Structural Performance Requirements

L1114 Yate Boxing Club

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Webb Yates Engineers Ltd
48-50 Scrutton Street
London. EC2A 4HH
020 3696 1550
london@webbyates.com
www.webbyates.com

Registered in England & Wales No.: 5393930

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1. INTRODUCTION AND SCOPE

This document outlines the structural performance requirements for the proposed development at Yate Boxing Club.

This document sets out the minimum civil and structural engineering performance requirements and other mandatory aspects that must be met in the design, construction and life of the facility to be co-opted by the contractor as part of a 'design and build' contract with Yate Town Council.

The Contractor is to develop their own calculations, drawings, specifications, schedules and other documents necessary for construction and will be fully responsible for the compliance of these with the Employer's Requirements.

The Employer's spatial requirements are as shown on the architectural drawings and schedules forming part of the Employer's Requirements and appropriate structural solutions must be developed to deliver these.

Approval and/or comment by or on behalf of the Employer at any stage shall not be taken to relieve the Contractor of his responsibility to ensure that his design, materials, and workmanship fully comply with the Employer's Requirements.

The Contractor will be required to provide calculations or other material, prior to construction, as necessary to demonstrate that his proposals will meet the Employer's Requirements if requested by the Client team. The Contractor shall submit all design calculations, drawings and details to the Approved Inspector and comply with their and all other statutory requirements.

The Contractor is responsible for obtaining all necessary approvals including those from Building Control.

The Contractor is responsible for undertaking any further surveys or investigations that may be necessary to fulfil the Employer's Requirements.

The Contractor is fully and solely responsible for undertaking any geotechnical or geo-environmental investigations that may be necessary to fulfil the Employer's Requirements. The foundations and ground floor slab will be selected and designed to be appropriate for the expected ground conditions.

2. PROPOSED DEVELOPMENT

The proposed development is located at Yate Outdoor Sports Facility, Broad Ln, Yate, Bristol BS37 7LB and approximate Grid Reference ST 70695 84220.

Figure 1 - Hybrid satellite image of the proposed site

The development involves the demolition of an existing building and construction of a new single storey portal frame industrial type building that is spread across a single 12m x 18m area. Note the column spacing for the portals are at ~6m c/c.

3. GENERAL INFORMATION

3.1. Ground Conditions

3.1.1. Geology

Geotechnical investigation works have not been undertaken for the site. Geological map information indicates that local geology comprises clay and weathered mudstone of the Mercia Mudstone Group. This would need to be confirmed through site investigation.

3.1.2. Groundwater

Geotechnical investigation works have not been undertaken for the site. This would need to be confirmed through site investigation.

3.1.3. Ground gas

Geotechnical investigation works have not been undertaken for the site. This would need to be confirmed through site investigation.

3.1.4. Radon

The site is located in an area of elevated radon potential. The maximum radon potential is 5-10 %. Appropriate protection measures for the proposed construction type should be designed for.

3.2. Structure Description

The proposed super-structure is formed from a primary steel portal frame. The building is structurally independent and is to be designed by the contractor to resist all relevant horizontal and vertical loads, including those generated due to second order effects.

Loads are to be transferred through the primary structure to foundations and to competent soil strata below.

3.3. Related Documents and References

This document shall be read in conjunction with the following documents:

- All relevant design standards and codes of practise as detailed in Section 4.8;
- All Architects drawings, specification and Employers Requirements

4. DESIGN CRITERIA

4.1. General Design Requirements

4.1.1. Design Life

The design life for the structural elements of the building shall be 60 years.

4.1.2. Fire Resistance

All structures shall be designed in accordance with The Building Regulations Approved Document B. The architect is to advise if additional fire protection is required to the steel work.

4.1.3. Deflections

Horizontal and vertical deflections due to imposed, wind and snow actions will be limited to the guidance within SCI publication P399 – Design of steel portal frame buildings to Eurocode 3 (Table 12.1).

4.1.4. Settlement

Differential settlement between column locations is to be limited to distance / 500 with an absolute limit of 20 mm.

Total settlement will be limited to 25 mm as per CIRIA SP27.

4.1.5. Tolerances

As a minimum, tolerances shall generally be in accordance with the National Structural Concrete Specification (NSCS) and the National Structural Steelwork Specification (NSSS).

Notwithstanding this, all building tolerances shall be specified to suit the applied finishes and cladding systems.

4.1.6. Robustness

The proposed building is categorised as Class 2A, Low risk as defined in the Building Regulations part A3 2010. Robustness against disproportionate collapse shall be ensured through the provision of effective horizontal ties or effective anchorage of suspended floors to walls.

4.1.7. Response Factor

Where the floor structure is non-ground bearing it shall be designed to meet a target 'Response factor (R)' of less than 8.

Due to the rhythmic activities associated with the intended use, frequencies up to 24 Hz shall be considered.

4.1.8. Electrical Continuity of Steelwork

All exposed steel structures must be electrically continuous to ensure the equipotential requirements are met as required by BS 7671 – Requirements for electrical installations – IEE wiring regulations. This requirement applies to any exposed steel member or framework where there is a likelihood of any physical contact. Refer to MEP engineer for details.

Major Movement Joints

The maximum length of the building is less than 50m therefore primary movement joints are not required.

