

SPECIFIC DEFECTS REPORT

**Relating to Concrete Sample Testing
Hertfordshire**



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INTRODUCTION AND INSTRUCTION

We have been instructed to provide further information with regard to the concrete structural frame that forms the main core structure.

We have previously carried out a Commercial Building Survey and this report should be read in conjunction with the original report.

The overall aim of this Defects Report is to look in more detail at the concrete structure, however given the limited time it is still a basic test to give an indication as to how best to move forward.

We are Independent Chartered Building Surveyors. We are registered with the Royal Institution of Chartered Surveyors and are members of the Independent Surveyors and Valuers Association.

The work has been carried out as per our standard Terms and Conditions of Contract which have been emailed to you as part of the confirmation of our instructions. If you would like further clarification please do not hesitate to contact us.

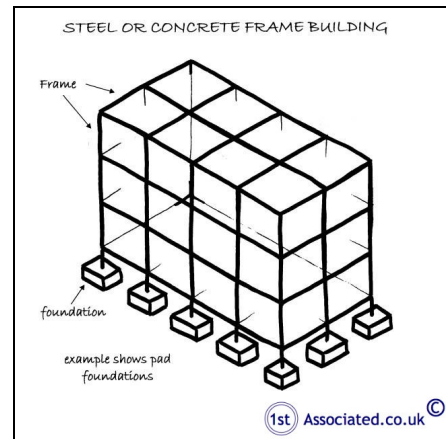
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SYNOPSIS

Our Commercial Building Survey identified possible problems with the concrete structure. These were from an aged base concern. In the era the property was built many structures have additives and accelerators added to the concrete. There is no physical evidence of deterioration. Having said that, the structural frame is 95% covered by roofing materials and floor coverings, carpets, etc.



Lack of information

We have received no evidence with regards to what the structure was made of or any contact details with regard to original architects/engineers. We would ask that your solicitors provide these if they are available.

Visual Inspection

Based upon our visual inspection the property could have been built in the 1970's, 1980's or 1990's. In the earlier part of this period concrete additives were used in the concrete to accelerate speed of construction together with various other experimental additives to reduce costs such as the early forms of aerated concrete. Such additives have since been identified as causing substantial deterioration to property.

High Alumina Cement Example

High Alumina Cement is a good example which we are aware of several cases where buildings had to be demolished following accelerated deterioration of the structure. We would reiterate there were no visible signs of this in place when we carried out our original survey.

Types of concrete construction

Although we have used the term concrete frame construction, it can take many forms, many of which are not visible until tested. For example the concrete used could be either in situ, which means poured as construction was built or pre-cast as it appears to be in this instance. Pre-cast, as the term implies, is where concrete is pre-cast in a factory prior to coming to site. With pre-cast concrete there are various types. One type we would draw your attention to is pre-stressed concrete. This is where the metal reinforcement within the concrete is tensioned (very much like stretching an elastic band and then encasing it with concrete). This can be carried out, as with most things in the construction world, for economics and speed.

Testing

The testing we have carried out is testing in a very basic form. This is due to the limited time. Normally testing takes a good two weeks.

INVESTIGATION

The core samples are approximately 100mm in diameter by the thickness of the floor which is generally 200mm. Samples were taken in the Service Cupboards where possible on each of the floors with the exception of the basement where there isn't a service cupboard.

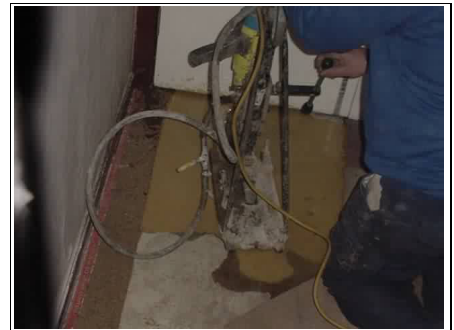
Core samples were taken from:

1. Basement
2. Ground floor
3. First Floor
4. Second Floor

The operation was made difficult as there was no electricity or water within the property and generators had to be used. Without any power we were working without proper lighting. Ideally we would have liked to have taken more core samples and samples to the roof but time was limited. As the property is unoccupied (although it has twenty four hour manned security), we didn't think this was appropriate or ideal and of course you don't currently own the property.



Generator



Example of first core sample being taken from the basement

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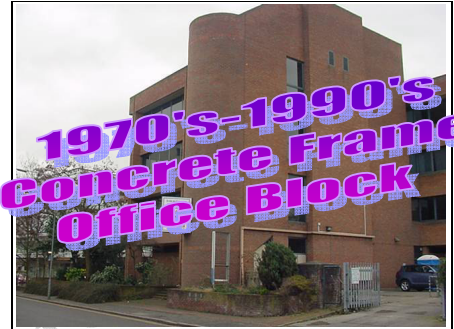
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EXECUTIVE SUMMARY

Summaries are not ideal as they try to précis often quite complex subjects into a few paragraphs. Here we give a summary of the problem and our various suggestions on how to solve it and all costs it relates to.

