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Swiss Cottage Library

Fin Survey Specification

London Borough of Camden

27 May 2022

5206133-ATK-XX-XX-RP-SE-000002

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Document history

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Client signoff

Client	London Borough of Camden
Project	Swiss Cottage Library
Job number	5026133
Client signature/date	

Contents

1. Introduction

Swiss Cottage Library is a Grade II Listed Building dating from 1963 and is notable for the concrete fins around its perimeter as shown in Figure 1.1.

Figure 1.1 – Swiss cottage library

During the current internal, non-structural, fit out works, the contractor reported various cracks in the concrete fins, both internally and externally. Additionally, one fin was reported to have significant damage on its inside face giving rise to the concern that it would be unable to support the cladding panels attached to it.

Therefore, Atkins carried out a high-level qualitative inspection of the fins on the 13th of April to examine the badly damaged fin and more generally to assess the general condition of all fins. A fin inspection report with summary of general inspection findings and recommendation of full condition survey of the fins including concrete testing to facilitate future assessment work was provided to the Council.

This report outlines the nature and extent of the full condition survey and concrete testing required for structural assessment of the fins and development of suitable remedial solution. Intrusive investigations are also to be undertaken to confirm sizes and details of the fins. The scope of the full condition survey and investigations considers the fins only but does not include the primary structures to which the fins are fixed.

We require an itemised fee proposal for undertaking these works.

The appointment for this work will be directly with the client, London Borough of Camden.

2. Existing Fins

There are 238 fins in total. They are precast reinforced concrete elements fixed to slabs of first floor, second floor and roof by dowels at the perimeter of the building as shown in Figures 2.1, 2.2 and 2.3.

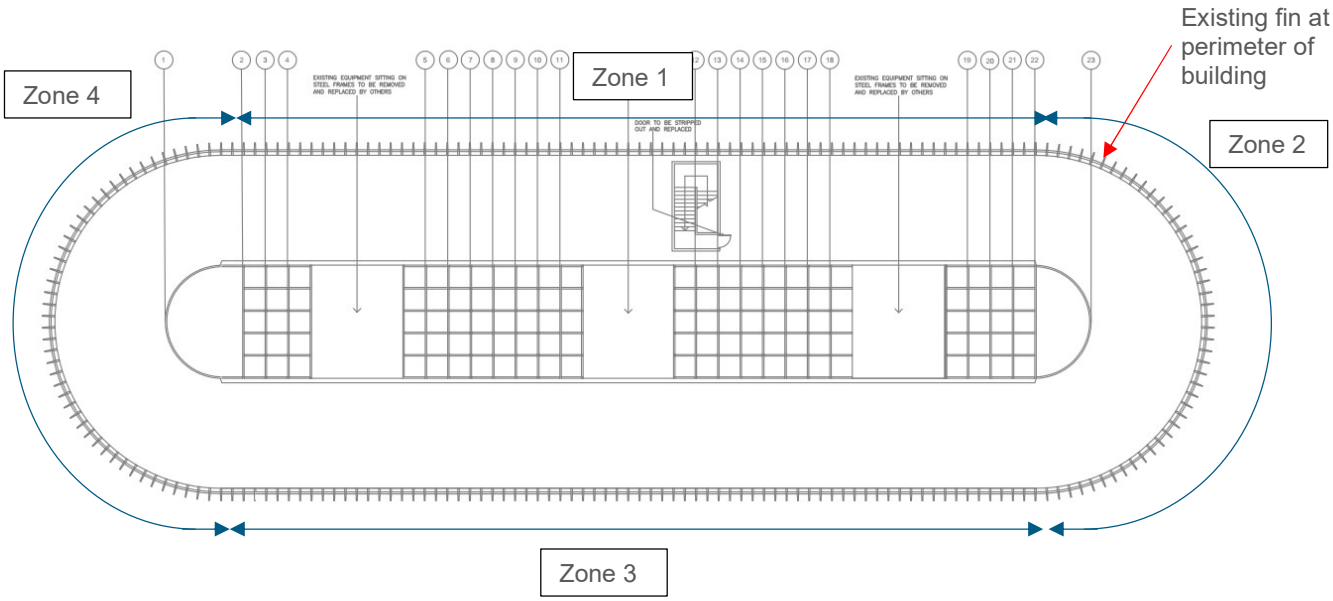

Figure 2.1 – Roof plan showing fins at perimeter of building

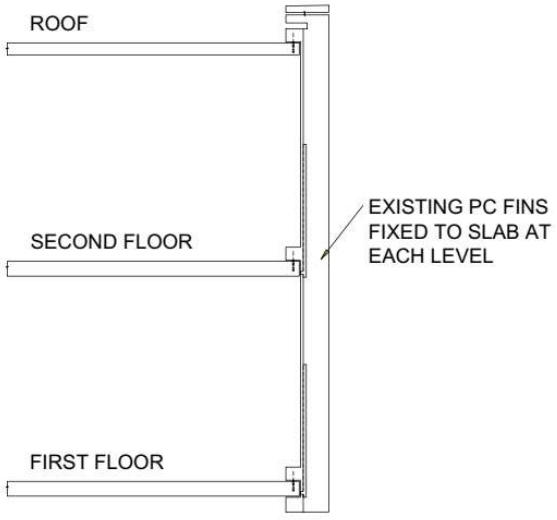

Figure 2.2 – Section of fin

Figure 2.3 – Photo showing possible grouted hole for dowel at fin

3. Survey Works

3.1. General Requirements

Detailed and full condition survey works are required to confirm the condition of every fin. It does not include the primary structures such as the supporting reinforced concrete floor slabs, nor the cladding panels or windows attached to them.

