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Grenfell Tower

Existing Building Overview

Prepared by

Simon Simpson

12th November 2017

Revision History			
	Date	**Description**	**Indicated by**
R00	12th November 2017	Internal Distribution for comments	-
R01	15th November 2017	Minor update and issued to HSE and BC for comment	-
R02	15th November 2017	Minor alteration to page layout	-

Index

1.0 Scope of Service/ Design Brief

1.1 On the 14th June 2017 a catastrophic fire occurred at Grenfell Tower.

1.2 I first became involved with the project on the 18th July 2017 at the request of Paul Ford, Chairman of Deconstruct (UK) Limited. The purpose of my involvement was twofold,

Firstly to appraise the structure and propping strategy which had been developed by Deconstruct and was at that time being installed. I would reiterate my earlier confirmation that I was satisfied the installation and rational for the propping installed at that time, and,

Secondly, to assist with the further development of a back propping strategy that facilitated the expeditious recovery of all victims from the upper levels, evidence within the building, especially the seat of the fire at level 4. This strategy is generally referred to as phases 1 and 2.

2.0 References

2.1 Fire Safety and Concrete Structures
Ir. J. F. Denoel, FEBELCEM

2.2 Grenfell Tower – Preliminary review of post fire stress state.
ARUP

3.0 Author

3.1 **Simon Simpson, c. eng, MIStruct.E, MICE.**

Has attained over 30 years of industry experience working exclusively within the demolition industry on major and infrastructure projects requiring the provision of bespoke temporary works solutions. His specialist field is with the refurbishment of historic buildings including façade retentions and basement excavations. He was previously employed at Wentworth House Partnership as a Board Director between 2007 and 2009 and as Technical Director between 2010 and 2014. Currently he is employed by Cantillon Limited and has been seconded to assist Deconstruct with the recovery operations at Grenfell tower.

From 2003 onwards, I have been involved with the recovery of various high profile dangerous structures, including,

- Carey Street, a collapsed Building, in Westminster,
- The 2011 civil disturbances, throughout various London Boroughs,
- Camden High Road, a major fire in the London Borough of Camden,
- Dean Street (Soho), a major fire, in Westminster,
- London Borough of Harrow, recovery following a significant gas explosion,
- Dean Farrar Street, a collapsed building, Westminster.

4.0 Purpose

4.1 The purpose of this report is to bring together all background information relating to temporary works installations carried out to date, and in doing so provide supporting evidence of investigations, assumptions and anecdotal evidence used

in preparation of calculations and design ratification.

4.2 This report has been prepared at the request of The District Surveyor following intervention by ARUP on behalf of the investigations team.

4.3 On the 14th November 2017, we undertook a further site inspection, by way of a walkthrough the building to satisfy ourselves that the building is safe to enter and that earlier assumptions remain valid.

5.0 Fire Load of Building

5.1 The extent of fire damage varies between floors and apartments quite significantly. It is our opinion that some of the flats would have been occupied by people who had either, extensive furnishings, elaborate ceiling finishes, or perhaps hoarded materials this would have led to a greater intensity of fire damage in some apartments when compared with others which are immediately adjoining. (i.e. fire damage is not uniform throughout the building).

Refer to Appendix B.

5.2 Even though the seat of the fire is at fourth floor level, it is the external fabric of the building that has been destroyed by the fire, generally the floors contained in the band of 3rd to 9th have suffered only relatively minor damage.

The worst effects of the fire are generally contained in a central block between levels 10 and 14, whilst the upper floors above level 15 are not so seriously damaged when compared to the “central block”.

There are of course local exceptions to this generalisation.

6.0 Existing Building

6.1 Constructed early to mid 1970’s Grenfell Tower is comprised of a reinforced concrete frame that is approximately 22 metres in length and width (plan) and rises to a height of approximately 70 metres above ground level. It is comprised of 23 above ground storeys. There is also a single 5.50 metre deep basement, which extends a distance of approximately 1m beyond the foot print of the building’s façade, retaining walls are 500mm thick reinforced concrete. The basement is understood to be founded from a 2m deep reinforced concrete raft foundation.

The existing building’s stability is provided by a central reinforced concrete core that is founded off the basement raft of an approximate square profile, 8.60 m by 7.80 m (plan), which is complemented by a series of outrigger walls. Outrigger walls commence initially as transfer structures which are present at various levels between ground and third floor, they do not extend to the basement. All stability walls, including outrigger walls are formed in reinforced concrete, typically of 200

mm thickness, rise to the full height of the building. A full height staircase and twin lift bank are contained within the core's foot print.

Around the building's perimeter are fourteen, 1.05 m by 1.05 m (overall) octagonal columns (i.e. original structure excluding any over cladding). These columns which have been arranged on plan to have five columns located at fifth points along the north and south elevations, and four columns at quarter points along the east and west elevations. These also rise to the full height of the building from basement level.

As mentioned above there are a series of reinforced concrete outrigger walls which complement to the buildings overall stability and are 200 mm thickness. These outrigger walls, two on each of the east and west elevations span between the central pair of external columns and the core return walls, and on the north/ south elevations span between the core wall and central column only.

6.2 At ground floor, mezzanine, first and second floor levels there are a combination of common areas, offices, and a gymnasium. At some locations within these floor levels, retrospectively installed steel beams and metal decked floor slabs are present. These areas are unaffected by the fire and are not discussed further in the body of this report.

There are 20 residential floors each having six apartments, comprised of four two bedroom apartments, one located at each of the four corners of the building along the north and south elevations and two one bedroom apartments at the centre of the east and west elevations. The residential unit demise is delineated by either the 200 mm thick core walls or the outrigger walls. Lightweight partitioning was used to sub divide each apartment into useable areas.

The building's roof is a 350 thick flat slab, which supports the building's external plant room. This was found to be in reasonably good condition.

6.3 Residential floor slabs are typically 200 mm thick solid slabs, they are presented as a flat slab construction. These are spanning typically 7.0 m by 7.0 m. There is a 50-60mm screed present at all floor levels refer to core results (at Appendix C and photographs at appendix D). No insulation is present between the underside of the screed and the top of the concrete slab.

6.4 As noted above there are fourteen number perimeter octagonal columns that are 1.05 m by 1.05 m overall dimensions, of area 0.838m2. This area ignores the modern day outer cladding but includes the outer precast concrete cladding.

Photographs taken at the time of construction show that these columns were formed using precast concrete outer skins, this formed the external finished face of the columns. Internally the columns have been formed using traditional in situ formwork. The internal cover to these columns was seen to vary from 35 mm to over 100mm depending on the location observed. The in situ concrete column allows all reinforcement from the outrigger walls, and spandrel panels to be tied together. Refer to anecdotal photos located in appendix D.

6.5 Precast spandrel panels are present along the full building perimeter at all floor levels, these are typically 325 mm in width, and 0.85 metres in height, measured from top of floor level (i.e. 1100mm overall height). Record photographs show that these are continuous beam units placed between the outer columns and extending over the full height of the spandrel, i.e. from underside of floor slab to top of window call. Refer reader to anecdotal photos located in appendix D.

It has been established that the spandrel panel has reinforcement extending into the floor slab by 750 mm from the inside face.

6.6 Around the perimeter are 20 number infill mullion panels, these have been established as being non-loadbearing mullions which are comprised of a lightweight backing restraining asbestos sheets. These mullions have since been shrink wrapped to protect the asbestos sheet from falling and equally to reduce potential exposure to the occupants. A movement joint in the form of an approximate 15 mm air gap is present between the soffit of the existing floor slab and the top of the mullion. A photograph of a typical mullion is included at Appendix D.

Some of these mullions have bowed outwards where they have started to attract load from the deflected spandrel/ floor slabs. Suitable protection has been installed to mitigate the possibility of these panels falling out, and propping installed to provide an alternative load path.

6.7 The existing column at grid A-1, 13th floor is severely damaged and has a 45 degree sloping crack that extends through the entire width of the column. Propping is in place to reduce the amount of load acting on this column and to provide a secondary load path from the upper floors through to the to the lower floors. The column is being regularly monitored for movement and a contingency plan exists for implementation of a repair to the column should it become needed.

6.8 Some cracking is present to the floors at the corners of the building, this cracking extends diagonally between adjacent spandrel panels, oblique to the corner columns. The same cracking can also be evidenced in the non fire damaged lower levels of the building.

It is our opinion that these particular cracks have occurred as a consequence of differential settlement which is attributable to adjacent façade columns having different magnitudes of vertical loading. The cracking is historic and is not attributable to the fire. It is also our opinion that these cracks are through the existing non-structural screed and are not manifested into the structural slab. It is also noted that the screed would have acted as an insulation to the top of the structural slab during the fire.

The effect of the fire, and subsequent water ingress is to have made these cracks more pronounced, especially at the upper levels. Further cracking of the non-structural screed also exists around the central cluster of shoring, this is likely as a consequence of slab deflection which occurred as a result of the fire debonding the screed and creating small voids, as load comes through the props onto the screed, the screed cracks (breaks) allowing load to pass directly into the underlying slab which is in turn prior propped.

6.9 Within flats 3, 5, and 6 at a number of levels, existing construction (day) joints have either opened up or have dropped; this varies quite significantly in extent between units. At some locations a gap of 1-2mm is present between opposing faces, whilst at other locations a tearing (in the form of a short slope can be seen at the soffit of the slab which manifests itself in a 40-50 millimetre step in the top of the slab. We are satisfied that these slabs are adequately back propped.

