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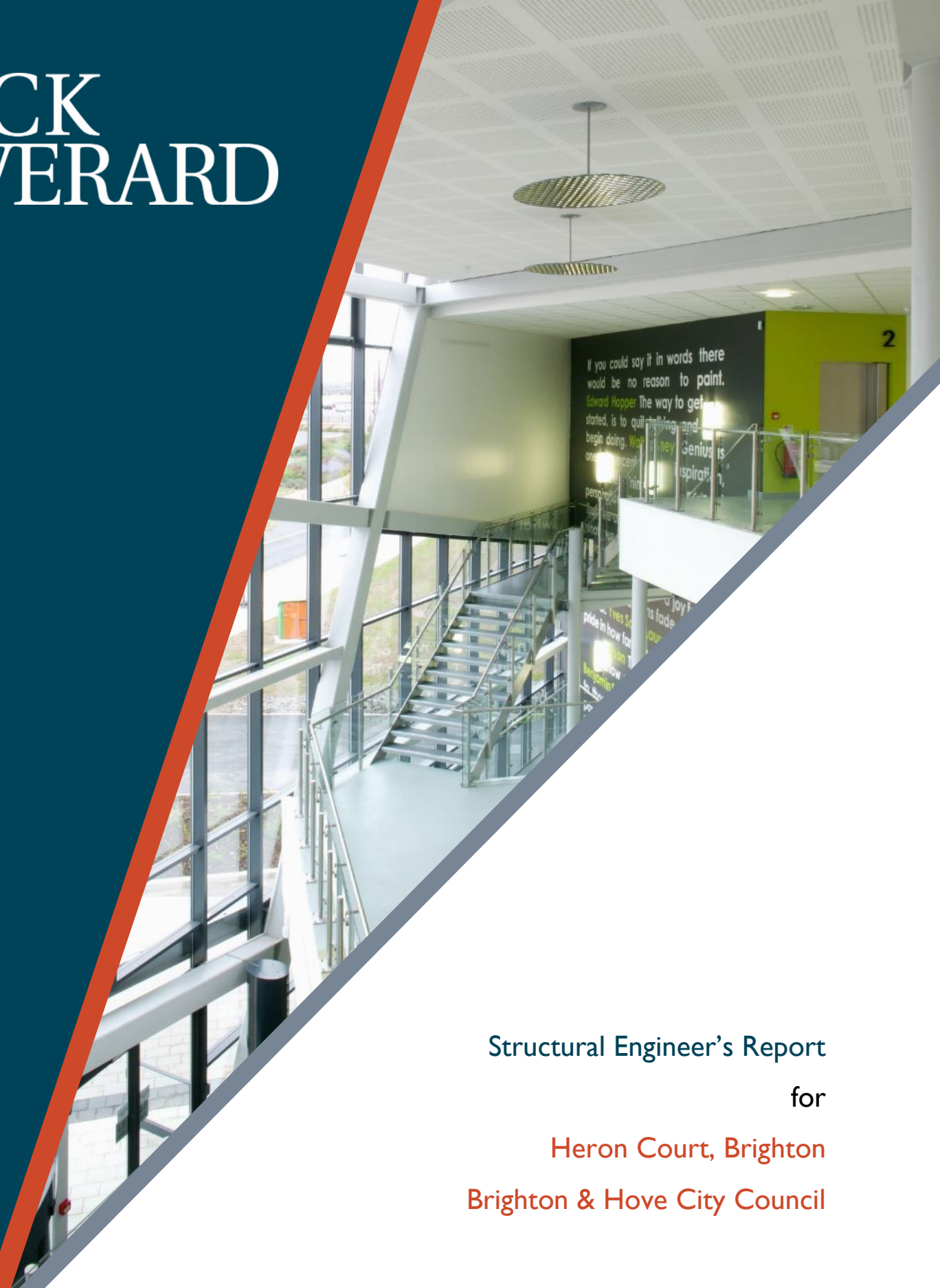


Structural Engineer's Report

for

Heron Court, Brighton

Brighton & Hove City Council

Issue Number 01
25 June 2019

Document History

Issue	Date	Comment	Author	Chk'd
01	25.06.19	First Issue	IAA	IPR

Contents

1.0 Reference and Instruction

1.1	PE Report Reference	:	STR/IPR/IAA/190215/17-2/R002 – Issue 01
1.2	Client	:	Brighton & Hove City Council
1.2.1	Address	:	Housing Centre Unit 1 Fairway Trading Estate Eastergate Road Moulsecoomb Brighton BN2 4QL
1.2.2	Telephone Number	:	[redacted]
1.3	Inspected Property	:	Heron Court Swanborough Place Brighton BN2 5QA
1.4	Occupier	:	Various tenants and leaseholders
1.5	Inspecting Engineer/Surveyor	:	[redacted]
1.6	Instruction		
1.6.1	Mode	:	Purchase Order
1.6.2	Reference	:	BHC0608879/0
1.6.3	Instructed by	:	Geof Gage
1.6.4	On behalf of	:	Brighton & Hove City Council

1.7 Brief

Site Inspection and Investigation Works

- To carry out a visual, non-intrusive inspection of the tower block superstructure, externally from ground level with the use of binoculars, and internally to accessible communal areas and to void flats or flats where residents had requested or agreed an internal inspection.
- To particularly focus on inspection of exposed surfaces at panel connection locations, to inform decisions regarding any further investigations, to establish hidden connection details and condition, not included in this brief (the brief did not require opening up and inspection at typical connection details at this time).
- To carry out carbonation testing and High Alumina Cement (HAC) testing to a sample of concrete from each elevation of the block at ground floor level only.
- To identify any obvious Fire or H&S risks associated with the structural observations (not a full Fire or H&S assessment of the building)

Reporting

- Following the site inspection and investigation works, to provide a report with comment on findings, the nature and cause of any damage; and recommendations on such further investigations as might be necessary to ascertain the cause of the damage and/or the type and scope of possible remedial measures.

2.0 Scope of Investigations and Report

In accordance with the aforesaid instructions, the following investigations have been undertaken:-

(a) A visual inspection of the superstructure
(b) On site carbonation testing of concrete samples from each elevation at ground floor level, using Phenolphthalein Solution on freshly broken concrete samples.
(c) Laboratory HAC testing of concrete samples taken from site.
(d) In addition, a desktop review of the following documents was undertaken:
   a. Feasibility Report for Additional Lift Shaft door openings from 2015, by Frankham Structural Engineers, provided by the Council.
   b. Online Geological maps

The investigations and this report are confined to technical assessment of the load bearing elements of the structure, the identification of damage in these elements at the time of our inspection, the cause of damage and the type and scope of measures necessary to repair that damage. Whilst every endeavour will be made to provide a positive and helpful report we are unable to predict the future behaviour of the structure or its components. Guarantee cannot therefore be given that the property will be free from future damage or that existing defects will not suffer from further deterioration or lead to damage.

