FORMER NESTLE FACTORY, HAYES

Demolition Report – Former Canteen Block

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DOCUMENT CONTROL SHEET

Project: **Former Nestle Factory, Hayes**

Job No: **W1965**

Title: **Demolition Report – Former Canteen Block**

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CONTENTS

APPENDICES

1 INTRODUCTION

1.1 PURPOSE OF REPORT

This report has been prepared for Barratt London to support the application to redevelop the site of the former canteen block on the former Nestle factory site in Hayes.

1.2 SITE LOCATION

The site is located just to the north of Nestles Avenue, Hayes, UB3 4RF, approximately 500 metres to the south-east of Hayes Town Centre. Hayes and Harlington Railway Station lies to the northwest of the site.

The site is bounded to the north by the Great Western Railway and the Grand Union Canal. To the west is the Squirrels Industrial Estate, accessed from Viveash Close, with the ongoing Segro development to the east of the site.

Figure 1: Site location plan

1.3 SITE CONTEXT

The site was formerly used in the production of coffee products, having originally been developed in 1912 by Sandow Ltd. as a cocoa factory. Nestlé owned and occupied the site from 1929.

Aside from the main factory building, there was warehousing, storage and packaging buildings, boiler houses, roasting and drying areas, and staff amenity buildings within the site.

The existing canteen building is located towards the south of the site, set back from Nestles Avenue, as shown in Figure 2.

We understand the canteen building was built in 1954, with a more recent shower block addition, which has been demolished as part of the approved site redevelopment.

The canteen block was used as a canteen and events space for the site, with a 2-storey building wrapping around the south and west of the main canteen hall providing office accommodation. The building has been derelict for several years.

1.4 CURRENT DEVELOPMENT

The ongoing Barratt development will provide over 1300 new homes, with the construction works currently progressing, and some of the residential blocks completed and occupied.

The development includes the retention and restoration of the existing facades to the main factory building (the Truscon Building), as well as the Art Deco style entrance tower. These exposed concrete structures have been retained and restored as part of the fabric of the new buildings.