For all items specified in this document; the contractor is required to:

- Make good to a standard and condition equivalent to or better than that encountered prior to the works taking place.
- Minimise the impacts of the works on the facility operations.
- Ensure the structural stability and integrity of the fins, the cladding panels and windows during the works.
- Provide safe access to the work areas.
- Submit RAMS for all elements of work including details of reinstatement methodology.
- Review the proposed description of works to ensure it will obtain the information required and submit alternative proposals where the proposed description of work will not provide (or has not provided) the information required.
- All testing to be undertaken by a UKAS/NAMPS accredited laboratory.

The contractor is required to produce a factual report of the data found from the sampling and testing. The factual report should be provided no more than 2 weeks after completion of on-site testing and return of laboratory results.

3.2. Concrete Investigation

The concrete investigation must obtain the following information:

- The sizes of the fins, their reinforcement provision and material properties. This is to allow for structural assessment of the fins.
- The condition of the existing concrete and level of deterioration from the ‘as new’ condition.

It is proposed that the concrete investigation be undertaken in two stages as follows:

Stage 1: General information collection and condition survey to identify the extent and severity of defects. It shall include:

- Concrete surface examination and photographic survey
- Rebound hammer tests
- Ferroscanning of reinforcement

Stage 2: For fins with defects identified in Stage 1, testing for assessing corrosion risk of reinforcement. It shall include:

- Carbonation tests
- Chloride tests
- Half-cell potential surveys

The contractor is required to undertake the work described in the following paragraphs of this section.

3.2.1. Concrete Surface Examination and Photographic Survey

Concrete surface examination and photographic survey shall be undertaken for every fin over their full height to identify areas where visible cracking, rust staining, spalling and concrete delamination has occurred. The survey shall be conducted by a trained person at touch distance to the fins. The visual survey shall be supported by testing with a handheld hammer to identify any hidden cavities, delamination or voids. Where possible, the cause of crack, spalling and delamination should be identified.

The contractor shall produce a report of the results, recording widths of cracking and quantifying areas of rust staining, spalling and delamination. It shall include the following:

- High resolution, colour photographs of the area.
- Labelled or numbered photographs with a distinguishable title and collated within a Schedule of Photographs.
- A diagramatic plan or other drawing (as appropriate) with indicators of where each photo was taken. This shall also be cross-referenced within the Schedule of Photographs.

If during this process, concrete becomes loose or breaks away, these concrete fragments shall be retained to be used as samples for carbonation and chloride tests described in Sections 3.2.4 and 3.2.5 respectively. The location and size of any debris samples shall be recorded.

3.2.2. Rebound Hammer Tests

To avoid undertaking a lot of intrusive core sampling, rebound hammer tests are to be undertaken to determine concrete compressive strength. Testing shall be carried out by a trained person in accordance with BS EN 13791:2019 and BS EN 12504-2:2021.

In accordance with BS EN 13791:2019, rebound hammer tests are only appropriate where carbonation depths do not exceed 5mm. It is therefore recommended that carbonation tests be undertaken first with appropriate rebound hammer locations determined accordingly.

The contractor shall produce a report covering the results of the rebound hammer tests and estimated concrete strength. The work is scheduled in Table 1.

Table 1. **Rebound Hammer Test Schedule**

Location	Information Required	No.	Description of Proposed Works
Any 24 fins (6 from within each of the zones identified in Figure 2.1). The precise locations shall be selected to achieve a representative distribution within each of these zones.	Compressive strength of concrete	1 per fin	Rebound hammer tests

3.2.3. Ferroscanning of Reinforcement

The contractor shall carry out a reinforcement survey to identify the reinforcement arrangement of the fins.

The four sides of the fins shall be surveyed. The ferroscanning shall be carried out by a trained person in accordance with BS 1881 Part 204:1988 and identify the following information:

- Dimensions of fins including breadth, length and height
- Diameter and spacing of primary and secondary reinforcement
- Diameter and spacing of any link reinforcement
- Concrete cover to reinforcement (four sides)

The information shall be determined with a combination of Ferroscan system (using Hilti PS 250 or equivalent) and Ground Penetration Radar system, (using Hilti PS1000 X-Scan or equivalent). The scanning procedure shall be in accordance with the scanning equipment manufacturers' recommendations.

The location, spacing and concrete cover depth of all reinforcement and any objects identified at depth of concrete shall be recorded on clear diagrams together with output images obtained from the scanning devices.