7.0 Investigations and Inspections undertaken to date

7.1 To date we have undertaken four inspections of the existing building, generally at monthly intervals, to verify our understanding of the structural form of the building and to allow us to continually review and check load paths. These visits have also allowed us to compare our latest findings and knowledge gained at various stages with our earlier findings so that we can be confident that the building remains stable, and as a precursor to establishing if the building is becoming "live".

7.2 During the course of our inspections, we have continually observed the colour of the aggregate within each of the apartments as we have conducted our walkthrough, typically, the aggregate being observed is pink to red. This is consistent with a heat of 300-600 degrees centigrade (*reference to page 79 of our reference 2.1*). The depth of fire damaged concrete was also monitored during the coring operations, and is typically to the depth of the concrete cover as evidenced by the core result sheets. (refer to appendix C).

In all bar a few locations the effects of the fire on the concrete is over the thickness of the cover to the outer cover layer, when viewing the central parts of the cores the concrete aggregate appears generally unaffected by the fire.

7.3 Concrete coring has been undertaken at several locations throughout the wall and floor slabs. The findings are as follows,

Walls,

- Level 18 (gl B wall 4-5) cube strength 30.6 N/mm2
- Level 18 (gl B wall 4-5) cube strength 33.5 N/mm2
- Level 14 (gl 4 wall 4-5) cube strength 27.9 N/mm2
- Level 13 (gl A-B wall 3) cube strength 22.2 N/mm2
- Level 10 (gl B wall 4-5) cube strength 32.2 N/mm2
- Level 9 (gl A-B wall3) cube strength 28.4 N/mm2

Floors

- Level 18 (gl C-D floor flat 2) cube strength 29.5 N/mm2
- Level 18 (gl C-D floor flat 2) cube strength 25.4 N/mm2
- Level 14 (gl A-B floor flat 5) cube strength 28.0 N/mm2
- Level 14 (gl A-B floor flat 5) cube strength 25.4 N/mm2
- Level 8 (gl A-B floor flat 6) cube strength 30.2 N/mm2
- Level 8 (gl A-B floor flat 6) cube strength 45.3 N/mm2
- Level 7 (gl C-D floor flat 2) cube strength 34.4 N/mm2
- Level 7 (gl C-D floor flat 2) cube strength 39.4 N/mm2

The results of the sampling are attached in appendix C.
Our assessment if the likely concrete strength for a building of this type is 30 N/mm2, based on the time that the building was constructed. It is noted that this is in line with Arup's assessment (Section 10, page 15 of our reference 2.2).

7.4 Joints between the concrete outrigger walls, and the internal core walls, along with the joint between the outrigger wall and the concrete column have been inspected for the presence of any cracking or signs of separation. Minor cracking is apparent at some locations typically 1 mm in width, however there is nothing that is causing us concern, generally the quality of these joints is in good order.

7.5 We have also undertaken close examination of the joints between the precast spandrel panels and the floors and the columns. Inclined tapering cracking is present in the spandrel panels at third points, in a way that suggests that the spandrel panel is in tension at the top rather than the bottom. The joints between the spandrel panels and the columns are generally crack free, other than for the presence of some hairline cracking at discrete locations. Photographs are included at appendix D.

7.6 From our inspections of the edge spandrel panels, it is clear that they have been used as a shutter to restrain the edge of the concrete slab pour, reinforcement has clearly been lapped into the slab reinforcement. A construction joint exists at the inside edge of the spandrel panel with lap reinforcement extending approximately 750mm into the slab, as evidenced on site. Refer to Appendix D for photographic plates.

We have inspected this detail closely at all levels, it is clear that the spandrel panel is integral with the concrete slab, as there is no physical evidence of any a separation or movement joint at this location. The deflected shape of the floor slabs supports the view that there is a clear load path present between the slab and the spandrel panel beam.

This may have been the original design intent where anecdotal evidence has referred to the spandrel as a beam.

7.7 From our inspections of the existing columns, it is known that there is an outer skin present to the columns, as per the original method of construction. (Refer to Appendix D).

At some locations the internal face of column cover has been lost, this can be seen to vary from 35 to 100 millimetres depending on location. This spalling has exposed two number column reinforcement bars (and links) at two separate locations it can be seen that these two bars have yielded. Photographs of the perimeter columns are included at Appendix D.

The affected columns are located at 14th floor level, flat 2; 16th floor level, flat 3; 20th floor level, flat 3 and 21st floor level, flat 2. The loss of cover to the column is not a cause for concern, it is noted that the exposed aggregate is a natural aggregate colour. We are satisfied that these columns are not in need of further propping, i.e. sufficient propping has been prior installed.

8.0 Monitoring regime

8.1 Prism targets have been applied to the external face of the building. These are monitored using a total station and the results regularly scrutinised. To date there is no untoward movement of the existing building beyond the normal environment and seasonal movements.

8.2 Internally a number of tell tales have been installed across significant cracks, again at regular intervals. As part of the ongoing propping inspection and maintenance plan there is a requirement to inspect the surrounding areas for signs of disturbance or evidence of any fresh cracking or spalling.

Concerns identified by third parties are regularly acted upon both to give assurance and to ensure that the building is remains safe.

8.3 It is shortly planned that as the scaffold is erected a series of GPS targets will be attached to the external corners of the building, typically at 4th floor, 13th floor and 23rd floor. This is to ensure that readings are able to be continually taken without the need for site lines to be maintained. It is anticipated that as the scaffold is erected sight lines will be lost or compromised.

In addition, we understand that site is currently installing further tell-tale monitoring across other cracks with in the building as a means of giving further assurance to operatives.

9.0 Back propping rational

9.1 No historic calculations for the existing building have been sourced. We have not undertaken or prepared calculations to justify the existing structure as there are too many unknowns; we have endeavoured to apply sound engineering judgement as to the condition and on-going performance of the existing structure. From our involvement with other dangerous structures we have not undertaken investigations into the building structure as we do not wish to further weaken a building that is already weakened.

9.2 Back propping to Floor Slabs

From commencement of our involvement with this project we have endeavoured to identify the extent of damage within each apartment, and in doing so have tabulated a simple representation that can be seen at Appendix B.

Green - Identifies those apartments with little or no damage and/ or those where slab deflections are not perceptible (i.e. the slab is perceived to have remained flat).
Yellow - Indicates those apartments where spalling has occurred, reinforcement is partially visible but not detached from the slab, and or up to 100mm of deflection is visible.
Red - Indicates those apartments where spalling has occurred, reinforcement has become visible and in some places detached from the slab, or the slab is in a degraded state, and/ or deflection is larger than 100 mm.

Grenfell tower was constructed during the early to mid 1970's and is likely to have been designed to CP 110, our opinions are based on the code that was in publication at the time the building was constructed. We have not considered modern standards as these are not appropriate to this building.

Reference has been made to the Institution of Structural Engineers report, Appraisal of Existing Buildings, which indicates a factor of safety of 1.2 for dead loads where existing floor slabs can be accurately measured. By adopting this, and by considering the gravity loads and their load factors, we can increase the imposed load on the floor as follows.

1.4 (0.25 x 24) + 1.6 (1.5) = <u>10.80 kN/m2,</u>

Working backwards to find equivalent live load under reduced self weight factor,

10.80 - (1.2 (0.25 x 24)) / 1.6 = <u>2.25 kN/m2</u> temporary imposed load allowance on floors for the purpose of assessing back propping requirements.

For the green floors, which have no noticeable deflection, and with reference to section 7.2.6 (page 50) fire safety and concrete structures, we consider that the

floors continue to be self supporting without the need for propping. This is on the basis that there is no significant loss of strength or material properties as a consequence of the fire.

In the case of amber floors, which have up to 100 millimetres of deflection, and again with reference to section 7.2.6 (page 50) fire safety and concrete structures, we consider that a loss of strength of 20 percent is applicable, this is equivalent to a five hundred degree exposure temperature. In this case propping is needed to deal with the imposed loads only as the slab would be able to sustain its own self weight.

Namely,
80/100 x (6.25 + 1.5) = 6.2 kN/m2 and is in fact equal to the weight of the concrete slab without imposed loads being present. In this scenario we consider that back propping would be needed to support the applied imposed loads and perhaps a notional amount of self weight.

A single level of propping would suffice on to a green floor.

For the red floors, which have experienced greater than 100 millimetres of deflection, or are seriously compromised and with reference to section 7.2.6 (page 50) fire safety and concrete structures, we consider that a loss of strength of 70 percent is applicable, this would be equivalent to a seven hundred degree temperature exposure (note that the aggregate colour is red pink as seen on site). In this case propping will be required to assist the slab and imposed loads,

30/100 x (6.25 + 1.5) = 2.325 kN/m2, and propping is required to support a floor weight of 3.925 kN/m2.

(3.925 + 1.5) / 2.25 = 2.411 levels (3 levels).

Propping has been provided throughout the building between the 5th and 23rd floor levels.

9.2 Column at grid A-1

The existing building at column A-1 has found an alternative load path and a way of standing up. It is being monitored for movement. A contingency repair detail exists and is ready for implementation, it is currently being held in reserve should it be needed. Following risk assessment and access considerations it has not been installed, and monitoring of the column indicates no concerning movement.