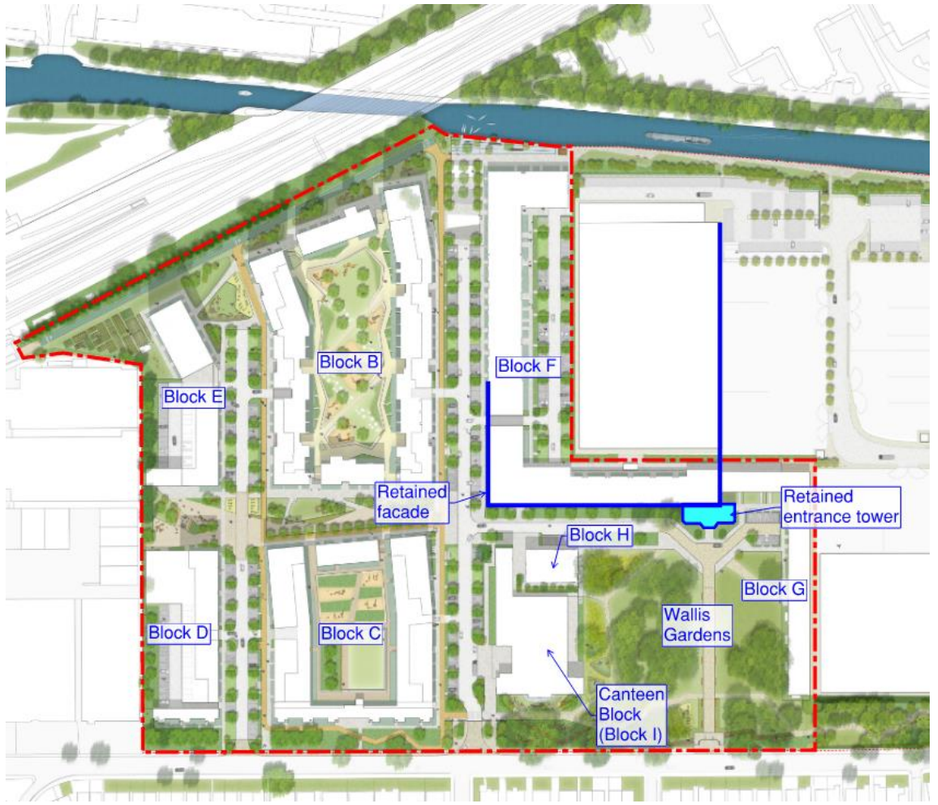


Figure 2: Site layout

2. OVERVIEW AND STRUCTURAL FORM OF EXISTING BUILDING

2.1 BUILDING LAYOUT

The building is formed of several parts, each of which is described individually below. Figure 3 shows the overall layout of the canteen block.

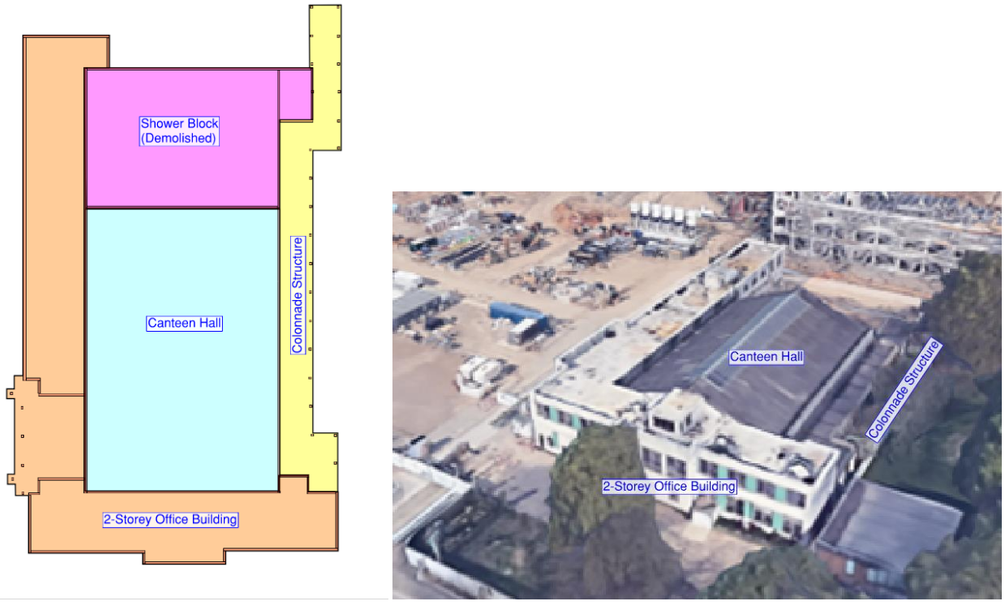


Figure 3:Building overview

2.1 CANTEEN HALL

The canteen hall is approximately 25.3m by 37.8m internal plan dimensions, and comprises a single storey open space with a duo-pitch roof supported by a series of steel trusses spanning across the width of the building.

The building has approximately 5m headroom to the underside of the trusses at eaves, with the overall height of the building ridge of approximately 12m. The structure is of steel framed construction with steel perimeter columns typically encased in brickwork.

The walls are generally formed of brickwork with the external walls of cavity construction. The internal face of the walls were rendered up to the ceiling level. The walls are also rendered externally where they form external perimeter walls.

2.2 OFFICE BUILDING

This section of the building wraps around the south and west of the canteen hall, extending out to a width of 8m. The building is a two-storey steel-framed structure, with steel downstand beams to the underside of the first floor and roof slabs.

The first floor slab and roof slab comprise precast concrete slabs supported on steel beams, which were encased in concrete.

Where measured, the height from ground floor to the underside of the first floor slab was 4.5m and from first floor to the underside of the roof slab was approximately 4m. This building extends beyond the north of the canteen hall, previously running along the edge of the shower block to the north of the canteen hall.