This report is not to be used for any other purpose or by any third party and is not to be taken as a specification for remedial action or works. However, if the recommendations included within this report are to be subsequently taken forward to detailed design / scheduling and / or construction; before any work can commence, there is a duty on designers, within the definition of the Construction (Design and Management) Regulations 2015, to ensure that Clients are aware of the specific duties they are required to carry out under the provisions set out in the CDM Regulations. HSE's Client Guidance document INDG 411 which can be found on www.hse.gov.uk sets out clear and concise guidance as to the role the Client plays in a project, and also what is expected of other disciplines involved in the project.

The visual inspection of the superstructure was made on 1 May 2019 and detailed notes are retained on file. The weather was fine and dry.

Other than samples taken for carbonation and HAC testing, no breaking out or opening up of the building fabric was undertaken at the time of our inspection and no part of the property which was not readily accessible, or which was covered or otherwise concealed, was inspected.

Internally, only communal areas were inspected and the following Flats were able to be accessed:

- Flat [redacted] – 1 May 2019. This was reported by the client as a void (empty) flat. However, a resident was in occupation but agreed to provide access.
- Flat [redacted] – 1 May 2019. The resident saw us carrying out our inspections on site and requested for us to inspect inside their flat.

Flat [redacted] was also reported by the client to be a void Flat. However, the void key did not open the door, and there was no response from residents when we knocked on the door:

Access was not possible to the following internal communal areas:

- Former Incinerator Rooms within the central core at all levels as no keys provided would operate the locks.
- Lift Shafts
- Lift Plant Room at Roof Level as none of the keys provided would operate the lock to the ceiling access hatch above 7th floor level.
- Ground floor Store adjacent to the central stairs.

Absence of report on areas not accessed is not to be taken that it is free from defect. Such areas and unexposed parts of the building may contain problems and special arrangements would need to be made for these areas to be investigated (where practicably possible) if confirmation were to be required about their condition.

Drains were not inspected or tested. Foundations were not uncovered. Woodwork was not inspected other than for present functional structural adequacy.

Enquiries with local or statutory authorities have not been carried out. Whilst attention may be drawn to any apparent breaches of statutory requirements relative to the buildings or site, the absence of any such comment does not imply compliance with such requirements. The building and associated structures have not therefore been assessed for compliance with the Building Regulations, for example, Approved Document B – Fire Safety.

Whilst attention may be drawn to the suspected presence of asbestos in the building, this report is to be taken specifically to exclude any advice or recommendation in respect of the identification, handling, management or disposal of asbestos. Advice should be sought from other specialists, as and where appropriate.

We have not carried out any inspections to external structures that are not part of the tower blocks, such as the Gas Boiler Outhouses and Retaining Walls around the site.

We have not carried out any inspections for invasive plant species such as Japanese Knotweed. Whilst attention may be drawn to the suspected presence of invasive plant species this report is to be taken specifically to exclude any advice or recommendation in respect of the identification, handling, management or disposal of such plants. If required advice should be sought from a qualified ecological or landscape consultant as and where appropriate.

2.1 Classification of Visible Damage to Walls and Ceilings

For the purposes of this report, the width of cracks is used as a basis for the classification of visible damage, broadly in compliance with the damage classifications defined by Building Research Establishment Digest 251, revision of 1991 (although updated in 1995 to provide greater description) :-

Description	Approximate crack width	BRE Category of Damage
Hairline cracks	Barely visible, less than 0.1mm wide	0
Very slight cracks	Up to 1mm wide	1
Slight cracks	1mm to 5mm wide	2
Moderate cracks	5mm to 15mm wide	3
Severe cracks	15mm to 25mm wide	4
Very severe cracks	Greater than 25mm wide	5

2.2 Orientation

Compass point orientation has been used to describe the location of various elements of the building. RIGHT-HAND and LEFT-HAND in relation to individual walls or components are taken when facing that wall or component.

3.0 The Property – General Details & History

3.1 Construction Details Observed

There are 5 no. tower blocks at the Whitehawk estate which appear to be of the same construction detail. The blocks are named Falcon, Heron, Kestrel, Kingfisher, Swallow.

The archive general arrangement floor plans provided by the client of these blocks, which includes a typical ground floor plan, typical upper floor plan, and typical stairwell/lift plan; appear to be the original design drawings and are dated late 1964, which suggests that the buildings were likely constructed c1965 and are of a Wates 'Large Panel System' (LPS) design.

Heron Court has a ground floor level and eight upper floor levels. It appears that the ground floor level loadbearing structure is likely to comprise of in-situ reinforced concrete columns and beams, supporting pre-cast reinforced concrete floor panels at first floor level, which appears to be the start of the main pre-cast wall and floor panel construction continuing upwards. The internal dividing walls at ground floor level and the lift shafts also appear to be pre-cast concrete units. External brick and block cavity construction walls at ground floor level appear to be non-loadbearing

The original external pre-cast concrete wall panels have been clad externally with an insulated rainscreen cladding system, and original windows replaced with UPVc framed double glazed windows. Ventilation grills were noted at the bottom of the new cladding. Given the presence of the cladding installation, only the underside edge at the bottom of the original pre-cast concrete panels at first floor level is visible in some locations. The remaining parts of the original external concrete panels are not visible.

Internally, the pre-cast concrete panels in the communal areas are generally visible, with a painted finish.

Online geological maps suggest that the building is founded on the Seaford Chalk Formation, likely utilising piled foundations, although this would have to be investigated further if confirmation was required.

The building is set within a hillside, meaning that to the north half of the building, there is no ground floor level below the flats above. A reinforced in-situ concrete retaining wall structure retains the higher ground of the hillside, above the ground floor level of the site which surrounds the southern half of the building.

There are various mature trees around the site, all typically more than 10m away from the building.

A brick outhouse building has been constructed approximately 7m away from the South West corner of the building. This houses the gas boilers, which heat water that is fed to the tower block.

3.2 Brief Background and History of Large Panel System Buildings

The majority of high rise tower blocks utilising 'Large Panel Systems' were designed and constructed in the 1950/1960s. They typically comprise pre-cast reinforced concrete floor and roof components spanning onto storey-height structural precast concrete wall panels. The pre-cast components are connected by various forms of joint made on site; typically dowels and hoops cast into the walls and floors are connected, with the gaps then infilled with a dry pack mortar on site to complete the structural construction. There are

however differences in the individual forms of LPS, which were propriety products produced by the various manufacturers of the day.