Internally we have done two things; firstly, to reduce the floor loading acting on the said column by back propping central portion of the floor slabs from above the level of the cracked column at 13th floor level to roof level and a corresponding number of floor levels below the cracked level. We have also provided a dead shoring system that is tight to the column, to transfer and reduce column loading above the cracked 13th floor level. This propping extends to roof level and to a corresponding number of floors below the cracked level. Owing to ongoing investigations we have not been able to prop below the 4th floor level.

9.3 **External scaffold.**

The design brief for the external scaffold is covered in a separate report dated 6th August 2017, and is available upon request from site.

The scaffold is founded off the ground floor slab, but has been back propped down to the lowest ground bearing basement slab (raft).

The scaffold is tied to the existing building, either by tying directly to the soffit of the floor slabs (between the underside of the third floor and the underside of the ninth floor). No ties are permitted into the areas which are sensitive to the police investigation at fourth floor. These soffit fixings are set into the building by 1.50 meters, to ensure that they fix into the existing slab just beyond the lap length of bars from the spandrel panel.

Above the ninth floor, no fixings are permitted into the soffit of the slabs; instead purpose made fixing clamps transfer the applied scaffold shear loads directly into the outrigger walls by means of friction achieved by through bolting these back to back brackets together. There is also no reliance made on fixing tension capacity in the area of potentially fire affected concrete zones.

The external scaffold is approximately 2m wider than the existing building. To avoid any increase in wind load and to reduce wind pressures, especially wind suction, the scaffold will be faced using debris netting on the way up, and on completion of the scaffold this will be changed to monarflex airflow. Both these products have a percentage of voids which off sets the nett loading which would otherwise have arisen as a consequence of the increased width of the scaffold.

9.4 **Imposed loads**

The current back propping regime allows for five existing floors to be accessed at any one time, and brought into use as general access, with a live loading capacity of 1.50 kN/m2 per floor. (i.e. to match the existing residential floor loading)

10.0 Summary

10.1 In developing the above propping strategy, we have avoided passing props through sensitive floors which containing remaining evidence still to be collected (4th floor level).

The need for full height dead shoring/ propping is to be considered by others as part of the phase 3 works, demolition of the existing building. We are satisfied as part of the recovery phases 1 and 2 that the building has been suitably back propped.

This above is in line with the Arup conclusions and next steps (reference 2.2 above refers). We also note that the remaining points contained in this section of the Arup report have been addressed.

11.0 Appendices

11.1 **Appendix A** – Typical Floor Plan

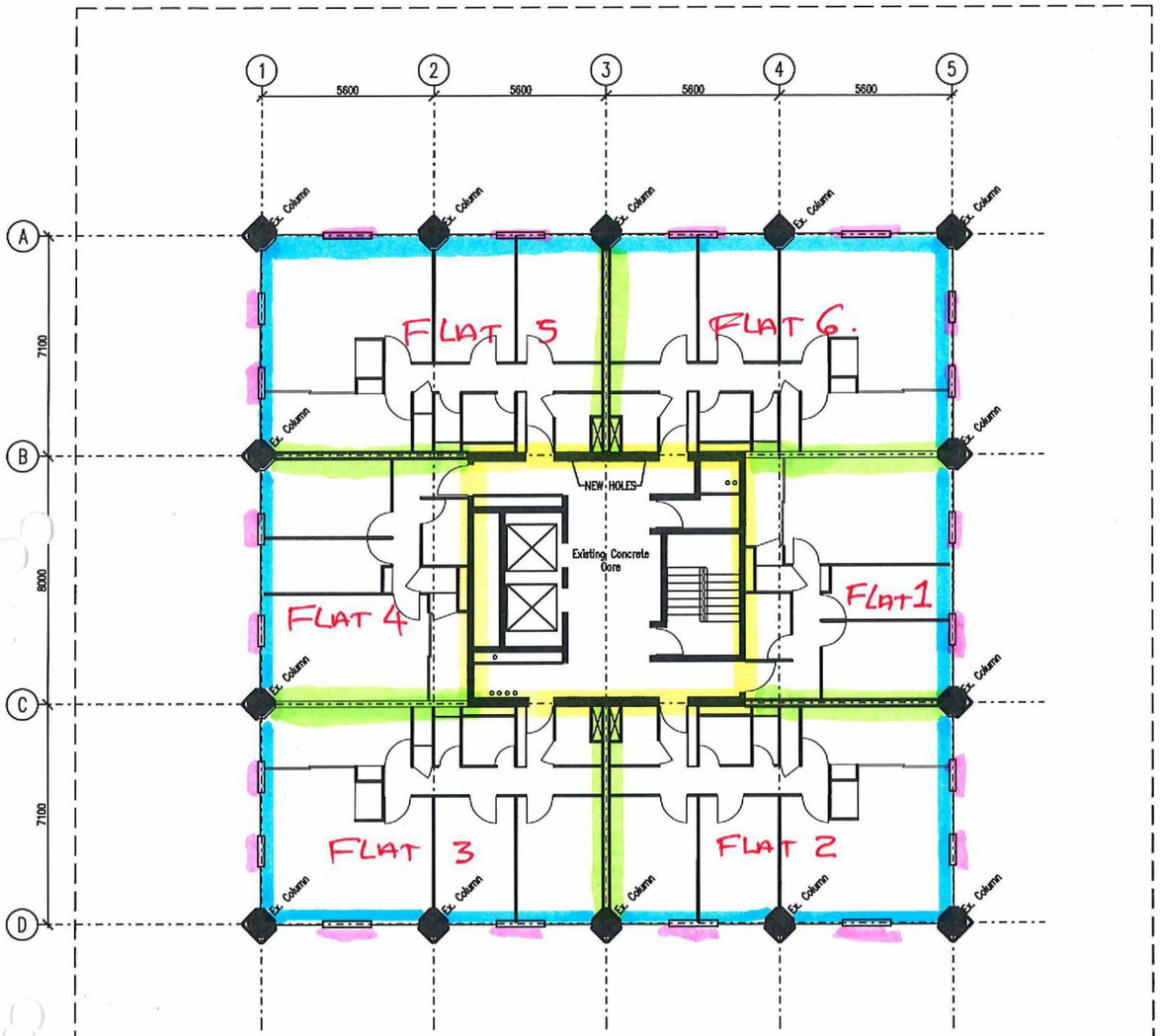
11.2 **Appendix B** – Assessment of Building

11.3 **Appendix C** – Concrete Core results

11.4 **Appendix D** – Anecdotal Photographic Evidence

Appendix A

Typical Structural Floor Plan



Appendix A:

EXISTING & PROPOSED TYPICAL RESIDENTIAL LEVEL FLOOR PLAN
Scale 1:100
Highlighting Structural Framing of building

- 20 number octagonal columns at building Perimeter shown thus - ●
  At grids A-1, A-2, A-3, A-4, A5
  B-1, B-5
  C-1, C-5
  D-1, D-2, D-3 - D-4, D-5
- Existing Rc core walls highlighted yellow – (200 mm Rc walls)
- Existing Rc outrigger walls highlighted green - (200 mm Rc walls)
- Existing Rc spandrel panel highlighted blue - (325 wide beam (upstand))
- Existing non-load bearing mullions highlighted red -
- Note. At all upper levels internal soft partioning no longer exists.

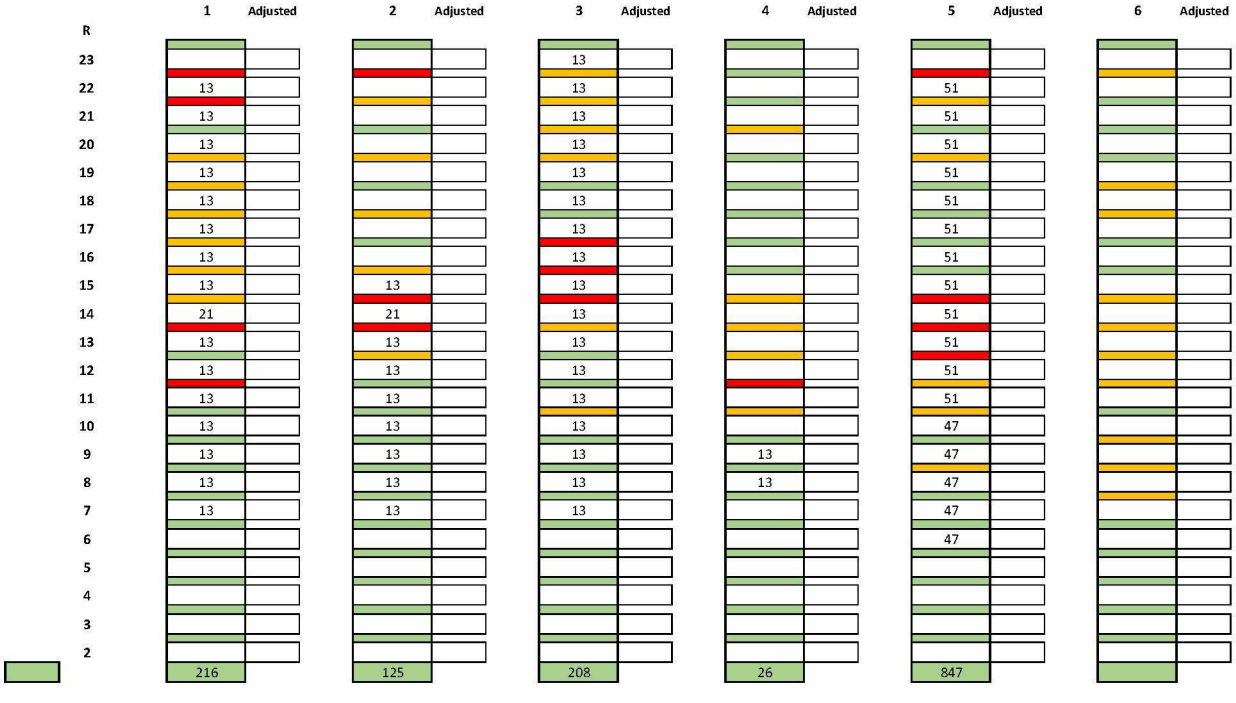
Appendix B

Building Assessment

Grenfell Tower

Temporary Works Daily Inspection

deconstructuk.com



Inspection Date	
Inspection Carried out by	
Signature	

Appendix C

Concrete Core Results

ESG
Unit 11
Cowley Mill Trading Estate
Longbridge Way
Uxbridge
Middlesex
UB8 2YG
Telephone: +44(0) 1895 235235
Facsimile: +44(0) 1895 274265