The supporting columns and beams were spaced at 3.6 m centres along the length of the building with supporting downstand beams spanning between each column in a regular grid. Within the west wing of this structure there is a covered vehicle access area underneath the first floor slab that leads into the main canteen hall.

The facades along the west and south were built in a Moderne style, with painted rendered elevations including large areas of Crittal type metal-framed glazing.

Figure 4 below shows a typical edge section, showing the junction between first floor and the existing façade. The steel beams and columns, and precast floor planks are embedded into the facades, which are formed in rendered brickwork.

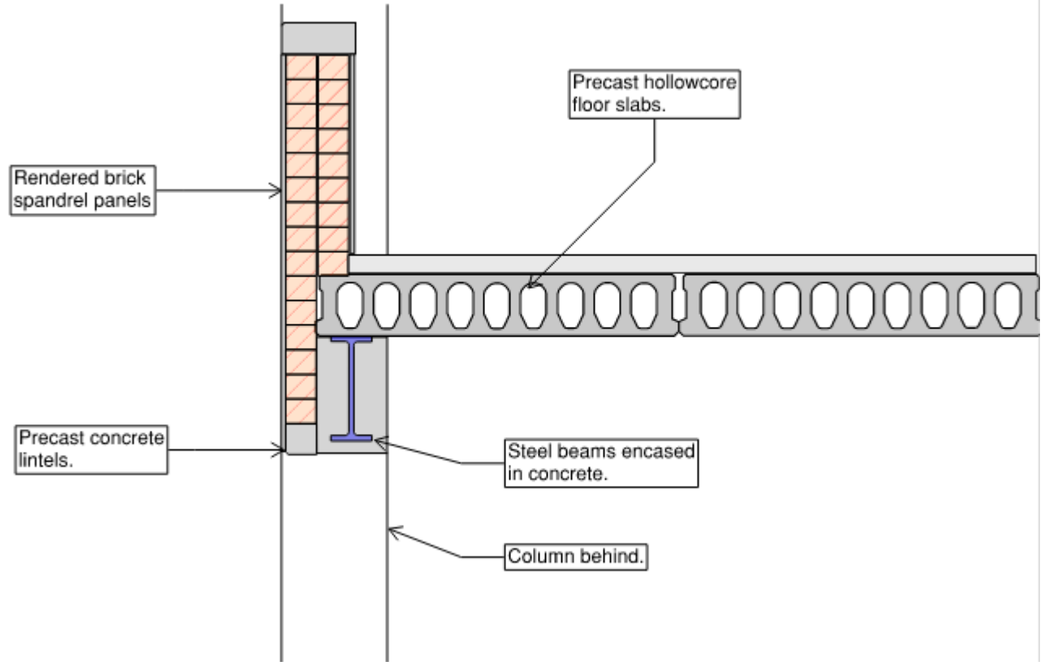


Figure 4: Indicative section through façade of office building.

2.3 COLONNADE

The colonnade lies to the east of the canteen hall and takes the form of a covered walkway formed of steel columns and beams supporting precast concrete roof planks. The downstand steel beams are encased in concrete, and the steel columns are encased in rendered brickwork. The colonnade extends to a width of 4.5m from the face of the canteen building and is of single storey height (4.5m) to the underside of the roof slab.

The colonnade also ran along the edge of the shower block to the north, extending a further 8m to the north of the former shower block. The supporting columns and beams in this section are spaced at 3.8m centres along the length of colonnade.

2.4 FORMER SHOWER BLOCK

The shower block was a steel-framed single storey structure with a duo-pitched roof. It has been removed as part of the consented scheme.

3. BUILDING INVESTIGATIONS

3.1 PREVIOUS INVESTIGATIONS

The following investigation reports have previously been undertaken to assess the existing structures. These are listed in chronological order, with the most recent reports at the end of the list.

