butt welds unless noted otherwise on the drawings.

9 Where endplates, capping plates, baseplates, etc. are shown at the end of a steel element, these are to be welded to the steel element with a 6mm fillet weld. That weld is to extend around the entire contract perimeter between the plate and steel element.

10 Minimum connection between steel elements to be 4no. M16 bolts with 12 thick end plate U.N.O.

11 Where any different steel materials or steel materials with different finishes (e.g. painted steel, galvanised steel, stainless steel, etc.) in contact or are connected together, all contact surfaces between them are to be isolated to prevent contact and corrosion.

12 The contractor is to design and detail all connections (including those between steel and other materials), not already detailed on the structural engineer's drawings, in accordance with the appropriate, current Eurocode, British Standards (if still applicable) or other applicable standard and Building Regulation where such exists.

13 All bolt pockets, spaces below base plates, etc. at column bases and beam bearings to be completely filled with Fosroc Conbextra Grout.

PROTECTIVE COATINGS

14 All steelwork is to be blast cleaning to Sa 2½ to BS EN ISO 8501-1 (Welds/edges/areas with surface imperfections: To BS EN ISO 8501-3, preparation grade) prior to the application of any coating.

15 All painting shall be carried out in accordance with BS EN ISO 12944, BS EN 1090-2 and the paint manufacturer's instructions. Paint systems as specified below are by Sherwin-Williams Protective & Marine Coatings. No alternative manufacturers are permitted.

16 All steelwork will be protected as follows, depending on which of the three categories below falls into. Should different parts of an element fall under two different categories, the whole beam must be protected to comply with the more onerous category:

Category 1: A warm, dry building with no risk of condensation on steelwork i.e. internal steelwork concealed and fire protected with plaster finishes

All surfaces, which shall be dry, shall be painted with 75 microns dry film thickness of Epigrip C400V3. This coat should be applied in the works with any subsequent damage made good on site.

Category 2: For steelwork within the perimeter wall of a building, such as within the inner leaf of a cavity wall but not in contact with the external leaf:

All surfaces, which shall be dry, shall be painted with 125 microns dry film thickness of Epigrip C400V3. This coat should be applied in the works with any subsequent damage made good on site.

Category 3: For steelwork in contact with the external leaf:
All surfaces, which shall be dry, shall be painted with 300 microns dry film thickness of Epigrip C400V3. This coat should be applied in the works with any subsequent damage made good on site.