The contractor is required to interpret the data and provide a summary report (the report is to be in accordance with BS1881 Part 204:1988) of the ferroscanning which details all the information required in Table 2. The report shall include photos, locations, and sketches of the existing reinforcement and dimensions of the fins.

Where the 'Ferroscanner' is not able to detect a bar size then an alternative similar element must be scanned.

Table 2. **Ferroscanning Schedule**

Location	Information Required	Total No.	Description of Proposed Works
One fin from each of the zones in Figure 2.1, selected as being a typical example from within each zone	Dimensions of fins. Diameter and spacing of primary, secondary and link reinforcement embedded in fins.	5 per fin	Ferroscanning at following five locations: - Base support at 1/F - Mid-height between 1/F and 2/F - Intermediate support at 2/F - Mid-height between 2/F and R/F - Top support at R/F
For every fin	Concrete cover to reinforcement.	5 per fin	Ferroscanning at following five locations: - Base support at 1/F - Mid-height between 1/F and 2/F - Intermediate support at 2/F - Mid-height between 2/F and R/F - Top support at R/F

3.2.4. Carbonation Tests

Carbonation tests are required to determine any reduction in concrete pH and therefore whether there is sufficient depth of uncarbonated concrete to protect the reinforcement against corrosion. In-situ testing for depths of carbonation using phenolphthalein indicator solution shall be used in accordance with BS EN 14630:2006.

Testing must be undertaken on the original concrete and not on a more recent concrete repair.

The following information (as a minimum) is to be reported:

- Unique identifier of the test such that the location of the test can be easily referenced.
- Date of undertaking the test.
- Location being tested.
- Minimum and maximum values for depth of carbonation recorded for each location.
- Photographs which clearly show each sample and colour/extent of the phenolphthalein indicator.

Testing shall first be undertaken on locations with loose or broken concrete resulting from the survey described in Section 3.2.1. Where no locations with loose or broken concrete are identified, only then shall concrete core samples be obtained at discrete locations for carbonation test. The work is scheduled in Table 3.

Table 3. **Carbonation Test Schedule**

Location	Information Required	Total No.	Description of Proposed Works
For every fin with defects identified as described in Section 3.2.1	Carbonation depth	2 per required fin	Carbonation tests at 1/F and 2/F

3.2.5. Chloride Tests

Chloride tests are required to determine whether chemical attack by chloride has occurred. Concrete drilled dust samples shall be prepared for chloride tests in accordance with BRE IP21/86 and Concrete Society Technical Report No. 32.

At least two holes shall be drilled at each location and the dust collected into sealed plastic bags. Dust from the outer 5mm shall be excluded from testing (due to weathering).

Testing must be undertaken on the original concrete and not on a more recent concrete repair.

The material sampled shall comprise several incremental sub-samples, prepared over the depth ranges 5-25mm, 25-50mm and 50-75mm.

The samples shall be analysed in a UKAS//NAMPS accredited laboratory for chemical analysis, in accordance with the procedures detailed in BS EN 14629:2007 and BS 1881 Part 124:2015.

The following information (as a minimum) is to be reported:

- Unique identifier of the test such that the location of the test can be easily referenced.
- Dates of undertaking the test and sample.
- Mass of sample tested.
- Chloride content as a percentage of the mass of the sample and mass of cement.

Testing shall first be undertaken on locations with loose or broken concrete resulting from the survey described in Section 3.2.1. Where no locations with loose or broken concrete are identified, only then shall a hole be drilled at discrete locations for chloride test. The work is scheduled in Table 4.

Table 4. **Chloride Test Schedule**

Location	Information Required	Total No.	Description of Proposed Works
For every fin with defects identified as described in Section 3.2.1	Chloride content	2 per required fin	Chloride tests at 1/F and 2/F

3.2.6. Half-cell Potential Surveys

Half-cell potential surveys are required to determine the risk of reinforcement corrosion. The surveys shall be carried out by a trained person in accordance with ASTM C876-15. The concrete cover is removed locally by drilling a hole to expose the reinforcement for electrical connection to the half-cell.

Testing must be undertaken on the original concrete and not on a more recent concrete repair.

Testing shall first be undertaken on locations with loose or broken concrete resulting from the survey described in Section 3.2.1. Where no locations with loose or broken concrete are identified, only then shall a hole be drilled at discrete locations for the half-cell potential survey.

The following information (as a minimum) is to be reported:

- Unique identifier of the test such that the location of the test can be easily referenced.

- Dates of undertaking the test.
- Half-cell potential readings and map of the area surveyed.

The work is scheduled in Table 5.

Table 5. **Half-cell Potential Survey Schedule**

Location	Information Required	Total No.	Description of Proposed Works
For every fin with defects identified as described in Section 3.2.1	Half-cell potential	2 per required fin	Half-cell potential surveys at 1/F and 2/F

3.3. Making Good and Repairs

Any concrete that has been damaged or broken during the survey or where surfacing has been removed must be made good temporarily and a suitable permanent repair method should be agreed. The For concrete repairs, grout shall have the following properties:

- High strength,
- Non-shrinkage,
- Bonded,
- Compatible coefficient of thermal expansion,
- Colour and surface texture match with the original concrete fin.

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