- Deleterious Concrete Materials and Durability Investigation 288101-01 (November 2015) by RSK.
- Main factory building and canteen investigation report 4097 (March 2016) by GBG
- Structural survey report 2150862 (May 2017) by Elliott Wood
- Structural condition survey report W1530/CS001 (December 2018) by Gravity Consulting Engineers
- Intrusive survey investigation report 4689 (October 2020) by GBG
- Report on the investigation of façade steel frame 5049 (June 2022) by GBG

The GBG and RSK reports included intrusive investigation and materials testing, while the reports by Gravity and Elliott Wood followed visual inspections.

3.2 INVESTIGATION FINDINGS

A brief summary of the findings of the various investigations is described as follows.

3.3 CANTEEN HALL ROOF

The main roof trusses were found to be in relatively good condition, with light surface corrosion encountered during Gravity's inspection of December 2018, which included an up-close visual inspection using a mobile elevated working platform.

The exception to this was at the truss ends and close to the box gutters at the eaves on both sides of the main hall, where there were signs of heavy corrosion and section loss due to significant water ingress through the failed gutters.

3.4 CANTEEN HALL COLUMNS

The steel columns were encased in brickwork for their full height. Inspections to the columns have therefore been limited to localised opening-up works.

Where exposed, the columns were generally in reasonable condition, with light to moderate surface corrosion. There is a possibility of heavier corrosion to the column heads close to the box gutters due to historical water penetration through the gutters as noted above.

3.5 OFFICE BUILDING ROOF

The roof structure was formed with precast hollowcore slabs spanning between steel downstand beams, which were encased in concrete.

There were areas of widespread water ingress through the roof structure due to the failure of the waterproofing membrane and blocked rainwater outlets.

Where exposed, the reinforcement within the hollowcore slabs was in reasonable condition, with light to moderate surface corrosion, however there was heavy surface corrosion in one surveyed location.

The materials testing has shown variable, and often high, chloride ion content within the hollowcore planks, which is often above the normally accepted 0.4% limit, leading to elevated risk of corrosion of reinforcement over the medium term.

3.6 OFFICE BUILDING FIRST FLOOR

The first floor structure was also formed with precast hollowcore slabs spanning between steel downstand beams, which were encased in concrete.

Where exposed, the reinforcement within the hollowcore slabs was in reasonable condition, with light surface corrosion.

Some cracking of the concrete encasement around steel beams was observed, with the cracks extending along the length of the steel beams, indicating corrosion of the encased steel beams.

GBG have carried out opening-up works to inspect typical steel beams in two locations – one along the west façade and one along the south façade. In both of these locations, the beams were exhibiting light surface corrosion, which has led to expansion and cracking of the concrete encasement.

As with the roof structure, the testing showed some high chloride ion content within the precast floor planks, leading to an elevated risk of corrosion of the embedded reinforcement.

3.7 OFFICE BUILDING COLUMNS

The columns were all steel sections encased in brickwork. In some cases there was a gap between the steel columns and the brick encasement, and in other cases the brick was built tightly around and into the columns. Where exposed, the columns showed light to moderate surface corrosion. The facades are discussed in more detail below.

3.8 OFFICE BUILDING EXTERNAL FAÇADE

The external facades on the south and west elevations comprised rendered brick infill panels around the structural steel framing members (beams and columns). The render was generally in poor condition, with horizontal, vertical and diagonal cracks in various locations.

There were two prominent vertical cracks at column locations on the south elevation. These cracks extended from ground level and followed the columns for most of the building height. In these locations, the columns were showing some surface corrosion due to exposure to moisture. The corrosion has caused expansion of the steel, resulting in large forces applied to the brickwork, which has caused the vertical cracks.

In their recent investigation, GBG have exposed the columns in 4 locations – two on the south façade and two on the west façade. These locations included areas where cracking had been observed in the rendered facade. The inspections revealed surface corrosion of the steel, including some areas of heavy surface corrosion and onset of section loss. The expansive forces produced by the corrosion have led to vertical cracks through the brickwork where it is contact with the steel columns.

The outer leaf is supported on precast concrete lintels between the column encasements. These concrete lintels were generally in poor condition, with steel reinforcement bars exposed and corroded, and is places detached from the lintel.