4.2. Design Standards, Codes and Sources of Reference

The following design standards will be used (all subsequent parts and the relevant national annex will be referred to where not explicitly listed):

4.2.1. Building Loading

- BS EN 1991-1-1: 2002 Eurocode 1: Actions on Structures – Part 1-1: General actions – Densities, self-weight, imposed loads for buildings
- BS EN 1991-1-3: 2003 Eurocode 1: Actions on Structures – Part 1-3: General actions – Snow loads
- BS EN 1991-1-4: 2005 Eurocode 1: Actions on Structures – Part 1-4: General actions – Wind actions
- BS EN 1991-1-5: 2003 Eurocode 1: Actions on Structures – Part 1-5: General actions – Thermal actions
- BS EN 1991-1-7: 2006 Eurocode 1: Actions on Structures – Part 1-7: General actions – Accidental actions

4.2.2. Reinforced concrete design

- BS EN 1992-1-1: 2004 Eurocode 2: Design of concrete structures – Part 1-1 General rules and rules for buildings
- BS EN 1992-1-2: 2005 Eurocode 2: Design of concrete structures – Part 1-2 Structural fire design

4.2.3. Structural steel design

- BS EN 1993-1-1: 2005 Eurocode 3: Design of steel structures – Part 1-1: General rules and rules for buildings
- BS EN 1993-1-2: 2005 Eurocode 3: Design of steel structures – Part 1-2: General – Structural fire design

4.2.4. Masonry

- BS EN 1996-1-1: 2005 Eurocode 6: Design of masonry structures – Part 1-1: General – Rules for reinforced and unreinforced masonry, including lateral loading

4.2.5. Foundations

- BS EN 1997-1: 2004 Eurocode 7: Geotechnical design – Part 1: General rules
- BS EN 1997-1: 2007 Eurocode 7: Geotechnical design – Part 2: Ground investigation and testing
- BS EN 1992-1-1: 2004 Eurocode 2: Design of concrete structures – Part 1-1: General rules and rules for buildings

4.2.6. Other

- The Building Regulations (all relevant parts)

4.3. Materials

4.3.1. Structural Steelwork

All steelwork shall be in accordance with BS EN 10025 and the National Structural Steel Specification (NSSS).

Grade S355 steel to be used unless noted on drawings and all hollow sections are to be hot rolled. Steel properties shall be as detailed below:

- General assumed grade: S355.
- For bolts and welds refer to SCI P212.
- Steelwork subgrade will depend on exposure of element.

The protection system to steelwork shall comply with Parts 1 to 8 of BS EN ISO 12944 and BS EN ISO 14713:1999.

4.3.2. Structural Concrete

All concrete shall be in accordance with BS EN 13670 and the National Structural Concrete Specification (NSCS).

All concrete shall be of a designated concrete mix suitable for the location and structural performance required.

4.4. Design Loading

The structure shall be designed to carry all applied dead loads due to the self-weight of the structure and the finishes and fixtures within.

The design shall be carried out in accordance with all relevant design standards as detailed in Section 4.8, including consideration of dead, imposed, wind, and equivalent horizontal force (EHF) loading.

Load combinations shall consider design at an Ultimate Limit State (ULS) and Serviceability Limit State (SLS).

The following loads shall be taken account of in design:

4.4.1. Permanent Actions

To be informed by structural self weight and finishes / services allowances as per architectural drawings/specification.

4.4.2. Imposed Actions

As specified in BS EN 1991-1-1 as detailed below:

- Roof Loading – access and maintenance – 0.6 kN/m^2 or 0.9 kN
- Floor loading – Category C4 – 4.5 kN/m^2 or 3.5 kN

4.4.3. Snow Actions

Snow actions to be be derived in accordance with BS EN 1991-1-3 Eurocode 1: Actions on Structures – Part 1-3 General actions - Snow Actions.

4.4.4. Wind Actions

Wind actions to be derived in accordance with BS EN 1991-1-4: 2005 Eurocode 1: Actions on Structures-Part 1-4: General actions - Wind actions. The derivation of wind actions will account for the building massing and site location.

It is considered reasonable to assume that any dominant openings would be shut during a severe storm; therefore only an accidental load case for wind pressures with dominant openings would be required. In this case a factor of 0.8 is applied to the peak velocity pressure.

4.4.5. Equivalent Horizontal Forces (EHF)

The structure's stability system is to be designed to resist EHF in accordance with BS EN1992-1-1 cl. 5.2: Geometric Imperfections. These actions are combined with the various externally applied forces.

4.5. Site Constraints

The Contractor is to obtain relevant information relating to the existing services crossing the site and the consequent impacts on the proposed method and sequence of works.

5. TECHNICAL SUBMISSIONS

The contractor is to submit his proposed construction information to the Client team for their general review as far as possible in advance of the works commencing on site or being committed to offsite manufacture but in any case, no less than two weeks beforehand.

This review by the Client team is for general compliance with the Employer's Requirements and, whether comments are made or not, the contractor will retain full and sole responsibility for compliance with the Employer's Requirements.

The contractor is required to provide if requested all reasonable information to demonstrate the compliance with the Employer's Requirements of any aspects of his proposals.