0001

TEST REPORT

Concrete Core Compressive Strength
BS EN12504-1:2009

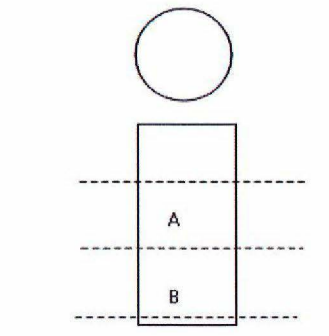
Report No:	**UXB0380812/916/M0**	**Report Date:**	**1 August 2017**
		Our Contract Ref:	51035235
Client:	DECONSTRUCT (UK) LTD	Client Order No.	DEC 13340 m
Address:	BURDETT HOUSE 15-16 BUCKINGHAM STREET LONDON WC2N 6U GB	Sample No.	24600916
		Client Sample Ref:	18/1 A
		Date Cast:	Not Supplied
		Date Received:	31 Jul 2017
Client Contact:	Not Advised	Date Tested:	31 Jul 2017
Site:	**Grenfell Tower, Grenfell Road, W11 1TQ**	Tested By:	ESG Uxbridge
Location:	Level 18 Flat 1 GL B 4-5 Wall		
Sampled by:	Client	Sampling Certificate:	Not Received
Samples Submitted by:	Client		

Results :

Date of Coring:	Not Supplied
Drilling Angle:	Horizontal
Mix Details:	Existing
Preparation method:	HAC & Sand
Age at Test (days):	Not Supplied
Visual Inspection of Core:	Satisfactory
Maximum Nominal Size of Aggregate (mm):	16
Average Length of Core As Received (mm):	190
Diameter of Test Core (mm):	98
Length / Diameter Ratio of Prepared Core:	1.12
Surface Moisture Condition at Test:	Dry
Estimated Excess Voidage (%):	0.5
As Rec'd Density inc. steel where shown (kg/m³):	2250
Type of Fracture:	Normal
Core Compressive Strength (N/mm²):	**29.3**
Corrected In-Situ Cube Strength (N/mm²):	**30.6**

Core Details - as received
Reinforcement bar(s) Diameter (mm)
No Reinforcement bars in sample
Distance from Top End (mm)
Not Applicable

Core Details - as tested
Reinforcement bar(s) Diameter (mm)
No Reinforcement bars in test core
Distance from Nearest End (mm)
Not Applicable



indicates saw cuts of prepared specimen

Comments: Signs of Fire Damage at around of 30mm

Density of core determined by water displacement method in accordance with BS EN12390-7:2009
Certified that the Concrete Core Compressive Strength was determined in accordance with BS EN12504-1:2009

KEY DET NOT APPROVED -

for and on behalf of
Environmental Scientifics Group Limited

Form L54

ESG
Unit 11
Cowley Mill Trading Estate
Longbridge Way
Uxbridge
Middlesex
UB8 2YG
Telephone: +44(0) 1895 235235
Facsimile: +44(0) 1895 274265

DRAFT

UKAS TESTING
0001

TEST REPORT

Concrete Core Compressive Strength
BS EN12504-1:2009

Report No:	**UXB0380812/917/M0**	**Report Date:**	**1 August 2017**
		Our Contract Ref:	51035235
Client:	DECONSTRUCT (UK) LTD	Client Order No.	DEC 13340 m
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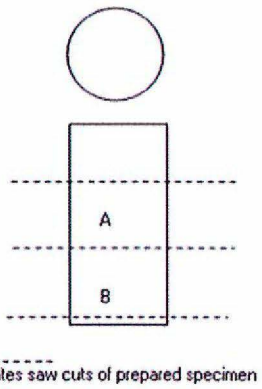
		Client Sample Ref:	18/1 B
		Date Cast:	Not Supplied
		Date Received:	31 Jul 2017
Client Contact:	Not Advised	Date Tested:	31 Jul 2017
Site:	**Grenfell Tower, Grenfell Road, W11 1TQ**	Tested By:	ESG Uxbridge
Location:	Level 18 Flat 1 GL B 4-5 Wall		
Sampled by:	Client	Sampling Certificate:	Not Received
Samples Submitted by:	Client		

Results :

Date of Coring:	Not Supplied
Drilling Angle:	Horizontal
Mix Details:	Existing
Preparation method:	HAC & Sand
Age at Test (days):	Not Supplied
Visual Inspection of Core:	Satisfactory
Maximum Nominal Size of Aggregate (mm):	16
Average Length of Core As Received (mm):	190
Diameter of Test Core (mm):	98
Length / Diameter Ratio of Prepared Core:	1.12
Surface Moisture Condition at Test:	Dry
Estimated Excess Voidage (%):	0.5
As Rec'd Density inc. steel where shown (kg/m³):	2250
Type of Fracture:	Normal
Core Compressive Strength (N/mm²):	**32.1**
Corrected In-Situ Cube Strength (N/mm²):	**33.5**

Core Details - as received
Reinforcement bar(s) Diameter (mm)
No Reinforcement bars in sample
Distance from Top End (mm)
Not Applicable

Core Details - as tested
Reinforcement bar(s) Diameter (mm)
No Reinforcement bars in test core
Distance from Nearest End (mm)
Not Applicable



indicates saw cuts of prepared specimen

Comments: Signs of Fire Damage at around a up to depth of 30mm.

Density of core determined by water displacement method in accordance with BS EN12390-7:2009
Certified that the Concrete Core Compressive Strength was determined in accordance with BS EN12504-1:2009

KEY DET NOT APPROVED

for and on behalf of
Environmental Scientifics Group Limited

Form L54

ESG
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UKAS TESTING
0001

TEST REPORT

Concrete Core Compressive Strength
BS EN12504-1:2009

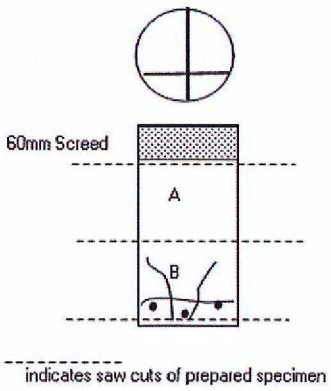
Report No:	**UXB0380812/918/M0**	**Report Date:**	**1 August 2017**
		Our Contract Ref:	51035235
Client:	DECONSTRUCT (UK) LTD	Client Order No.	DEC 13340 m
Address:	BURDETT HOUSE 15-16 BUCKINGHAM STREET LONDON WC2N 6U GB	Sample No.	24600918
		Client Sample Ref:	18/2 A
		Date Cast:	Not Supplied
		Date Received:	31 Jul 2017
Client Contact:	Not Advised	Date Tested:	31 Jul 2017
Site:	**Grenfell Tower, Grenfell Road, W11 1TQ**	Tested By:	ESG Uxbridge
Location:	Level 18 Flat 2 GL C-D 4 Floor		
Sampled by:	Client	Sampling Certificate:	Not Received
Samples Submitted by:	Client		

Results :

Date of Coring:	Not Supplied
Drilling Angle:	Vertical
Mix Details:	Existing
Preparation method:	HAC & Sand
Age at Test (days):	Not Supplied
Visual Inspection of Core:	Satisfactory
Maximum Nominal Size of Aggregate (mm):	16
Average Length of Core As Received (mm):	263
Diameter of Test Core (mm):	98
Length / Diameter Ratio of Prepared Core:	1.12
Surface Moisture Condition at Test:	Dry
Estimated Excess Voidage (%):	0.5
As Rec'd Density inc. steel where shown (kg/m³):	2270
Type of Fracture:	Normal
Core Compressive Strength (N/mm²):	**28.2**
Corrected In-Situ Cube Strength (N/mm²):	**29.5**

Core Details - as received
Reinforcement bar(s) Diameter (mm)
16 / 16
Distance from Top End (mm)
236 / 251

Core Details - as tested
Reinforcement bar(s) Diameter (mm)
No Reinforcement bars in test core
Distance from Nearest End (mm)
Not Applicable



Comments: Signs of Fire Damage at around up to a depth of 40mm.