As noted above, the system used for Heron Court is understood to be a Wates System.

Concerns regarding the general structural form of LPS construction for high rise buildings were brought into focus in 1968 at the time of the Ronan Point disaster where a gas explosion in a flat caused a progressive collapse to one side of the building. The Ronan Point building was a Taylor Woodrow-Anglian (TWA) LPS dwelling block.

In subsequent years to the Ronan Point disaster, various structural investigations and appraisals have been undertaken on various manufacturers' systems, by the Building Research Establishment (BRE) and others, with reports readily available. These reports have led to recommendations on requirements for appraisals and assessment of these buildings from the BRE and the Ministry of Housing and Local Governments (MHLG) (as once was).

Particularly after the Ronan Point disaster there were immediate recommendations, amongst others, for strengthening works to the joints between the pre-cast panels.

Various localised defects have been found to different types of LPS system buildings over the years during previous BRE and other investigations, which although raise concern about potential build quality of the systems, does not necessarily mean that all LPS buildings were constructed poorly.

However, the BRE Report in 1987 (The Structural Adequacy and Durability of LPS dwellings) made recommendations that a full structural assessment of a complete LPS dwelling block should be undertaken every 20 years; with supporting visual inspections of the external envelope of the building at intervals of about 5 years, together with intrusive investigations every 10 years to check upon the condition of the reinforcement within in-situ joints which might experience rain penetration.

The most recent guidance document regarding LPS buildings is the BRE Handbook for the Structural Assessment of LPS Dwelling Blocks for Accidental Loading of 2012, which reiterates the above inspection regime of the 1987 report and provides 3 criteria against which LPS dwelling blocks should be evaluated.

3.3 Review of Previous Reports on the Building

The client was largely unable to readily locate any historic records for structural appraisals or remedial works undertaken to the building since its construction, although did report that the Council's archiving system was in the progress of being digitised, which means that there may be historic records available which are not currently readily accessible.

Apart from the typical archive general arrangement floor plans provided, the client was only able to locate one other previous report which refers to the building structure, which was the 2015 Feasibility Report on Additional Lift Shaft Door Openings, by Frankham Structural Engineers.

This report indicates that the lift shafts within Swallow Court, Kestrel Court and Kingfisher court were inspected as part of this feasibility study to form new door openings in the shafts (to allow new lifts to stop at every floor rather than every other floor). However, the shafts at Heron Court & Falcon Court were not inspected, but assumed to be of similar construction details to the other blocks at the Whitehawk estate and therefore did not require inspection for the purposes of this particular feasibility study. We understand that

the lift shaft for Heron Court has not therefore been inspected and reported on previously to our knowledge.

However, there was no reference to any obvious visible defects observed in the lift shaft structures of the 3 no. buildings that were inspected.

It was also reported by the client that the piped gas supply had been removed from the tower block, presumably at some point following the Ronan Point disaster. The gas supply is now only to the Outhouse building feeding the gas boilers, which heat water that is fed to the tower block.

From the limited records currently available, there is no documentary evidence at present to suggest that BRE or MHLG recommended inspection or remedial works have been carried out over the years since the Ronan Point disaster.

4.0 Visual Inspection – Observations and Principal Present Damage

Generally, there was no obvious significant structural damage observed to the areas of the tower block that we were able to inspect and the building generally appeared to be in good structural condition.

However, as noted above, external inspection of the original concrete panels was not possible and the internal inspection was limited to communal areas and two out of approximately 48 flats. There were no obvious significant deformations in the external cladding panels which might otherwise give cause for immediate structural concern.

There was no obvious evidence of internal patch repairs to floor/wall junctions within the areas inspected, which might otherwise suggest that strengthening works at joints may have been carried out following the Ronan Point disaster. However, evidence of such strengthening works may now be hidden behind decorative finishes.

Regarding specific areas of damage observed during our on-site inspections, we have itemised these into the table in Section 4.1, with a recommendation for further investigation or repair, and a recommendation for when such works should be carried out. Photographs can be found in Appendix B. Although most of these are not of structural concern at present, they have been recorded to allow for future visual monitoring.

The localised repairs recommended for the year 2020 and beyond (amber and green highlights) are subject to the findings of the wider further recommendations provided in Section 6.0 of this report, such that, if further investigations yield any significant further concerns, the necessity for localised repairs may be superseded. However, if further investigations are not undertaken as recommended in Section 6.0, then localised repairs should be undertaken as recommended.

4.1 Visual Inspection – Observations and Principal Present Damage

Location	Building Element	Element Description	Condition / Defect	Recommended Works	Photo Number	Rec Year Of Work
Flat [redacted] Storeroom	Internal Wall	Stud Wall	Diagonal hairline crack to wall. The damage is not considered structurally significant.	Visually monitor as part of future routine inspections.	194	**2024**
Flat [redacted] Lounge	Internal Ceiling	Precast Reinforced Concrete Slab	Filled joint between precast concrete floor panels.	Visually monitor as part of future routine inspections.	195	**2024**
Flat [redacted] Lounge	Internal Ceiling	Precast Reinforced Concrete Slab	Filled joint between precast concrete floor panels.	Visually monitor as part of future routine inspections.	196	**2024**
Flat [redacted] Balcony	Floor Slab Covering	Roof Covering	Waterproof covering to balcony torn. This damage is not considered structurally significant.	Replace covering to prevent water damage to concrete slab.	197	**2019**
Flat [redacted] Hallway	Wall / Ceiling Joint	Precast Reinforced Concrete	Hairline crack to joint between ceiling and wall. The damage is not considered structurally significant.	Visually monitor as part of future routine inspections.	198	**2024**
Flat [redacted] Wardrobe/ Coat Room	Internal Wall	Stud Wall	Very slight vertical and horizontal crack to wall. The damage is not considered structurally significant.	Visually monitor as part of future routine inspections.	199	**2024**
Flat [redacted] Bathroom	Internal Ceiling	Precast Reinforced Concrete Slab	Filled joint between precast concrete floor panels.	Visually monitor as part of future routine inspections.	200	**2024**
Flat [redacted] Bedroom	Internal Ceiling	Precast Reinforced Concrete Slab	Possible previous concrete repairs. No evidence of current spalling.	Visually monitor as part of future routine inspections.	201	**2024**