Given the limited time available we completed a basic test in the form of:

1. Core samples which are circles of concrete approximately 100mm in diameter have been taken one per floor of the property.
2. Core samples have been taken in the service room which is adjacent to the cracking on the ground floor, first floor and second floor.
3. These have then been subject to compression testing. In this case the ground floor results are not in line with what the testers expected:
 - i) First floor having a maximum failure of 491 kN
 - ii) Second floor having a maximum failure of 394 kN
 - iii) Basement having a maximum failure of 374 kN
 - iv) Ground Floor having a maximum failure of 155 kN



PHOTOGRAPHIC RECORD

(A reminder of the condition of the property)

Office Areas



Internal stripped of precious metals

Services



Service cupboard where core samples have been taken at ground floor, first floor and second floor



Cracking



Close up of cracking

Limited view of the Concrete Frame



Ground floor rear parking area –
first floor concrete frame and floor
slabs visible



Concrete frame visible to basement
area

SUMMARY UPON REFLECTION

The Summary Upon Reflection is a second summary so to speak, which is carried out when we are doing the second or third draft a few days after the initial survey when we have had time to reflect upon our thoughts on the property. We would add the following in this instance:

Due to the irregular results, we believe further testing is needed. This needs to be in the form of further compression tests, Ferro scanning, looking for reinforcement and chemical analysis of the cubes. This typically takes several weeks. We can accelerate it as we did this, but it comes with a premium of 25-50% increase in the price which is added by the testing companies.

Request for information

Your Legal Advisors need to make a request for information with regard to the original designers and engineers as we need to have consultations and meetings with them and/or people who worked on the original building. Inconsistency within the readings is unusual.

Every Business Transaction has a Risk

Every business transaction has a risk, only you can assess whether that risk is acceptable to you and your circumstances

If you would like any further advice on any of the issues discussed or indeed any that have not been discussed! Please do not hesitate to contact us on 0800 298 5424.

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APPENDICES

INSPECTION

SURVEY FINDINGS

PHOTOGRAPHIC RECORD

SUMMARY OF CONSTRUCTION

ESTIMATE OF COSTS

LIMITATIONS

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INSPECTION

We have taken one 100mm core sample to the:

1. Basement – adjacent to the double doors leading to the car park
2. Ground floor – service/cleaners area adjacent to the lift
3. First Floor – service/cleaners area adjacent to the lift
4. Second Floor – service/cleaners area adjacent to the lift

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SURVEY FINDINGS

As per the Test Results provided in the report. The variation was greater than expected in the ground floor; this may be due to a composite construction.

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PHOTOGRAPHIC RECORD

(Taken from original Commercial Building Survey)

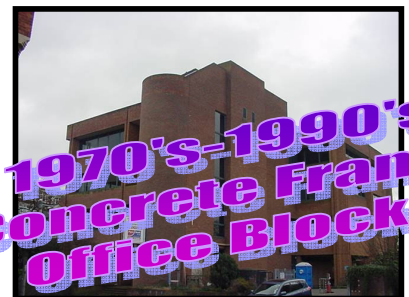
External



Front Elevation



Left hand view



Right hand view

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Ground Floor



Lobby



Service/cleaners cupboard



Gentlemen's toilets



Ladies toilets



Shower room with WC



Open plan office



Kitchenette



Office left hand side



Office right hand side

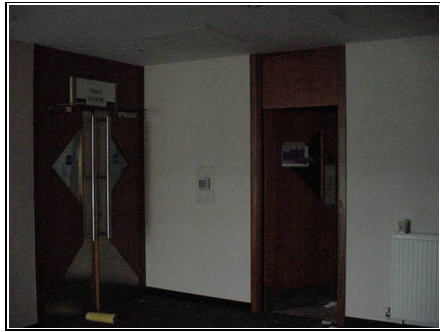
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First Floor