Density of core determined by water displacement method in accordance with BS EN12390-7:2009
Certified that the Concrete Core Compressive Strength was determined in accordance with BS EN12504-1:2009

KEY DET NOT APPROVED -

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UKAS TESTING
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TEST REPORT

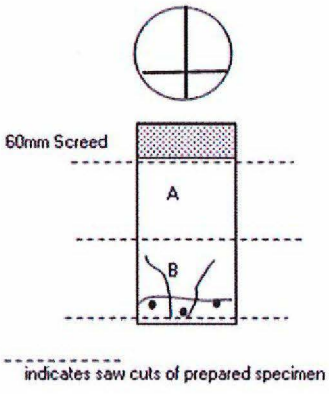
Concrete Core Compressive Strength
BS EN12504-1:2009

Report No:	**UXB0380812/919/M0**	**Report Date:**	**1 August 2017**
		Our Contract Ref:	51035235
Client:	DECONSTRUCT (UK) LTD	Client Order No.	DEC 13340 m
Address:	BURDETT HOUSE 15-16 BUCKINGHAM STREET LONDON WC2N 6U GB	Sample No.	24600919
		Client Sample Ref:	18/2 B
		Date Cast:	Not Supplied
		Date Received:	31 Jul 2017
Client Contact:	Not Advised	Date Tested:	31 Jul 2017
Site:	**Grenfell Tower, Grenfell Road, W11 1TQ**	Tested By:	ESG Uxbridge
Location:	Level 18 Flat 2 GL C-D 4 Floor		
Sampled by:	Client	Sampling Certificate:	Not Received
Samples Submitted by:	Client		

Results :

Date of Coring:	Not Supplied
Drilling Angle:	Vertical
Mix Details:	Existing
Preparation method:	HAC & Sand
Age at Test (days):	Not Supplied
Visual Inspection of Core:	Satisfactory
Maximum Nominal Size of Aggregate (mm):	16
Average Length of Core As Received (mm):	263
Diameter of Test Core (mm):	98
Length / Diameter Ratio of Prepared Core:	1.12
Surface Moisture Condition at Test:	Dry
Estimated Excess Voidage (%):	0.5
As Rec'd Density inc. steel where shown (kg/m³):	2390
Type of Fracture:	Normal
Core Compressive Strength (N/mm²):	**22.4**
Corrected In-Situ Cube Strength (N/mm²):	**25.4**

Core Details - as received
Reinforcement bar(s) Diameter (mm)
16 / 16
Distance from Top End (mm)
236 / 251
Core Details - as tested
Reinforcement bar(s) Diameter (mm)
16 / 16
Distance from Nearest End (mm)
37 / 23



Comments: Signs of Fire Damage at around up to a depth of 40mm.

Density of core determined by water displacement method in accordance with BS EN12390-7:2009
Certified that the Concrete Core Compressive Strength was determined in accordance with BS EN12504-1:2009

KEY DET NOT APPROVED -

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UKAS TESTING
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TEST REPORT

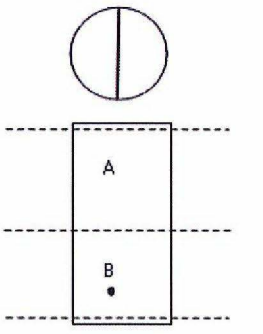
Concrete Core Compressive Strength
BS EN12504-1:2009

Report No:	**UXB0380812/920/M0**	**Report Date:**	**1 August 2017**
		Our Contract Ref:	51035235
Client:	DECONSTRUCT (UK) LTD	Client Order No.	DEC 13340 m
Address:	BURDETT HOUSE 15-16 BUCKINGHAM STREET LONDON WC2N 6U GB	Sample No.	24600920
		Client Sample Ref:	14/5 A
		Date Cast:	Not Supplied
		Date Received:	31 Jul 2017
Client Contact:	Not Advised	Date Tested:	31 Jul 2017
Site:	**Grenfell Tower, Grenfell Road, W11 1TQ**	Tested By:	ESG Uxbridge
Location:	Level 14 Flat 5 GL A-B 2 Floor		
Sampled by:	Client	Sampling Certificate:	Not Received
Samples Submitted by:	Client		

Results :

Date of Coring:	Not Supplied
Drilling Angle:	Vertical
Mix Details:	Existing
Preparation method:	HAC & Sand
Age at Test (days):	Not Supplied
Visual Inspection of Core:	Satisfactory
Maximum Nominal Size of Aggregate (mm):	16
Average Length of Core As Received (mm):	208
Diameter of Test Core (mm):	98
Length / Diameter Ratio of Prepared Core:	1.12
Surface Moisture Condition at Test:	Dry
Estimated Excess Voidage (%):	0.5
As Rec'd Density inc. steel where shown (kg/m³):	2270
Type of Fracture:	Normal
Core Compressive Strength (N/mm²):	**26.8**
Corrected In-Situ Cube Strength (N/mm²):	**28.0**

Core Details - as received
Reinforcement bar(s) Diameter (mm)
16
Distance from Top End (mm)
192
Core Details - as tested
Reinforcement bar(s) Diameter (mm)
No Reinforcement bars in test core
Distance from Nearest End (mm)
Not Applicable



indicates saw cuts of prepared specimen

Comments: Signs of Fire Damage throughout the length of the sample.

Density of core determined by water displacement method in accordance with BS EN12390-7:2009
Certified that the Concrete Core Compressive Strength was determined in accordance with BS EN12504-1:2009

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TEST REPORT

Concrete Core Compressive Strength
BS EN12504-1:2009

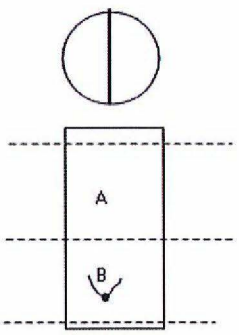
Report No:	**UXB0380812/921/M0**	**Report Date:**	**1 August 2017**
		Our Contract Ref:	51035235
Client:	DECONSTRUCT (UK) LTD	Client Order No.	DEC 13340 m
Address:	BURDETT HOUSE 15-16 BUCKINGHAM STREET LONDON WC2N 6U GB	Sample No.	24600921
		Client Sample Ref:	14/2 B
		Date Cast:	Not Supplied
		Date Received:	31 Jul 2017
Client Contact:	Not Advised	Date Tested:	31 Jul 2017
Site:	**Grenfell Tower, Grenfell Road, W11 1TQ**	Tested By:	ESG Uxbridge
Location:	Level 14 Flat 5 GL A-B 2 Floor		
Sampled by:	Client	Sampling Certificate:	Not Received
Samples Submitted by:	Client		

Results :

Date of Coring:	Not Supplied
Drilling Angle:	Vertical
Mix Details:	Existing
Preparation method:	HAC & Sand
Age at Test (days):	Not Supplied
Visual Inspection of Core:	Satisfactory
Maximum Nominal Size of Aggregate (mm):	16
Average Length of Core As Received (mm):	208
Diameter of Test Core (mm):	98
Length / Diameter Ratio of Prepared Core:	1.12
Surface Moisture Condition at Test:	Dry
Estimated Excess Voidage (%):	0.5
As Rec'd Density inc. steel where shown (kg/m³):	2430
Type of Fracture:	Normal
Core Compressive Strength (N/mm²):	**23.3**
Corrected In-Situ Cube Strength (N/mm²):	**25.4**

Core Details - as received
Reinforcement bar(s) Diameter (mm)
16
Distance from Top End (mm)
192

Core Details - as tested
Reinforcement bar(s) Diameter (mm)
16
Distance from Nearest End (mm)
18



indicates saw cuts of prepared specimen

Comments: Signs of Fire Damage throughout the length of the sample.

Density of core determined by water displacement method in accordance with BS EN12390-7:2009
Certified that the Concrete Core Compressive Strength was determined in accordance with BS EN12504-1:2009

KEY DET NOT APPROVED -

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TEST REPORT

Concrete Core Compressive Strength
BS EN12504-1:2009

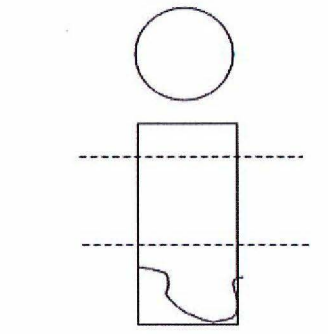
Report No:	**UXB0380812/922/M0**	**Report Date:**	**1 August 2017**
		Our Contract Ref:	51035235
Client:	DECONSTRUCT (UK) LTD	Client Order No.	DEC 13340 m
Address:	BURDETT HOUSE 15-16 BUCKINGHAM STREET LONDON WC2N 6U GB	Sample No.	24600922
		Client Sample Ref:	14/1
		Date Cast:	Not Supplied
		Date Received:	31 Jul 2017
Client Contact:	Not Advised	Date Tested:	31 Jul 2017
Site:	**Grenfell Tower, Grenfell Road, W11 1TQ**	Tested By:	ESG Uxbridge
Location:	Level 14 Flat 1 GL 4 4-5 Wall		
Sampled by:	Client	Sampling Certificate:	Not Received
Samples Submitted by:	Client		

Results :

Date of Coring:	Not Supplied
Drilling Angle:	Horizontal
Mix Details:	Existing
Preparation method:	HAC & Sand
Age at Test (days):	Not Supplied
Visual Inspection of Core:	Satisfactory
Maximum Nominal Size of Aggregate (mm):	16
Average Length of Core As Received (mm):	179
Diameter of Test Core (mm):	98
Length / Diameter Ratio of Prepared Core:	1.12
Surface Moisture Condition at Test:	Dry
Estimated Excess Voidage (%):	1.0
As Rec'd Density inc. steel where shown (kg/m³):	2250
Type of Fracture:	Normal
Core Compressive Strength (N/mm²):	**26.6**
Corrected In-Situ Cube Strength (N/mm²):	**27.9**

Core Details - as received
Reinforcement bar(s) Diameter (mm)
No Reinforcement bars in sample
Distance from Top End (mm)
Not Applicable

Core Details - as tested
Reinforcement bar(s) Diameter (mm)
No Reinforcement bars in test core
Distance from Nearest End (mm)
Not Applicable



---------- indicates saw cuts of prepared specimen

Comments: Signs of Fire Damage at around up to a depth of 20mm.