4.1 Visual Inspection – Observations and Principal Present Damage

Location	Building Element	Element Description	Condition / Defect	Recommended Works	Photo Number	Rec Year Of Work
Flat [redacted] Bedroom	Internal Ceiling	Precast Reinforced Concrete Slab	Filled joint between precast concrete floor panels.	Visually monitor as part of future routine inspections.	202	**2024**
Bin Store East Wall	Internal face of Brick / Blockwork wall	Masonry	Very slight vertical crack. The damage is considered to be due to thermal expansions and contractions in the internal blockwork leaf, which do not have movement joints. This is not considered to be of structurally significance.	Visually monitor as part of future routine inspections.	209	**2024**
Bin Store East Wall	Internal face of Brick / Blockwork wall	Masonry	Impact damage. The damage is not considered structurally significant.	Visually monitor as part of future routine inspections.	210	**2024**
Bin Store South West Corner	Internal Ceiling / Floor Slab	Precast Reinforced Concrete Slab	Corrosion stain and exposed reinforcement at what appears to be a previous concrete repair perpendicular to joint.	Break out surrounding concrete. Clean any corroded steel reinforcement back to bright metal and apply zinc rich paint followed by proprietary concrete repair in accordance with manufacturer's specification.	212	**2020**

4.1 Visual Inspection – Observations and Principal Present Damage

Location	Building Element	Element Description	Condition / Defect	Recommended Works	Photo Number	Rec Year Of Work
Bin Store South West Corner	Downstand Beam	In-situ Reinforced Concrete	Rust-stain to underside of downstand beam.	Break out surrounding concrete. Clean any corroded steel reinforcement back to bright metal and apply zinc rich paint followed by proprietary concrete repair in accordance with manufacturer's specification.	213	**2020**
Bin Store West of Central Wall	Internal Ceiling	Precast Reinforced Concrete Slab	Possible damp damage. No evidence of current spalling.	Provide access and remove any damaged plaster/render to the soffit, carry out a damp meter survey and	214	**2020**
Bin Store West Wall	Internal face of Brick / Blockwork wall	Masonry	Slight impact damage and scuffing. This damage is not considered structurally significant.	Visually monitor as part of future routine inspections.	215	**2024**
Bin Store West Wall	Internal face of Brick / Blockwork wall	Masonry	Very slight vertical crack. The damage is considered to be due to thermal expansions and contractions in the internal blockwork leaf, which do not have movement joints. This is not considered to be of structurally significance.	Visually monitor as part of future routine inspections.	216	**2024**
Hallway Various Floors	Internal face of wall	Precast Concrete Wall	Typical hairline to very slight vertical cracks at joints of precast concrete wall panels at various floor levels. This damage is not considered structurally significant.	Visually monitor as part of future routine inspections.	219	**2024**

4.1 Visual Inspection – Observations and Principal Present Damage

Location	Building Element	Element Description	Condition / Defect	Recommended Works	Photo Number	Rec Year Of Work
Hallway Dry Riser Various Floors	Left hand wall joint	Stud Wall	Typical vertical crack at joint of wall panels. This damage is not considered structurally significant. However, it could be a passage for smoke in the event of a fire, which may hinder the fire service whilst using the dry riser.	It would be prudent to seal these very slight gaps between the panels in the Dry Riser at all levels up through the building, with a proprietary Intumescent Sealant.	220	**2019**
Hallway Service void door 3rd Floor	Door	N/A	Lock broken.	Replace lock.	222	**2019**
Hallway North wall 3rd floor	Internal face of wall	Precast Concrete Wall	Possible previous concrete repairs. No evidence of current spalling.	Visually monitor as part of future routine inspections.	224	**2024**
Hallway West wall	Internal face of Hallway walls 6th Floor	Precast Concrete Wall	Possible previous concrete repairs, or possibly only repairs to the finishes. No evidence of current spalling.	Visually monitor as part of future routine inspections.	225	**2024**
Hallway South wall 7th floor	Internal face of wall	Precast Concrete Wall	Possible previous concrete repairs, or possibly only repairs to the finishes. No evidence of current spalling.	Visually monitor as part of future routine inspections.	226	**2024**
Hallway West wall 7th floor	Internal face of wall	Precast Concrete Wall	Possible previous concrete repairs. No evidence of current spalling.	Visually monitor as part of future routine inspections.	227	**2024**
Hallway North wall 7th floor	Internal face of wall	Precast Concrete Wall	Possible previous concrete repairs. No evidence of current spalling.	Visually monitor as part of future routine inspections.	228	**2024**

4.1 Visual Inspection – Observations and Principal Present Damage

Location	Building Element	Element Description	Condition / Defect	Recommended Works	Photo Number	Rec Year Of Work
Stairwell North wall 7th floor.	Internal face of wall	Precast Concrete Wall	Very slight horizontal crack to wall at joint in wall panels. This damage is not considered structurally significant.	Visually monitor as part of future routine inspections.	230	**2024**
Stairwell North wall 8th floor	Internal face of wall	Precast Concrete Wall	Very slight horizontal crack to wall at joint in wall panels. This damage is not considered structurally significant.	Visually monitor as part of future routine inspections.	231	**2024**
Hallway South lift shaft wall 8th floor	Internal face of wall	Precast Concrete Wall	Possible previous concrete repairs. No evidence of current spalling.	Visually monitor as part of future routine inspections.	232	**2024**
Hallway Dry Riser 8th floor	Ceiling	Precast Reinforced Concrete	Corrosion stain to soffit of roof slab, possibly historic water penetration from roof above.	Break out surrounding concrete. Clean any corroded steel reinforcement back to bright metal and apply zinc rich paint followed by proprietary concrete repair in accordance with manufacturer's specification.	233	**2020**
Roof	Soffit of Roof Overhang to Central Stairwell and Lift Shafts	Precast Reinforced Concrete	Various localised patches of exposed corroding reinforcement and spalling concrete to all elevations.	Break out surrounding concrete. Clean any corroded steel reinforcement back to bright metal and apply zinc rich paint followed by proprietary concrete repair in accordance with manufacturer's specification.	241	**2020**

4.1 Visual Inspection – Observations and Principal Present Damage

Location	Building Element	Element Description	Condition / Defect	Recommended Works	Photo Number	Rec Year Of Work
West External Elevation Soffit of [redacted] balcony, [redacted]	Floor Slab	Precast Reinforced Concrete	Localised corrosion stain and possible concrete spalling.	Break out surrounding concrete. Clean any corroded steel reinforcement back to bright metal and apply zinc rich paint followed by proprietary concrete repair in accordance with manufacturer's specification.	254	**2020**
South External Elevation Edge of [redacted] slab between [redacted]	Floor Slab	In-situ Reinforced Concrete	Slight vertical crack to edge of floor slab. This damage is considered likely due to thermal expansions and contractions in the ground floor slab and is not considered to be structurally significant at the present time.	Rake out crack and inject with epoxy resin with flush finish to the external face. Visually monitor as part of future routine inspections.	255	**2020**
South External Elevation, Ground level Eastern column	Column	In-situ Concrete Column	Very slight diagonal crack to column. This damage is not considered structurally significant.	Visually monitor as part of future routine inspections.	256	**2024**
East External Elevation, [redacted] level column between [redacted]	Column	In-situ Concrete Column	Corrosion stain to bottom of column, suggesting localised corrosion to internal reinforcement.	Break out surrounding concrete. Clean any corroded steel reinforcement back to bright metal and apply zinc rich paint followed by proprietary concrete repair in accordance with manufacturer's specification.	257	**2020**