A damp proof course was found at only two of six surveyed locations.

3.9 COLONNADE STRUCTURE

The colonnade is formed with precast hollowcore roof planks supported on steel downstand beams, which are encased in concrete. The columns are also formed in hot rolled steel sections, encased in brickwork similar to the main building. There were areas of water ingress through the colonnade roof due to failure of the waterproofing.

3.10 GROUND FLOOR SLABS

The ground floor slab is approximately 200mm thick concrete ground-bearing slab. Localised cracking in the screed was observed, including in the south east corner of the office building.

Cracking of concrete ground-bearing slab was found to correspond with locally weak supporting soils, which has resulted in settlement of the ground floor slab.

3.11 FOUNDATIONS

Foundations were found to be mass concrete pad foundations, generally taken down into the competent soils of the Lynch Hill Gravel formation. The exception to this was the colonnade, which was found to have no foundations below the columns, with the columns extending a nominal depth into the near-surface made ground/ fill.

4. CONCLUSIONS

4.1 BUILDING FORM AND HISTORICAL CONTEXT

The building was constructed in 1954, with the main facades following the popular modernist style, which was typified by a minimalist approach to style and form, often using modern materials of the time such as exposed concrete and steel ribbon windows.

The building uses elements of the styling of the main factory building on the site, which was a concrete frame, with the main beams and columns expressed through the façade to form a regular structural grid, infilled with exposed concrete panels and steel Crittall windows. The existing façades to the main factory building, along with the art-deco entrance tower have been retained and restored for use within the proposed development.

The structure of the canteen block, although giving the external appearance of a concrete building, is however formed with a structural steel frame, which has been over-clad in rendered brickwork, as a cheaper replica of the modernist style.

4.2 REGENT STREET DISEASE

Regent Street Disease is a well-known defect affecting buildings of similar form, with elements of structural steelwork embedded in their facades.

The steel columns and beams are embedded in brickwork within the façade, with the brick built tight against the steelwork. This has allowed moisture to come into contact with the steelwork by permeating through the porous brickwork. Over the life of the building, this has led to the breakdown of any protective paintwork on the steel frame, and the onset of corrosion. This corrosion produces expansive forces, which has caused the brickwork to push away from the steel columns, with large cracks opening up in the façade.

This building has seen the onset of Regents Street disease in several locations, where the steel corrosion has caused cracking of the rendered brickwork.

4.3 OVERALL QUALITY AND CONDITION OF STRUCTURE

The building is of low quality construction with materials and detailing that provide inherent limitations to the long-term durability. Examples of poor detailing include the embedded steel beams and columns within the façade, which have corroded over the life of the building due to their exposure to moisture. Examples of substandard materials include the precast hollowcore planks, which have variable and often high chloride ion content, leading to an enhanced risk of corrosion of the reinforcing tendons. The colonnade structure is also of low quality, with no foundations under the columns.

The building has been derelict for several years. During this time, the roof waterproofing has failed in several locations, leading to water ingress through the building, and degradation of the building's fabric. Areas of particular concern include the main steel framing members under the box gutters in the main canteen hall.

As noted above, the building is suffering from 'Regents Street Disease', with the steel structure embedded in the facades starting to corrode and cause damage to the facades. In order to rectify this problem, the steel would all need to be exposed and protected, which would involve dismantling the facades from around the steelwork. We do not see a way of retaining the facades, or a benefit of doing so, based on the low quality construction form and materials.

5. PROPOSED DEVELOPMENT

5.1 The proposed development includes:

Full demolition and redevelopment of the former Canteen Building to provide a new healthcare facility (Class E(e)), nursery (Class E(f)) and reconfigured residential building (Block H) (Class C3 and Class E), including associated landscaping, access, car parking and other engineering works.

The proposed development incorporates the key historic features of the existing locally listed building, including the 'L' shaped building. the design of the proposed development closely resembles the original 'L' shaped building.