Density of core determined by water displacement method in accordance with BS EN12390-7:2009
Certified that the Concrete Core Compressive Strength was determined in accordance with BS EN12504-1:2009

KEY DET NOT APPROVED -

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UKAS TESTING
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TEST REPORT

Concrete Core Compressive Strength
BS EN12504-1:2009

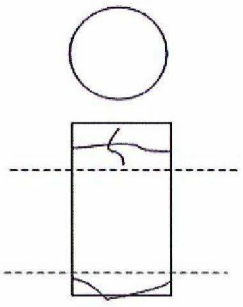
Report No:	**UXB0380812/923/M0**	**Report Date:**	**1 August 2017**
		Our Contract Ref:	51035235
Client:	DECONSTRUCT (UK) LTD	Client Order No.	DEC 13340 m
Address:	BURDETT HOUSE 15-16 BUCKINGHAM STREET LONDON WC2N 6U GB	Sample No.	24600923
		Client Sample Ref:	13/5
		Date Cast:	Not Supplied
		Date Received:	31 Jul 2017
Client Contact:	Not Advised	Date Tested:	31 Jul 2017
Site:	**Grenfell Tower, Grenfell Road, W11 1TQ**	Tested By:	ESG Uxbridge
Location:	Level 13 Flat 5 GL A-B 3 Wall		
Sampled by:	Client	Sampling Certificate:	Not Received
Samples Submitted by:	Client		

Results :

Date of Coring:	Not Supplied
Drilling Angle:	Horizontal
Mix Details:	Existing
Preparation method:	HAC & Sand
Age at Test (days):	Not Supplied
Visual Inspection of Core:	Satisfactory
Maximum Nominal Size of Aggregate (mm):	16
Average Length of Core As Received (mm):	149
Diameter of Test Core (mm):	98
Length / Diameter Ratio of Prepared Core:	1.12
Surface Moisture Condition at Test:	Dry
Estimated Excess Voidage (%):	1.5
As Rec'd Density inc. steel where shown (kg/m³):	2200
Type of Fracture:	Normal
Core Compressive Strength (N/mm²):	**21.2**
Corrected In-Situ Cube Strength (N/mm²):	**22.2**

Core Details - as received
Reinforcement bar(s) Diameter (mm)
No Reinforcement bars in sample
Distance from Top End (mm)
Not Applicable

Core Details - as tested
Reinforcement bar(s) Diameter (mm)
No Reinforcement bars in test core
Distance from Nearest End (mm)
Not Applicable



---------- indicates saw cuts of prepared specimen

Comments:
Signs of Fire Damage throughout the length of the sample

Density of core determined by water displacement method in accordance with BS EN12390-7:2009
Certified that the Concrete Core Compressive Strength was determined in accordance with BS EN12504-1:2009

KEY DET NOT APPROVED -

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UKAS TESTING
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TEST REPORT

Concrete Core Compressive Strength
BS EN12504-1:2009

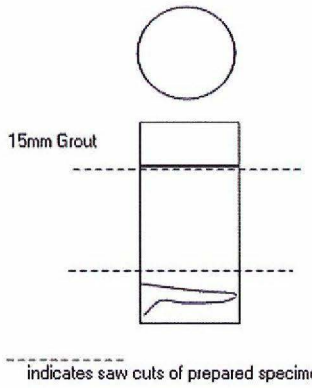
Report No:	**UXB0380812/924/M0**	**Report Date:**	**1 August 2017**
		Our Contract Ref:	51035235
Client:	DECONSTRUCT (UK) LTD	Client Order No.	DEC 13340 m
Address:	BURDETT HOUSE 15-16 BUCKINGHAM STREET LONDON WC2N 6U GB	Sample No.	24600924
		Client Sample Ref:	10/1
		Date Cast:	Not Supplied
		Date Received:	31 Jul 2017
Client Contact:	Not Advised	Date Tested:	31 Jul 2017
Site:	**Grenfell Tower, Grenfell Road, W11 1TQ**	Tested By:	ESG Uxbridge
Location:	Level 10 Flat 1 GL B 4-5 Wall		
Sampled by:	Client	Sampling Certificate:	Not Received
Samples Submitted by:	Client		

Results :

Date of Coring:	Not Supplied
Drilling Angle:	Horizontal
Mix Details:	Existing
Preparation method:	HAC & Sand
Age at Test (days):	Not Supplied
Visual Inspection of Core:	Satisfactory
Maximum Nominal Size of Aggregate (mm):	16
Average Length of Core As Received (mm):	195
Diameter of Test Core (mm):	98
Length / Diameter Ratio of Prepared Core:	1.12
Surface Moisture Condition at Test:	Dry
Estimated Excess Voidage (%):	0.5
As Rec'd Density inc. steel where shown (kg/m³):	2320
Type of Fracture:	Normal
Core Compressive Strength (N/mm²):	**32.0**
Corrected In-Situ Cube Strength (N/mm²):	**33.4**

Core Details - as received
Reinforcement bar(s) Diameter (mm)
No Reinforcement bars in sample
Distance from Top End (mm)
Not Applicable

Core Details - as tested
Reinforcement bar(s) Diameter (mm)
No Reinforcement bars in test core
Distance from Nearest End (mm)
Not Applicable



Comments: Signs of Fire Damage at around up to a depth of 15mm.

Density of core determined by water displacement method in accordance with BS EN12390-7:2009
Certified that the Concrete Core Compressive Strength was determined in accordance with BS EN12504-1:2009

KEY DET NOT APPROVED -

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TEST REPORT

Concrete Core Compressive Strength
BS EN12504-1:2009

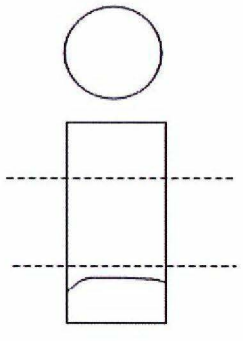
Report No:	**UXB0380812/925/M0**	**Report Date:**	**1 August 2017**
		Our Contract Ref:	51035235
Client:	DECONSTRUCT (UK) LTD	Client Order No.	DEC 13340 m
Address:	BURDETT HOUSE 15-16 BUCKINGHAM STREET LONDON WC2N 6U GB	Sample No.	24600925
		Client Sample Ref:	9/5
		Date Cast:	Not Supplied
		Date Received:	31 Jul 2017
Client Contact:	Not Advised	Date Tested:	31 Jul 2017
Site:	**Grenfell Tower, Grenfell Road, W11 1TQ**	Tested By:	ESG Uxbridge
Location:	Level 9 Flat 5 GL A-B 3 Wall		
Sampled by:	Client	Sampling Certificate:	Not Received
Samples Submitted by:	Client		

Results :

Date of Coring:	Not Supplied
Drilling Angle:	Horizontal
Mix Details:	Existing
Preparation method:	HAC & Sand
Age at Test (days):	Not Supplied
Visual Inspection of Core:	Satisfactory
Maximum Nominal Size of Aggregate (mm):	16
Average Length of Core As Received (mm):	197
Diameter of Test Core (mm):	98
Length / Diameter Ratio of Prepared Core:	1.12
Surface Moisture Condition at Test:	Dry
Estimated Excess Voidage (%):	0.5
As Rec'd Density inc. steel where shown (kg/m³):	2200
Type of Fracture:	Normal
Core Compressive Strength (N/mm²):	**27.2**
Corrected In-Situ Cube Strength (N/mm²):	**28.4**

Core Details - as received
Reinforcement bar(s) Diameter (mm)
No Reinforcement bars in sample
Distance from Top End (mm)
Not Applicable

Core Details - as tested
Reinforcement bar(s) Diameter (mm)
No Reinforcement bars in test core
Distance from Nearest End (mm)
Not Applicable



---------- indicates saw cuts of prepared specimen

Comments: Signs of Fire Damage at around up to a depth of 60mm.

