

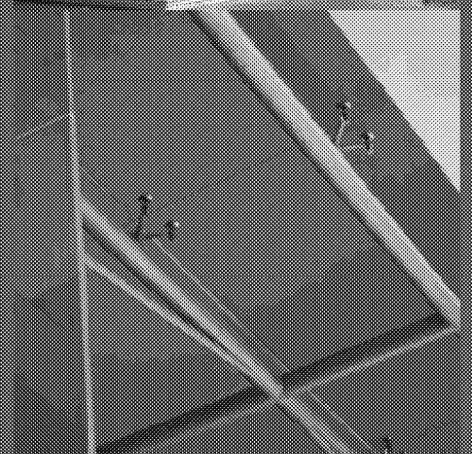
Grenfell Tower

Structural Design Criteria

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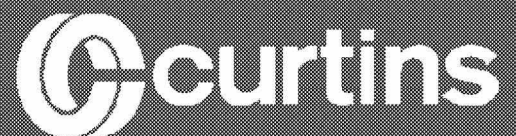


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It should be read in conjunction with all other Consultants reports and specifications and Curtins Consulting's drawings.

Author	Signature	Date
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Reviewed	Signature	Date

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1 CODES AND STANDARDS

1.1 OVERVIEW

Unless noted otherwise the structural design will be in accordance with the codes of practice listed in the table below:

Reference	Title
BS EN 1990 2002 + UK National Annex	Eurocode: Basis of structural design
BS EN 1991-1-1 2002 + UK National Annex	Eurocode 1: Actions on structures – General actions – Densities, Self-weight, imposed loads for buildings
BS EN 1991-1-3 2003 + UK National Annex	Eurocode 1: Actions on structures – General actions – Snow Loads
BS EN 1991-1-4 2005 + UK National Annex	Eurocode 1: Actions on structures – General actions – Wind Actions
BS EN 1992- 2004 + UK National Annex	Eurocode 2: Design of concrete structures
BS EN 1993- 2005 + UK National Annex	Eurocode 3: Design of steel structures
BS EN 1995- 2004 + UK National Annex	Eurocode 5: Design of timber structures
BS EN 1996- 2005 + UK National Annex	Eurocode 6: Design of masonry structures

1.2 Additional Design Guidance

National Structural Steelwork Specification 2007 (NSSS)

2 LOADING REQUIREMENTS

2.1 Permanent Loads (Dead)

The following permanent dead loads in addition to the self-weight of the slab and structural frame are to be assumed in the design of the new structure.

Description	Loading	Notes
Typical existing floor (assumed) <ul style="list-style-type: none"> - 270mm slab - 75mm screed - Raised floor - Ceiling + Services 	6.75 kN/m ² + 1.88 kN/m ² + 0.30 kN/m ² + <u>0.45 kN/m²</u> 9.38 kN/m ²	Finish and build-up TBC
Composite deck infill <ul style="list-style-type: none"> - 150mm composite deck - 65mm screed - Floor finishes - Ceiling + Services 	3.75 kN/m ² + 1.625 kN/m ² + 0.30 kN/m ² + <u>0.45 kN/m²</u> 6.125 kN/m ²	Finish and build-up TBC

2.2 Variable Loads (Q_k Live)

Loads in accordance with BS EN 1991-1-1 2002 + UK National Annex:

Description	Uniform Load	Notes
Entrance lobby (C33)	4.00kN/m ²	Potentially subject to crowd load
Boxing club (C41)	5.00kN/m ²	Storage and loading requirements to be confirmed

Office (B1)	2.50+1kN/m ²	Includes an allowance for light partitioning
Nursery (C13)	3.00kN/m ²	Potentially subject to crowd load
Residential (A1)	1.50+1kN/m ²	

2.3 Wind Loads

In accordance with BS EN 1991-1-4 2005+ UK National Annex:

Parameter	Value	Notes
Basic Wind Speed	$V_b = 21.5 \text{ m/s}$	Refer to BS EN 1991-1-4 2005 Figure NA.1
Roughness factor	$c_r(z) = 1.37$	Refer to BS EN 1991-1-4 2005 Figure NA.3
Mean Wind Speed	$V_m = 29.5 \text{ m/s}$	$V_m = C_r(z) \times C_0(Z) \times V_b$

2.4 Snow Loads

In accordance with BS EN 1991-1-3 2003+ UK National Annex:

Parameter	Value	Notes
Zone Number	$Z = 3$	Refer to BS EN 1991-1-3 2003 Figure NA.1
Building Altitude	$A = 12\text{m}$	
Characteristic Snow Load	$S_k = 0.33\text{kN/m}^2$	$S_k = (0.15 + (0.1 \times Z + 0.05)) + ((A - 100)/525)$ (NA.1)
Snow Load Shape Coefficient	$\mu_1 = 0.80$	Refer to BS EN 1991-1-3 2003 Table NA.1

3 DEFLECTION CRITERIA

Deflection limits in accordance with the governing design codes and established best practice:

3.1 Vertical Deflection Limits

Element	Load Condition	Deflection Limit	Notes
Beams	Dead + Live	L/250	Normal Finish
Beams	Live	L/360	Normal Finish
Beams	Live	L/500	Brittle Finish
Cantilevers	Live	L/180	

3.2 Horizontal Limits

Element	Load Condition	Deflection Limit	Notes
Column	Wind	H/300	Normal Finish
Column	Wind	H/500	Brittle Finish

3.3 Floor Dynamics

Unless noted otherwise the occupied floor structure within the building will be designed to the SCI Report P354, Design of Floors for Vibration which leads to the following dynamic performance criteria:

Area	Guide Natural Frequency limit	R factor ¹ Limit	Notes
Critical Area (Hospital)	N.A.	1	Refer to ASHRAE Guidance
Residential	6Hz	4	Criteria can vary depending on time of day
Office	4Hz	8	
Stairs (Heavy use)	N.A.	24	

¹ Response or Multiplying factor applied to the base curve of human perception and based on a continuous single person walking excitation.

4 ADDITIONAL CRITERIA

4.1 Design Life

A minimum design life of 60 years will be provided on all concrete elements through the correct detailing of concrete cover to all steel reinforcement.

Structural steel elements, where accessible, will be provided with an appropriate anti-corrosion paint protection system specified by the architect to provide a life to first maintenance of 15-20 years within a design life of 60 years.

4.2 Tolerances

Building tolerances shall be in accordance with the relevant National Specifications, good practice guides and BS 5606 Accuracy in Buildings.

4.3 Fire strategy

TBC by architect