4.1 Visual Inspection – Observations and Principal Present Damage

Location	Building Element	Element Description	Condition / Defect	Recommended Works	Photo Number	Rec Year Of Work
East External Elevation, [redacted] level column between [redacted]	Column	In-situ Concrete Column	Corrosion stain to bottom of column, suggesting localised corrosion to internal reinforcement.	Break out surrounding concrete. Clean any corroded steel reinforcement back to bright metal and apply zinc rich paint followed by proprietary concrete repair in accordance with manufacturer's specification.	258	**2020**
East External Elevation, [redacted] level column between [redacted]	Column	In-situ Concrete Column	Slight impact Damage. The damage is not considered structurally significant.	Visually monitor as part of future routine inspections.	259	**2024**
East External Elevation, [redacted] level column between [redacted]	Column	In-situ Concrete Column	Slight impact Damage. The damage is not considered structurally significant.	Visually monitor as part of future routine inspections.	260	**2024**
East External Elevation, Ground level	Entrance Staircase Landing	In-situ Concrete	Cracked concrete landing with loose section of concrete.	Break out loose concrete and apply proprietary concrete repair in accordance with manufacturer's specification.	261	**2020**

4.1 Visual Inspection – Observations and Principal Present Damage

Location	Building Element	Element Description	Condition / Defect	Recommended Works	Photo Number	Rec Year Of Work
West External Elevation [redacted] balcony slab edge, [redacted]	Floor Slab	Precast Reinforced Concrete	Possible previous concrete repairs. No evidence of current spalling.	Visually monitor as part of future routine inspections.	264	**2024**
West External Elevation [redacted] balcony soffit, [redacted]	Floor Slab	Precast Reinforced Concrete	Possible spalling to soffit – unclear when viewed from ground level through netting.	Inspect more closely and if repair required, break out surrounding concrete. Clean any corroded steel reinforcement back to bright metal and apply zinc rich paint followed by proprietary concrete repair in accordance with manufacturer's specification.	265	**2020**
West External Elevation [redacted] balcony soffit, [redacted]	Floor Slab	Precast Reinforced Concrete	Corrosion stain to soffit, suggesting localised corrosion to internal reinforcement.	Break out surrounding concrete. Clean any corroded steel reinforcement back to bright metal and apply zinc rich paint followed by proprietary concrete repair in accordance with manufacturer's specification.	266	**2020**
West External Elevation [redacted] balcony slab edge [redacted]	Floor Slab	Precast Reinforced Concrete	Corrosion stain to slab edge, suggesting localised corrosion to internal reinforcement.	Break out surrounding concrete. Clean any corroded steel reinforcement back to bright metal and apply zinc rich paint followed by proprietary concrete repair in accordance with manufacturer's specification.	267	**2020**

4.1 Visual Inspection – Observations and Principal Present Damage

Location	Building Element	Element Description	Condition / Defect	Recommended Works	Photo Number	Rec Year Of Work
West External Elevation [redacted] [redacted] balcony soffit, [redacted]	Floor Slab	Precast Reinforced Concrete	Corrosion stain to soffit, suggesting localised corrosion to internal reinforcement.	Break out surrounding concrete. Clean any corroded steel reinforcement back to bright metal and apply zinc rich paint followed by proprietary concrete repair in accordance with manufacturer's specification.	268	**2020**
West External Elevation [redacted] [redacted] balcony soffit, [redacted]	Floor Slab	Precast Reinforced Concrete	Corrosion stain to soffit, suggesting localised corrosion to internal reinforcement.	Break out surrounding concrete. Clean any corroded steel reinforcement back to bright metal and apply zinc rich paint followed by proprietary concrete repair in accordance with manufacturer's specification.	269	**2020**
West External Elevation [redacted] [redacted] balcony soffit, [redacted]	Floor Slab	Precast Reinforced Concrete	Corrosion stain to soffit, suggesting localised corrosion to internal reinforcement.	Break out surrounding concrete. Clean any corroded steel reinforcement back to bright metal and apply zinc rich paint followed by proprietary concrete repair in accordance with manufacturer's specification.	270	**2020**

4.1 Visual Inspection – Observations and Principal Present Damage

Location	Building Element	Element Description	Condition / Defect	Recommended Works	Photo Number	Rec Year Of Work
West External Elevation [redacted] balcony soffit, [redacted]	Floor Slab	Precast Reinforced Concrete	Possible spalling to soffit – unclear when viewed from ground level through netting.	Inspect more closely and if repair required, break out surrounding concrete. Clean any corroded steel reinforcement back to bright metal and apply zinc rich paint followed by proprietary concrete repair in accordance with manufacturer's specification.	271	**2020**
West External Elevation [redacted] balcony soffit, [redacted]	Floor Slab	Precast Reinforced Concrete	Possible spalling to soffit – unclear when viewed from ground level through netting.	Inspect more closely and if repair required, break out surrounding concrete. Clean any corroded steel reinforcement back to bright metal and apply zinc rich paint followed by proprietary concrete repair in accordance with manufacturer's specification.	272	**2020**
West External Elevation [redacted] balcony soffit, [redacted]	Floor Slab	Precast Reinforced Concrete	Possible spalling to soffit – unclear when viewed from ground level through netting.	Inspect more closely and if repair required, break out surrounding concrete. Clean any corroded steel reinforcement back to bright metal and apply zinc rich paint followed by proprietary concrete repair in accordance with manufacturer's specification.	273	**2020**

4.1 Visual Inspection – Observations and Principal Present Damage

Location	Building Element	Element Description	Condition / Defect	Recommended Works	Photo Number	Rec Year Of Work
East External Elevation [redacted] balcony soffit, [redacted]	Floor Slab	Precast Reinforced Concrete	Possible spalling to soffit – unclear when viewed from ground level through netting.	Inspect more closely and if repair required, break out surrounding concrete. Clean any corroded steel reinforcement back to bright metal and apply zinc rich paint followed by proprietary concrete repair in accordance with manufacturer's specification.	274	**2020**

5.0 Carbonation and HAC Testing of Concrete

5.1 Samples were taken for on-site carbonation testing and laboratory HAC testing at the following locations as shown in the Floor Layout Plans in Appendix A:

North Elevation:	The north facing elevation was fully clad. We therefore took a sample from the corridor concrete window cill that faces east, which is close to the north end of the building. This may be in-situ concrete.
East Elevation:	Underside of first floor balcony pre-cast concrete slab
South Elevation:	In-situ concrete column
West Elevation:	In-situ concrete column

5.2 Carbonation testing was carried out on site using phenolphthalein solution sprayed onto the freshly broken off samples of concrete. The concrete surface turns pink in the presence of a high pH value above 9.0, indicating that the concrete has not been subject to the carbonation process whereby its pH has been reduced and thus its potential passive protection to the reinforcement steel may be less effective.