The proposed healthcare and nursery building will use white render, with vert terre tiles and double glazed windows in the same glazing bar style as the original building, with subtle amendments including more frequent tiles to provide smaller rooms.

6. PROPOSED EXTENT OF DEMOLITION

6.1 EXTENT OF DEMOLITION

The proposed demolition includes the canteen block in its entirety, including the former canteen hall, the two-storey office building, and the colonnade structure.

6.2 COLONNADE DEMOLITION

The colonnade is formed with precast concrete planks supported on a series of concrete-encased steel downstand beams, which are in-turn supported on brick-encased steel columns. Stability is assumed to be provided via connection to the canteen hall structural frame.

The colonnade is to be fully demolished by removing the roof coverings and encasements to steels and columns, allowing the structure to be dismantled and removed, and the foundations grubbed out.

6.3 CANTEEN HALL DEMOLITION

The canteen hall is a steel-framed structure, with steel trusses spanning the width of the building and supporting the duo-pitched roof. The trusses are supported on steel columns, which are in-turn supported on pad foundations. Stability is assumed to be provided by the brick infill wall panels.

The structure is to be fully demolished, with the roof sheeting removed, steel trusses lifted out and dismantled, column encasements, walls and columns removed, the concrete ground bearing floor slab removed and pad foundations grubbed out.

6.4 OFFICE BUILDING DEMOLITION

The two-storey office building is of steel-framed construction, with precast hollowcore slabs at roof and first floor level supported on a series of concrete-encased steel beams, which are supported on brick-encased steel columns.

The office building is to be fully demolished. The internal finishes and fittings are to be removed, roof and floor coverings and windows removed, allowing the precast slabs to be removed, the walls removed and the steel frame dismantled. The ground-bearing concrete floor slab will be broken out and the foundations grubbed out.

7. GENERAL DEMOLITION REQUIREMENTS

7.1 METHOD STATEMENT

A detailed demolition method statement shall be developed by the demolition contractor. This shall take into account the form of construction of the existing buildings, the capacity of the structure, and how the buildings achieve stability.

Sequencing shall be taken into account such that the temporary stability of the structure is maintained at all times.

The contractor shall also consider health and safety, traffic management and storage areas, and dust and noise controls.

7.2 OTHER CONSIDERATIONS

The demolition site shall be properly protected and segregated from the surrounding construction site and any areas of public use.

Any live services which may be affected by the demolition works shall be protected, isolated or diverted where required.

Waste materials, including any hazardous materials shall be disposed of in a suitable manner and in accordance with the site waste management plan.

APPENDIX A: PHOTOS


Photo 1: Projecting slab on west elevation


Photo 2: Rendered parapet wall


Photo 3: Typical rendered façade wall and window


Photo 4: West elevation


Photo 5: Canteen hall


Photo 6: Canteen hall truss embedded in brickwork.


Photo 7: Roof truss embedment into brickwork under box gutter.


Photo 8: Colonnade column

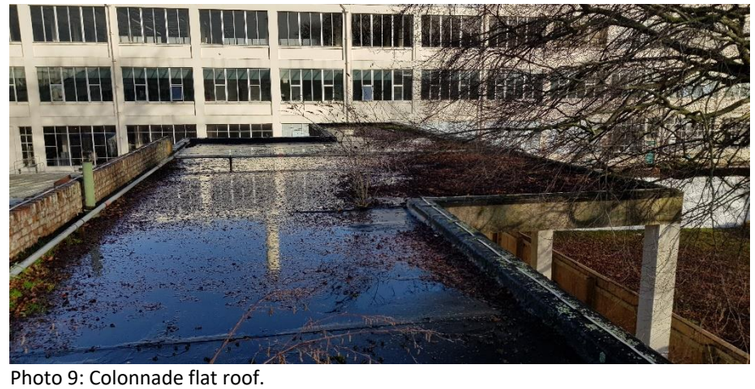


Photo 9: Colonnade flat roof.