Density of core determined by water displacement method in accordance with BS EN12390-7:2009
Certified that the Concrete Core Compressive Strength was determined in accordance with BS EN12504-1:2009

KEY DET NOT APPROVED -

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TEST REPORT

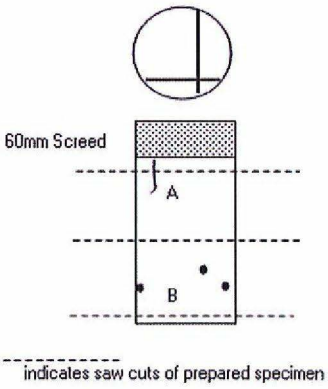
Concrete Core Compressive Strength
BS EN12504-1:2009

Report No:	**UXB0380812/926/M0**	**Report Date:**	**1 August 2017**
		Our Contract Ref:	51035235
Client:	DECONSTRUCT (UK) LTD	Client Order No.	DEC 13340 m
Address:	BURDETT HOUSE 15-16 BUCKINGHAM STREET LONDON WC2N 6U GB	Sample No.	24600926
		Client Sample Ref:	8/6 A
		Date Cast:	Not Supplied
		Date Received:	31 Jul 2017
Client Contact:	Not Advised	Date Tested:	31 Jul 2017
Site:	**Grenfell Tower, Grenfell Road, W11 1TQ**	Tested By:	ESG Uxbridge
Location:	Level 8 Flat 6 GL A-B 4 Floor		
Sampled by:	Client	Sampling Certificate:	Not Received
Samples Submitted by:	Client		

Results :

Date of Coring:	Not Supplied
Drilling Angle:	Vertical
Mix Details:	Existing
Preparation method:	HAC & Sand
Age at Test (days):	Not Supplied
Visual Inspection of Core:	Satisfactory
Maximum Nominal Size of Aggregate (mm):	16
Average Length of Core As Received (mm):	265
Diameter of Test Core (mm):	98
Length / Diameter Ratio of Prepared Core:	1.12
Surface Moisture Condition at Test:	Dry
Estimated Excess Voidage (%):	0.5
As Rec'd Density inc. steel where shown (kg/m³):	2280
Type of Fracture:	Normal
Core Compressive Strength (N/mm²):	**28.9**
Corrected In-Situ Cube Strength (N/mm²):	**30.2**

Core Details - as received
Reinforcement bar(s) Diameter (mm)
16
Distance from Top End (mm)
16
Core Details - as tested
Reinforcement bar(s) Diameter (mm)
230
Distance from Nearest End (mm)
244



Comments: No Signs of Fire Damage.

Density of core determined by water displacement method in accordance with BS EN12390-7:2009
Certified that the Concrete Core Compressive Strength was determined in accordance with BS EN12504-1:2009

KEY DET NOT APPROVED -

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TEST REPORT

Concrete Core Compressive Strength
BS EN12504-1:2009

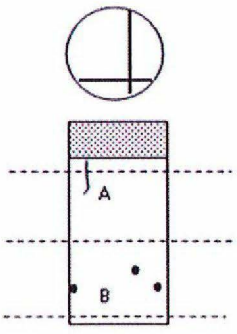
Report No:	**UXB0380812/927/M0**	**Report Date:**	**1 August 2017**
		Our Contract Ref:	51035235
Client:	DECONSTRUCT (UK) LTD	Client Order No.	DEC 13340 m
Address:	BURDETT HOUSE 15-16 BUCKINGHAM STREET LONDON WC2N 6U GB	Sample No.	24600927
		Client Sample Ref:	8/6 B
		Date Cast:	Not Supplied
		Date Received:	31 Jul 2017
Client Contact:	Not Advised	Date Tested:	31 Jul 2017
Site:	**Grenfell Tower, Grenfell Road, W11 1TQ**	Tested By:	ESG Uxbridge
Location:	Level 8 Flat 6 GL A-B 4 Floor		
Sampled by:	Client	Sampling Certificate:	Not Received
Samples Submitted by:	Client		

Results :

Date of Coring:	Not Supplied
Drilling Angle:	Vertical
Mix Details:	Existing
Preparation method:	HAC & Sand
Age at Test (days):	Not Supplied
Visual Inspection of Core:	Satisfactory
Maximum Nominal Size of Aggregate (mm):	16
Average Length of Core As Received (mm):	265
Diameter of Test Core (mm):	98
Length / Diameter Ratio of Prepared Core:	1.12
Surface Moisture Condition at Test:	Dry
Estimated Excess Voidage (%):	0.5
As Rec'd Density inc. steel where shown (kg/m³):	2450
Type of Fracture:	Normal
Core Compressive Strength (N/mm²):	**39.9**
Corrected In-Situ Cube Strength (N/mm²):	**45.3**

Core Details - as received
Reinforcement bar(s) Diameter (mm)
16 / 16
Distance from Top End (mm)
230 / 244

Core Details - as tested
Reinforcement bar(s) Diameter (mm)
16 / 16
Distance from Nearest End (mm)
39 / 24



indicates saw cuts of prepared specimen

Comments: No Signs of Fire Damage.

Density of core determined by water displacement method in accordance with BS EN12390-7:2009
Certified that the Concrete Core Compressive Strength was determined in accordance with BS EN12504-1:2009

KEY DET NOT APPROVED -

for and on behalf of
Environmental Scientifics Group Limited

Form L54

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TEST REPORT

Concrete Core Compressive Strength
BS EN12504-1:2009

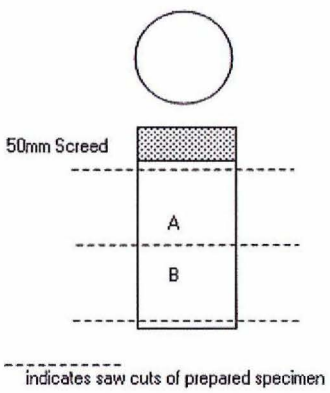
Report No:	**UXB0380812/928/M0**	**Report Date:**	**1 August 2017**
		Our Contract Ref:	51035235
Client:	DECONSTRUCT (UK) LTD	Client Order No.	DEC 13340 m
Address:	BURDETT HOUSE 15-16 BUCKINGHAM STREET LONDON WC2N 6U GB	Sample No.	24600928
		Client Sample Ref:	7/2 B
		Date Cast:	Not Supplied
		Date Received:	31 Jul 2017
Client Contact:	Not Advised	Date Tested:	31 Jul 2017
Site:	**Grenfell Tower, Grenfell Road, W11 1TQ**	Tested By:	ESG Uxbridge
Location:	Level 7 Flat 2 GL C-D 4 Floor		
Sampled by:	Client	Sampling Certificate:	Not Received
Samples Submitted by:	Client		

Results :

Date of Coring:	Not Supplied
Drilling Angle:	Vertical
Mix Details:	Existing
Preparation method:	HAC & Sand
Age at Test (days):	Not Supplied
Visual Inspection of Core:	Satisfactory
Maximum Nominal Size of Aggregate (mm):	16
Average Length of Core As Received (mm):	260
Diameter of Test Core (mm):	98
Length / Diameter Ratio of Prepared Core:	1.12
Surface Moisture Condition at Test:	Dry
Estimated Excess Voidage (%):	0.5
As Rec'd Density inc. steel where shown (kg/m³):	2290
Type of Fracture:	Normal
Core Compressive Strength (N/mm²):	**32.9**
Corrected In-Situ Cube Strength (N/mm²):	**34.4**

Core Details - as received
Reinforcement bar(s) Diameter (mm)
No Reinforcement bars in sample
Distance from Top End (mm)
Not Applicable

Core Details - as tested
Reinforcement bar(s) Diameter (mm)
No Reinforcement bars in test core
Distance from Nearest End (mm)
Not Applicable



Comments: No Signs of Fire Damage.

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Certified that the Concrete Core Compressive Strength was determined in accordance with BS EN12504-1:2009

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TEST REPORT

Concrete Core Compressive Strength
BS EN12504-1:2009

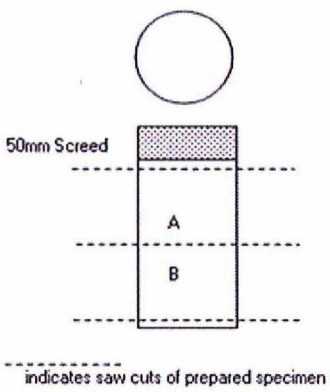
Report No:	**UXB0380812/929/M0**	**Report Date:**	**1 August 2017**
		Our Contract Ref:	51035235
Client:	DECONSTRUCT (UK) LTD	Client Order No.	DEC 13340 m
Address:	BURDETT HOUSE 15-16 BUCKINGHAM STREET LONDON WC2N 6U GB	Sample No.	24600929
		Client Sample Ref:	7/2 B
		Date Cast:	Not Supplied
		Date Received:	31 Jul 2017
Client Contact:	Not Advised	Date Tested:	31 Jul 2017
Site:	**Grenfell Tower, Grenfell Road, W11 1TQ**	Tested By:	ESG Uxbridge
Location:	Level 7 Flat 2 GL C-D 4 Floor		
Sampled by:	Client	Sampling Certificate:	Not Received
Samples Submitted by:	Client		

Results :

Date of Coring:	Not Supplied
Drilling Angle:	Vertical
Mix Details:	Existing
Preparation method:	HAC & Sand
Age at Test (days):	Not Supplied
Visual Inspection of Core:	Satisfactory
Maximum Nominal Size of Aggregate (mm):	16
Average Length of Core As Received (mm):	260
Diameter of Test Core (mm):	98
Length / Diameter Ratio of Prepared Core:	1.12
Surface Moisture Condition at Test:	Dry
Estimated Excess Voidage (%):	0.5
As Rec'd Density inc. steel where shown (kg/m³):	2330
Type of Fracture:	Normal
Core Compressive Strength (N/mm²):	**37.7**
Corrected In-Situ Cube Strength (N/mm²):	**39.4**

Core Details - as received
Reinforcement bar(s) Diameter (mm)
No Reinforcement bars in sample
Distance from Top End (mm)
Not Applicable

Core Details - as tested
Reinforcement bar(s) Diameter (mm)
No Reinforcement bars in test core
Distance from Nearest End (mm)
Not Applicable



Comments: No Signs of Fire Damage.