Testing and measurements taken on site indicated that there was carbonation occurring to a depth of approximately 4mm to the samples taken from the East and South elevations, but virtually no carbonation to the samples taken from the North and West elevations.

5.3 HAC testing results, which are shown in Appendix C, returned negative results for all samples, although it should be noted that on this block only one sample of pre-cast concrete could be tested.

6.0 Assessment of Findings & Recommendations

6.1 Generally, there was no obvious significant structural damage observed to the areas of the tower block that were able to be inspected and the building generally appeared to be in good structural condition. The hairline to very slight cracking at joints in the concrete panels is considered to be due to slight thermal expansions and contractions between the panels.

6.2 If carbonation depths to all concrete elements are similar to the areas tested during our inspections, then it appears that the concrete will still be providing good protection to steel reinforcement, assuming that the concrete cover is at typical depths of say 30-40mm. Areas where localised corrosion staining have been observed are likely to be localised areas where reinforcement cover is relatively shallow.

6.3 However, as noted above, external inspection of the original concrete walls was not possible and the internal inspection was limited to communal areas and two out of approximately 48 flats. There were no obvious significant deformations in the external cladding panels which might otherwise give cause for immediate structural concern.

6.4 Depending on the design and installation of the ventilation detail behind the new cladding to allow air flow, there may be potential for condensation to build up behind the cladding panels.

6.5 As noted above, we are not aware of any records that structural strengthening has been carried out, and there was no obvious evidence from our observations on site, that such work has been undertaken following the Ronan Point collapse.

6.6 However, one of the main hazard sources to the building; internal gas explosion, has been removed from the block, although there remains the risk of an external gas explosion from the boilers in the Outhouse, albeit that this is a single source where the risk should be reduced assuming a routine boiler servicing and maintenance regime is in place.

6.7 Although there was no indication of structurally significant movement in the building at present; given the apparent lack of records and the age and construction type of the building, we consider that it would be prudent to follow the BRE guidance in relation to undertaking a full structural assessment of the block, which will require intrusive investigations to check the condition of the reinforcement within typical in-situ external and internal joints and confirm the condition of typical external walls which are currently hidden by the newer cladding.

6.8 However, in the first instance, we consider that it would be prudent to review the feasibility of carrying out a thermal imaging survey of the exterior façades, as this may be a cost effective way to provide an initial indication of any damp patches or structural anomalies (cracking/spalling) that may be occurring behind the external cladding. This may allow targeted intrusive investigations to be undertaken of the structure behind the cladding.

6.9 At the time of intrusive investigations, it would also be prudent to carry out the following further testing:

1. Compressive strength testing of pre-cast concrete wall and floor samples and of some typical in-situ concrete samples.
2. Further carbonation testing of pre-cast concrete wall panels
3. Chloride testing, given the proximity of the building to the sea and that the concrete was exposed to the elements before the current cladding system was installed.
4. Testing of the below ground foundations for chlorides/sulphates, given the possibility that sea-dredged aggregates may have been used in the in-situ concrete foundation construction.

6.10 It would also be prudent as part of intrusive investigations, to assess whether the newer over cladding design and installation has taken into account the conclusions within the BRE Report of 1986 'Overcladding external walls of large panel system dwellings'.

6.11 Following the findings of the intrusive investigations, it would be prudent to carry out a full structural assessment of the original concrete structure of the block in line with the guidance in the BRE Handbook for the Structural Assessment of LPS Dweling Blocks for Accidental Loading, including assessment against the 3 criteria which LPS dwelling blocks should be evaluated.

6.12 Localised repairs recommended in Section 4.0 should be undertaken, but those recommended in the year 2020 and beyond (amber and green highlights) will be subject to the findings of the wider further investigations recommendations above and should be reviewed again following the further investigations and appraisal. For example, if further investigations yield any significant further concerns, the necessity for localised repairs may be superseded by larger scale remedial works. However, if further investigations are not undertaken as recommended above, localised repairs should be undertaken as recommended.

6.13 In regards to future long term inspections, appraisals and investigations, the BRE recommendations from their 1987 report (The Structural Adequacy and Durability of LPS dwellings) should be followed:

- A full structural assessment of a complete LPS dwelling block should be undertaken every 20 years
- Supporting visual inspections of the external envelope of the building at intervals of 5 years
- Intrusive investigations every 10 years to check upon the condition of the reinforcement within in-situ joints which might experience rain penetration.

7.0 Status of Report

This report does not provide a warranty or guarantee as regards the structural adequacy and condition of the building. It provides a considered professional opinion based on a limited visual inspection and no liability shall attach to us except to the extent that we have failed to exercise reasonable skill, care and diligence in the provision of our services.

Pick Everard

Pick Everard
Consulting Civil and Structural Engineers
Halford House
Charles Street
Leicester
LE1 1HA