Photo 10: Office building

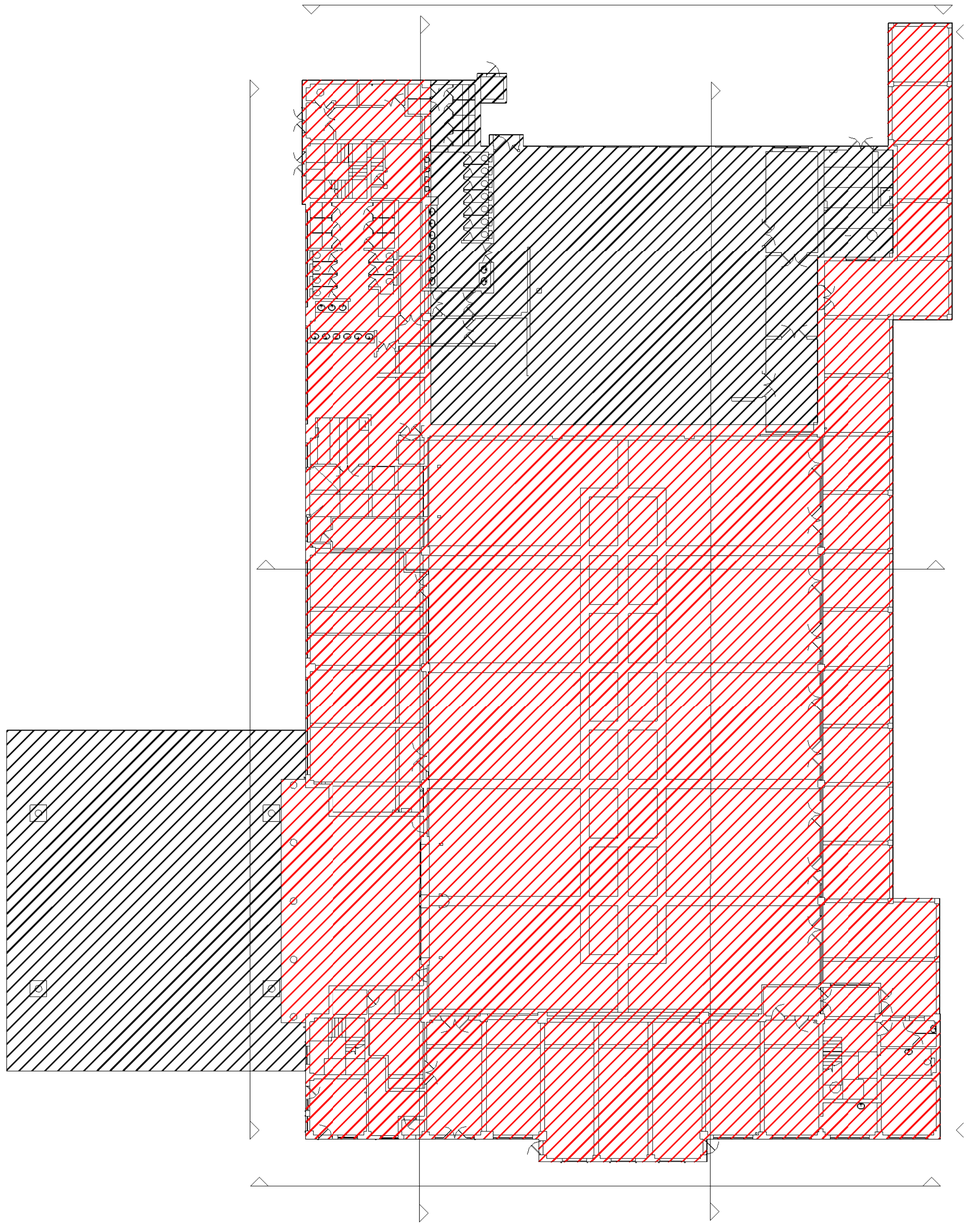

Photo 11: Crack through render on south-west corner of building


Photo 12: Steel column exposed within brick encasement.