Lobby



Service/cleaners cupboard



Open plan office



Office left hand side



Office to middle



Kitchen

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Second Floor



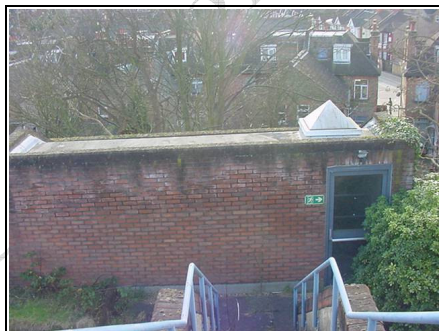
Lobby



Open plan office general view



Centre of open plan office



Balcony area

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Third/Top Floor



Lobby



Service/cleaners cupboard



Gentlemen's toilets



Ceiling down in gents toilets



Open plan office



Kitchen

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Office left hand side



Office right hand side



Balcony

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SUMMARY OF CONSTRUCTION

External

Main Roof:	Inverted flat roof.
Roof Structure:	Concrete frame
Gutters and Downpipes:	Internal (not visible)
Soil and Vent Pipe:	Internal (not visible)
Structural frame:	Structural concrete frame
Walls/cladding:	Brick cladding
Detailing:	Double glazed proprietary finished aluminium windows

Internal

Ceilings:	Plaster applied directly to the concrete structural frame, various finishes plaster and suspended tile ceiling system (assumed)
Walls	Studwork and block walls some of which form fire break walls
Floors:	
Basement	Concrete frame with in fill concrete blocks (assumed)
Ground Floor:	Concrete with in fill concrete blocks (assumed)
First Floor:	Concrete with in fill concrete blocks (assumed)
Second Floor:	Concrete with in fill concrete blocks (assumed)
Third Floor:	Concrete with in fill concrete blocks (assumed)

The above terms are explained in full in the main body of the Report.

We have used the term 'assumed' as we have not opened up the structure.

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LIMITATIONS

Specific Defects Report

1. Conditions of Engagement

Please note: references to the masculine include, where appropriate, the feminine.

Subject to express agreement to the contrary (which in this particular case has been none) and any agreed amendments/additions (of which in this particular case there have been none), the terms on which the Surveyor will undertake the Specific Defects Report are set out below.

Based upon a visual inspection as defined below the Surveyor will advise the Client by means of a written report as to his opinion of the visible condition and state of repair of the specific problem or problems only.

2. The Inspection

a) Accessibility and Voids

The Surveyor will base this report on a visual inspection and accordingly its scope is limited. It does not include an inspection of those areas, which are covered, unexposed or inaccessible. Our visual inspection will relate to the specific defects shown to us only.

b) Floors

We have not opened up the floor structure. We have only carried out a visual inspection and any conclusions will be based upon our best assumptions. We can open up the floor if so required at an extra fee.

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c) Roofs

The Surveyor will not inspect the roofs in this instance.

d) Boundaries, Grounds and Outbuildings

The inspection will not include boundaries, grounds and outbuildings unless specifically stated (none stated).

e) Services

No services inspected.

f) Areas not inspected

The Surveyor will have only inspected those areas identified within the report. His report will be based upon possible or probable defects based upon what he has seen together with his knowledge of that type of structure. If you feel that any further areas need inspection then please advise us immediately.

g) Specific Defects Report

As this is a report upon a Specific Defect we do not offer any comment or guidance upon reactive maintenance and/or planned or routine maintenance items.

h) Whilst we have used reasonable skill and care in preparing this report, it should be appreciated that the Chartered Surveyors cannot offer any guarantee that the property will be free from future defects or that existing defects will not suffer from further deterioration;

3. Deleterious and Hazardous materials

a) Unless otherwise expressly stated in the Report, the Surveyor will assume that no deleterious or hazardous materials or techniques have been used in the construction of the property. However the Surveyor will advise in the report if in his view there is a likelihood that high

alumina cement (HAC) concrete has been used in the construction and that in such cases specific enquiries should be made or tests carried out by a specialist.

4. Contamination

The Surveyor will not comment upon the existence of contamination as this can only be established by appropriate specialists. Where, from his local knowledge or the inspection he considers that contamination might be a problem he should advise as to the importance of obtaining a report from an appropriate specialist.

5. Consents, Approvals and Searches

- a) The Surveyor will assume that the property is not subject to any unusual or especially onerous restrictions or covenants which apply to the structure or affect the reasonable enjoyment of the property.
- b) The Surveyor will assume that all bye-laws, Building Regulations and other consents required have been obtained. In the case of new buildings and alterations and extensions, which require statutory consents or approval the Surveyor will not verify whether, such consents have been obtained. Any enquiries should be made by the Client or his legal advisers.

Drawings and specifications will not be inspected by the Surveyor. It is the Clients responsibility to forward any drawings and specifications that he has or knows the whereabouts of to us to include information in our report. If these are not forthcoming we will make our best assumptions based upon the information available.

- c) The Surveyor will assume that the property is unaffected by any matters which would be revealed by a Local Search and replies to the usual enquiries or by a Statutory Notice and that neither the property nor its condition its use or intended use is or will be unlawful.