Appendix A

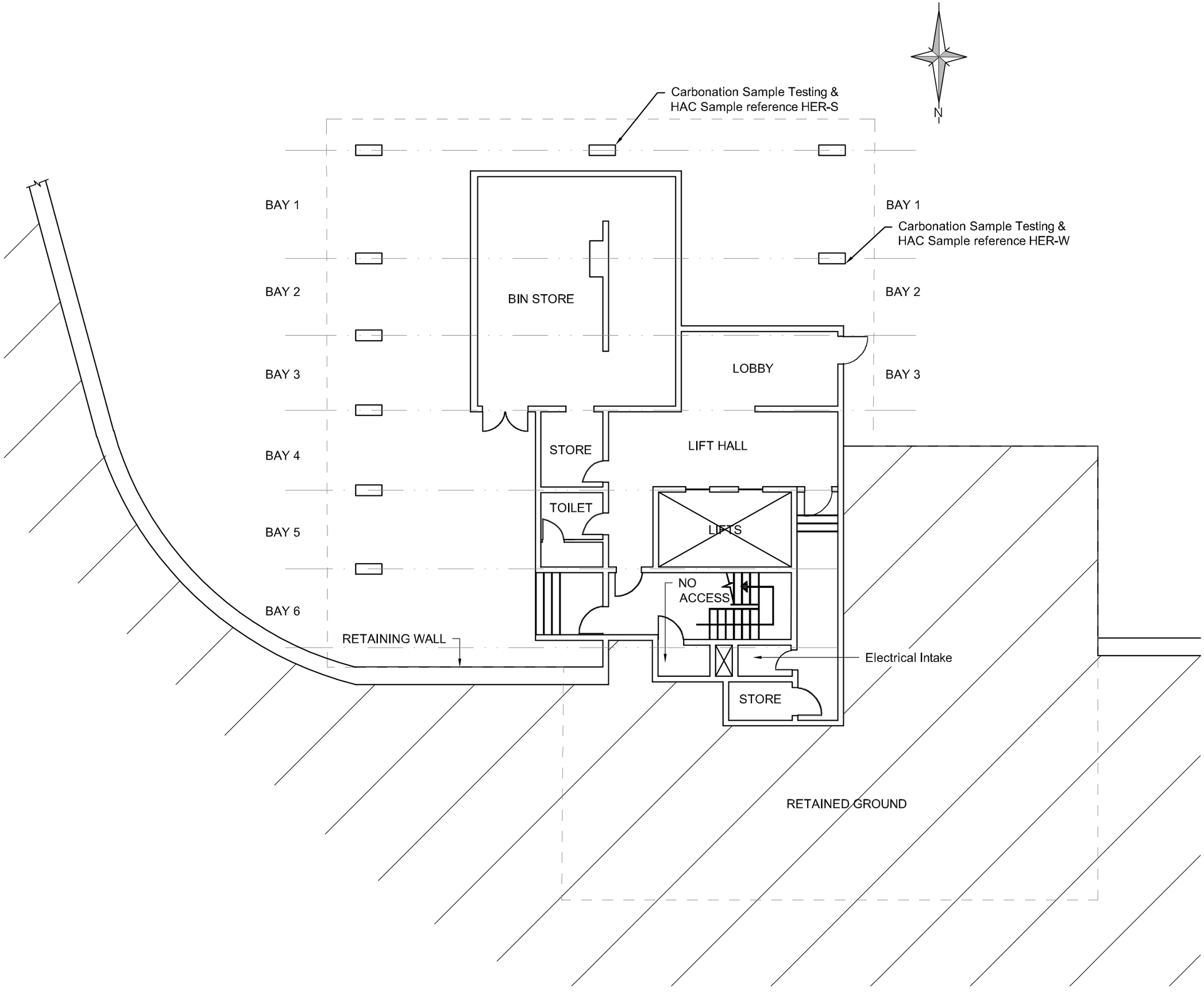
Typical Floor Layout Plans

Drawing No. 190215-PEV-02-00-DR-S-0201	-	Ground Floor Layout Plan
Drawing No. 190215-PEV-02-01-DR-S-0202	-	Floors 1-8 Typical Floor Layout Plan

NO DIMENSIONS TO BE SCALED FROM THIS DRAWING

Note:

To be read in conjunction with Pick Everard Report reference STR/IPR/IAA/190215/17-2/R002



Revision		Date	Drn	Chk
P01	Report Issue	21.06.19	IAA	IPG

Client
Brighton and Hove City Council

Project
Large Panel System Tower Block Inspection

Drawing Title
Heron Court
Ground Floor Layout

Suitability Status
S2 - Suitable for Information

Job No.	Scale	Size	Rev
190215	NTS	@ A3	P01

Drawing Number
190215-PEV-02-00-DR-S-0201
Project Code - Originator - Zone - Level - Type - Role - Number

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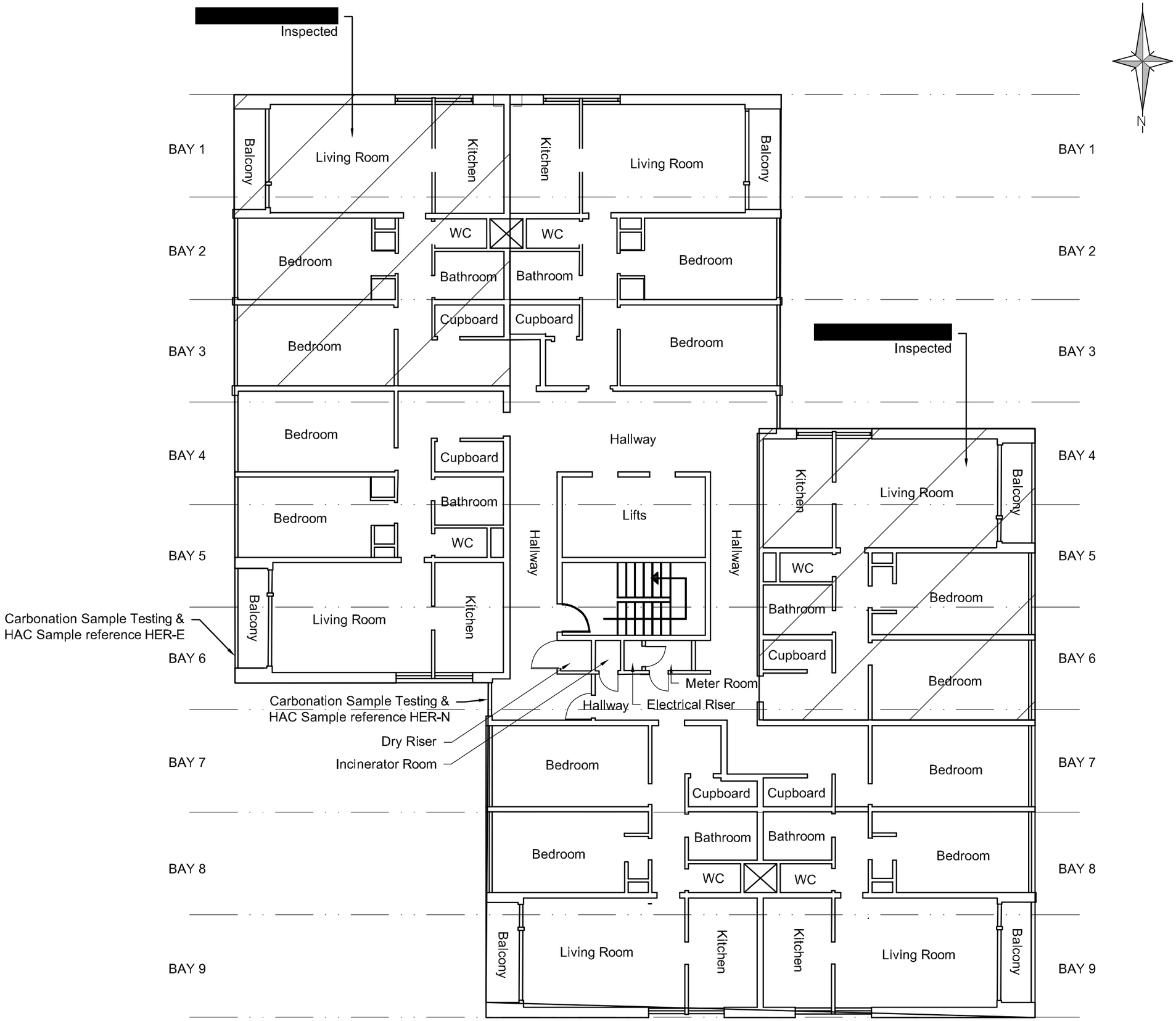