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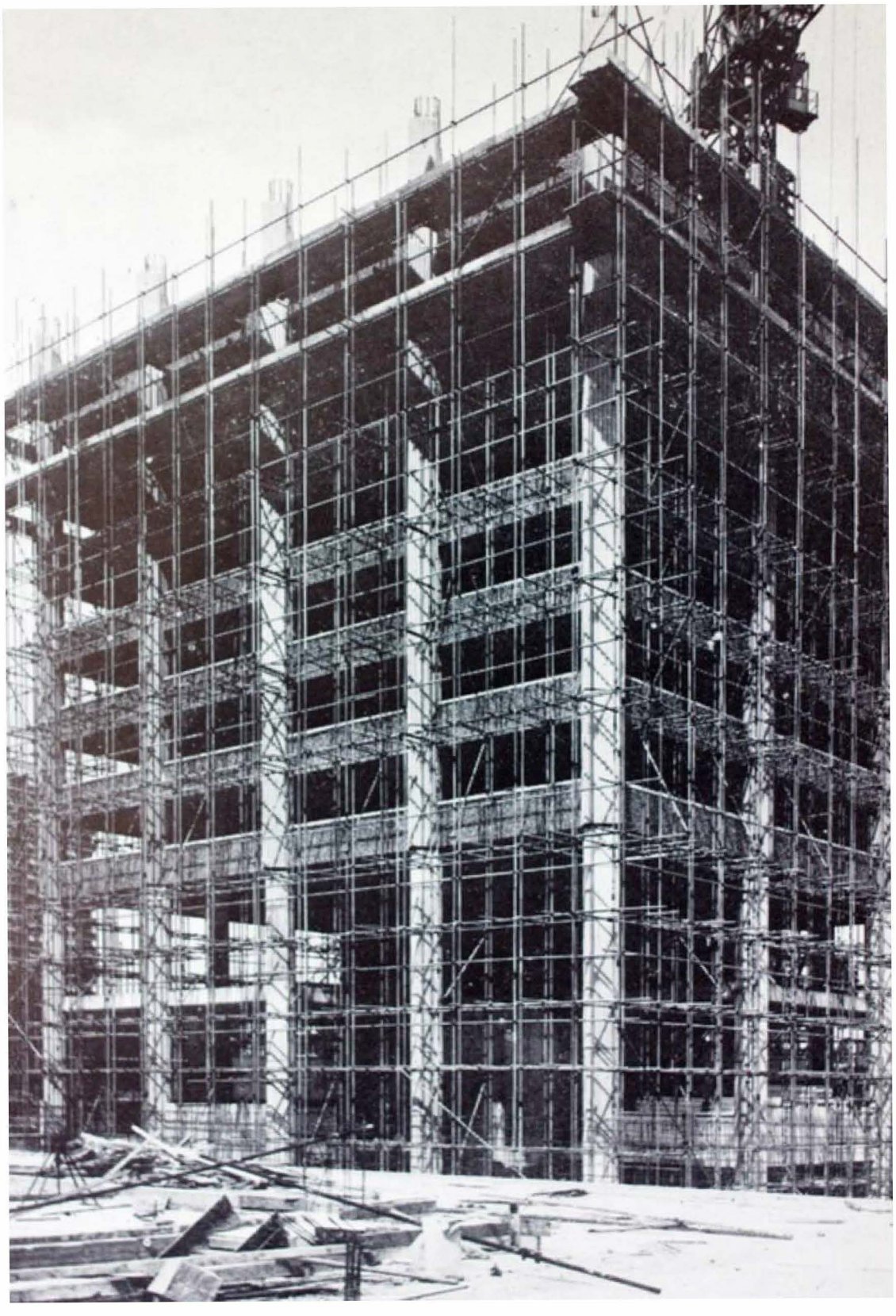
Appendix D

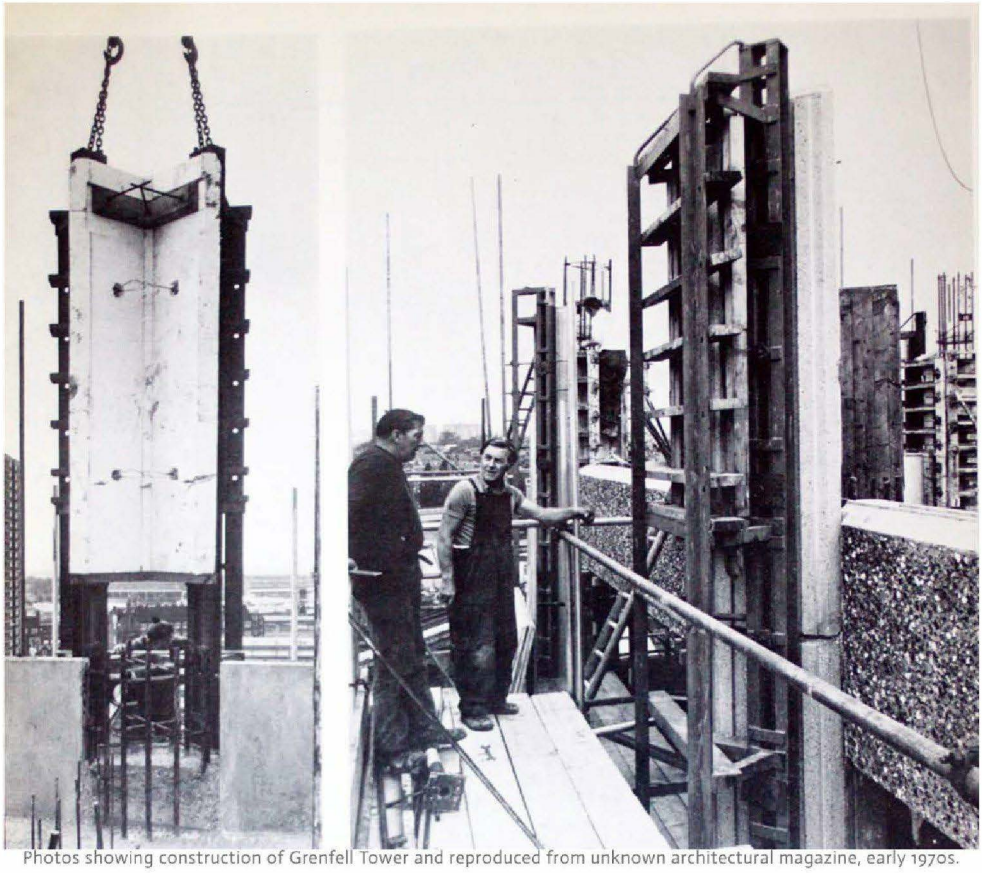
Anecdotal Photographs

Appendix D – Anecdotal Evidence

Existing Building During Construction



Existing Perimeter Columns during Construction



Photos showing construction of Grenfell Tower and reproduced from unknown architectural magazine, early 1970s.

Grenfell tower is a flexible building although designed for flats. You could take away all those internal partitions and open it up if that's what you wanted to do in the future, This was unusual in terms of residential tower blocks. I also don't know of any other council built tower block in London or anywhere else in England that also has the central core and six flats per floor rather than four flats which is typically done on the London County Council or Greater London Council plans. We were wanting to put our own identity on this. The GLC built Silchester estate and I had nothing against that but this was so different in many ways. While a lot of brick had been used in LCC and GLC buildings, we thought that putting bricks one on top of the other for twenty storeys was a crazy thing to do. We used insulated pre-cast concrete beams as external walls, lifted up and put into place with cranes and they were so much more quicker.

In an architects mind, they want towers to be an elegant form rather than stumpy. This was a challenge and was why I introduced as many vertical elements within the fenestration as I could. The only thing I could play with was the windows and the infill between the windows. I treated it like a curtain wall, to get the rhythm of a curtain wall. We lost some of this verticality in the recent re-cladding but it's not the end of the world. And the building is now better insulated as we had different standards then.

The floor plans were based on Parker Morris Standards which they used at that time and sadly have gone now. These were very good standards for storage and the way furniture had to be included in the plans. It was delightful to hear that residents thought flat arrangements worked well and I saw the views recently which I always thought were terrific. I wouldn't have minded living in a tower block myself. Tower blocks were criticized for not being suited to people or a lot of families were being forced into it and they were feeling more and more remote from the street and meeting other people. But there is another side to this and it always seemed to me that if American's can live in tower blocks, why can't the English?

As first encountered

Typical floor propping – Green floor

Typical Floor propping – Red floor

Damage to floor slabs (where noted in body of report)

Viewed above (note step 40-50mm,)

Viewed below (note tear and slope)

Open construction joint (at locations noted in report approximately 1-2mm wide)

Outrigger walls (demise of apartments)

(in background)

Typical views of a spandrel panels

Columns – Spalled (typical)

Detail at head of non-loadbearing mullions

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