6. Fees and Expenses

The Client will pay the Surveyor the agreed fee for the Report and any expressly agreed disbursements in addition.

7. Restrictions on Disclosures

- a) This report is for the sole use of the Client in connection with the property and is limited to the current brief. No responsibility is accepted by the Chartered Surveyors if used outside these terms.
- b) Should any disputes arise they will be dealt with and settled under English law;
- c) This report does not fall under the Third Parties Rights Act.

8. Safe Working Practices

The Surveyor will follow the guidance given in Surveying Safely issued by the Royal Institution of Chartered Surveyors (RICS).

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PROCESSES USED-STRUCTURAL PROBLEM

1. General Appraisal

General appraisal of building, its age, use, general construction form and condition, noting any unusual aspect of its materials structural character, and changes made (especially recent), potentially relevant information – for example, recent or ongoing nearby construction, nearby trees (proximity, species and maturity) and soil type.

2. General Appraisal of Cracking

Please note we have not recorded width, direction or taper etc. OR In this instance there are no cracks to record.

3. Assessment

Make a first assessment of severity according to the above list; then seek a cause or causes, but with time and effort at this stage in proportion to supposed severity.

Typically it is considered that there are seven causes of structural movement and we look to identify whether structural movement falls under one of these seven headings:

- i. Lack of strength
- ii. Lack of continuation
- iii. Material decay
- iv. Dimensional instability
- v. Sub-soil and foundations
- vi. Overall instability
- vii. Alterations and misuse

4. Consider Causes of Cracking

Consider whether the cause or causes are likely to lie:

- i. in the cracked part itself or
- ii. in associated parts which impose forces (tension, compression, shear, rotation and bowing) on the cracked part.

If ii, consider whether the forces arise from within the building itself (e.g. dead or live loads, deflection, creep or sway) or from external sources affecting the entire building (e.g. wind loads or snow loads) or from changes in its support (e.g. settlement of made ground, erosion by leakages, poor compaction of fill, seasonal volume changes under shallow foundations in clay, longer term volume changes, mining subsidence, local excavation, swallow holes or landslip).???

5. Make an approximate first assessment of temperature-induced size changes and, if applicable, size changes due to initial expansion or contraction and to reversible moisture-induced size changes. Compare estimated changes with crack widths and spacings and joint widths and spacings; relate to any changes of section or of construction or materials. Consider whether any of these size changes are of the right order of magnitude to be responsible, alone, for the cracks; check that the first assessment is consistent with the age of the crack.
6. Consider possible chemical causes: corrosion of metals, sulphate attack on ordinary Portland cement-based products and materials, alkali silica reaction (reactive aggregates), carbonation (of cement-based products, especially sheets). In all cases check whether the constituents for reaction are present and the conditions are favourable to the reaction.
7. For each potential cause identified by these initial assessments, seek a mechanism linking cause and effect. (If that was the cause, how did it produce this effect?) Accept as possible causes only those for which a

possible mechanism can be found; re-examine those causes, seeking further evidence that confirms or denies their existence.

8. When a possible cause is thus identified, seek answers to the following questions.
 - i. Are the constituents and conditions confirmed to be, or to have been, present?
 - ii. Is the mechanism one that can be confidently accepted?
 - iii. Is the supposed cause consistent with the evidence obtained at 2 above?
 - iv. Is the potential order of magnitude of the cause consistent with the observed effects?

If the answer to either i, ii or iii is no, provisionally discount that cause. If the answers to i, ii and iii are yes but the answer to iv is no, consider whether other causes are also present and contributing to the observed effects.

9. Avoid the assumption that a cause is correctly diagnosed until all other reasonably possible causes have been examined and discounted; do not overlook the considerable probability that more than one cause is operating. Recognise that the first assumptions may be overturned as the investigation yields further information; also that the first general appraisal of the building may later need to be more specific in the light of that further information.
10. If diagnosis indicates foundation movements as a probable cause and there is reason to believe that movements might be progressive, take account of published guidance (e.g. Building Research Establishment Digests) to decide whether long term monitoring is necessary.

Distinguish between:

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- **settlement:** downward movement caused by compression of the ground by foundation loads. Settlement does not crack buildings – only differential settlement potentially does so; damage due to consolidation of poor or made ground usually becomes apparent within the first ten years (e.g. Building Research Establishment Digests)
- **subsidence:** downward movement caused by activity in the ground. However, in the absence of trees, progressive subsidence on shrinkable clay (i.e. continuing beyond the duration of a drought) is most uncommon (Building Research Establishment Digests). Where clay soils are involved see also Building Research Establishment Digests current at the time of writing this report).
- **heave:** upward movement caused by activity in the ground

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