NO DIMENSIONS TO BE SCALED FROM THIS DRAWING

Note:

To be read in conjunction with Pick Everard Report reference STR/IPR/IAA/190215/17-2/R002

Revision		Date	Drn	Chk
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Client
Brighton and Hove City Council

Project
Large Panel System Tower Block Inspection

Drawing Title
Heron Court
Floors 1 - 8 Typical Floor Layout

Suitability Status
S2 - Suitable for Information

Job No.	Scale	Size	Rev
190215	NTS	@ A3	P01

Drawing Number
190215-PEV-02-01-DR-S-0202
Project Code - Originator - Zone - Level - Type - Role - Number

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Appendix B

Photographs

Photo No. 194

Photo No. 195

Photo No. 196

Photo No. 197

Photo No. 198

Photo No. 199

Photo No. 200

Photo No. 201

Photo No. 202

Photo No. 209

Photo No. 210

Photo No. 212

Photo No. 213

Photo No. 214

Photo No. 215

Photo No. 216

Photo No. 219

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Photo No. 222

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Photo No. 225

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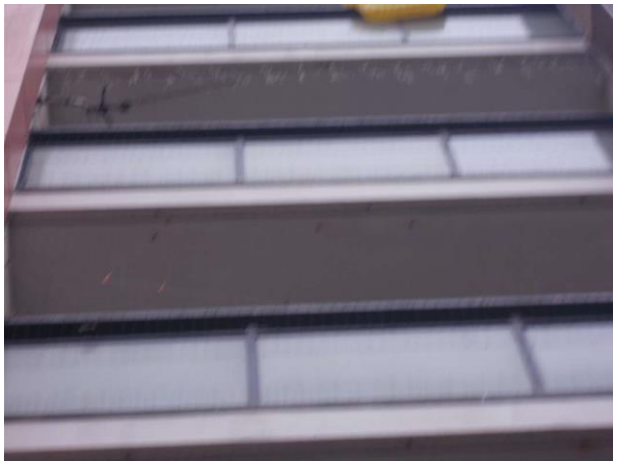

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Photo No. 271

Photo No. 272

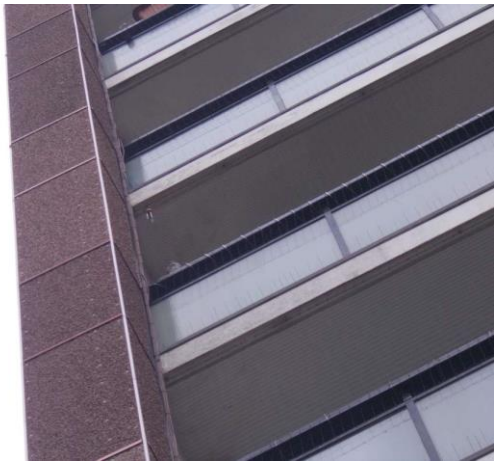

Photo No. 273

Photo No. 274

Appendix C

HAC Testing Results

Nicholls Colton Group
7 - 11 Harding Street
Leicester
LE1 4DH

Pick Everard
Halford House
Charles Street
Leicester
LE1 1HA

Analytical Test Report: L19/1274/PIC/001

Your Project Reference:	**Brighton & Hove Tower Blocks**	Samples Received on:	20/05/2019
Your Order Number:	71569	Testing Instruction Received:	20/05/2019
Report Issue Number:	1	Sample Tested:	20/05 to 30/05/2019
Samples Analysed:	32 concrete samples	Report issued:	30/05/2019

Signed

James Gane
Group Data Manager
Nicholls Colton Group

Notes:

General

Please refer to Methodologies tab for details pertaining to the analytical methods undertaken.

Samples will be retained for 14 days after issue of this report unless otherwise requested.

Samples were supplied by customer, results are representative of the material provided

Accreditation Key

UKAS = UKAS Accreditation, u = Unaccredited

Date of Issue 24.01.2017
Owned by Emily Blissett - Customer Services Supervisor
Authorised by James Gane - Commercial Manager
J:\Public\Projects\2019\L19\PIC - Pick Everard\L19-1274-PIC\[L19-1274-PIC-001.xlsx]Cover Sheet

Nicholls Colton Group
7 - 11 Harding Street
Leicester
LE1 4DH

L19/1274/PIC/001

Project Reference - Brighton & Hove Tower Blocks

Analytical Test Results - Concrete

NC Reference		37535	37536	37537	37538
Client Sample Reference		HER/N	HER/E	HER/S	HER/W
Location		Heron Court Tower	Heron Court Tower	Heron Court Tower	Heron Court Tower
Location		Heron North Elevation	Heron East Elevation	Heron South Elevation	Heron West Elevation
Sample Description		Concrete dust and lumps	Concrete dust and lumps	Concrete dust and lumps	Concrete dust and lumps
BRE DETECTION OF HIGH ALUMINA CEMENT	**Accreditation**				
Presence Of High-Alumina Cement (HAC)	UKAS	No	No	No	No

Nicholls Colton Group
7 - 11 Harding Street
Leicester
LE1 4DH

L19/1274/PIC/001

Project Reference - Brighton & Hove Tower Blocks

Analysis Methodologies and Notes

Determinant	Test method and notes
BRE Detection of High Alumina Cement	1. Testing was in accordance with BRE Information Sheet IS 15/74. 2. Contaminated samples may give a false result. 3. Samples taken from extensively carbonated concrete containing Portland Cement may give a false positive result. 4. If conclusive identification of the presence of High Alumina Cement is required this result should be confirmed by a more definitive test.