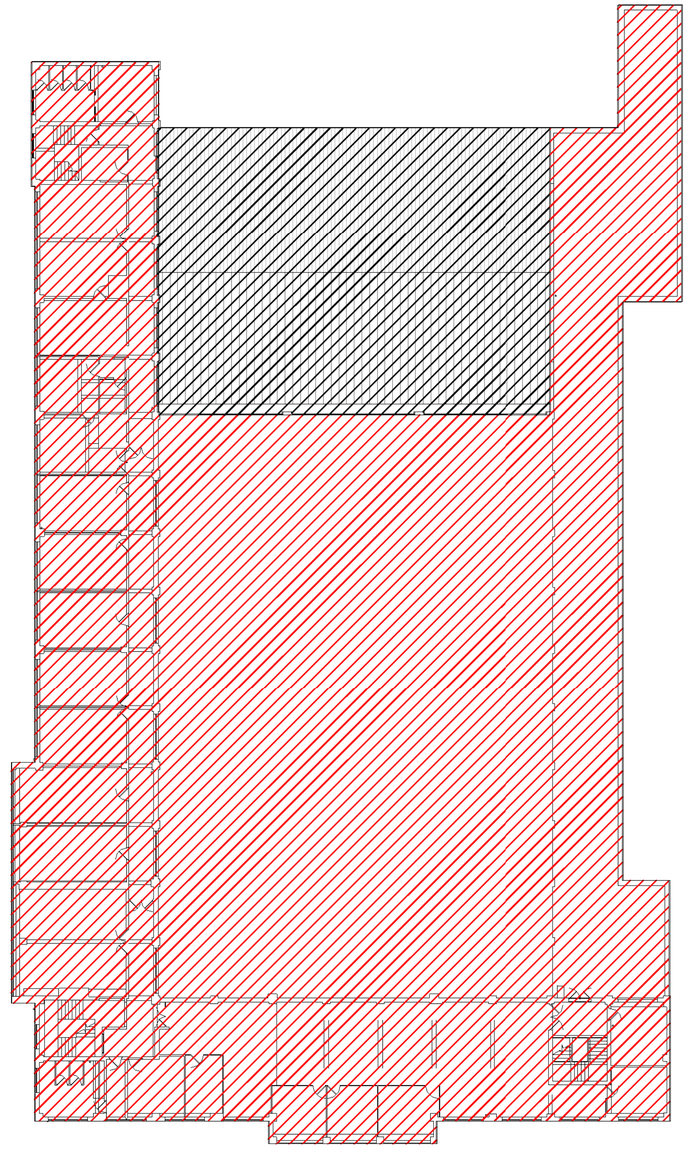

Photo 13: Crack through render on south elevation


Photo 14: Façade lintel spalling with reinforcement dislodged.

APPENDIX B: DEMOLITION DRAWINGS



Ground Floor Plan - Proposed for demolition



First Floor Plan - Proposed for demolition

Date	Rev	Description

Legend

Demolished prior to current submission

Proposed for demolition

Notes

Key Plan

0 2 4 6 8 10 metre

1:200 Scale

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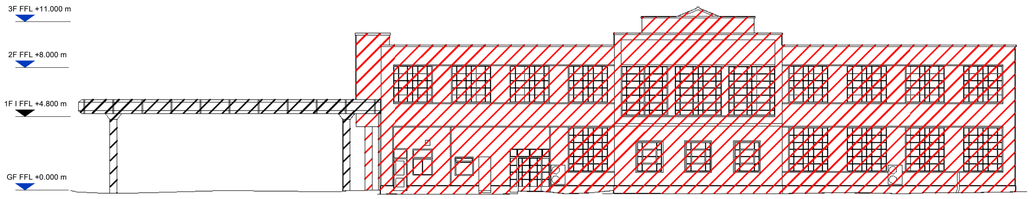
Project: Nestle Canteen

Client: Barratt London

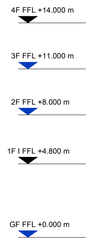
Drawing Title: Demolition Plans

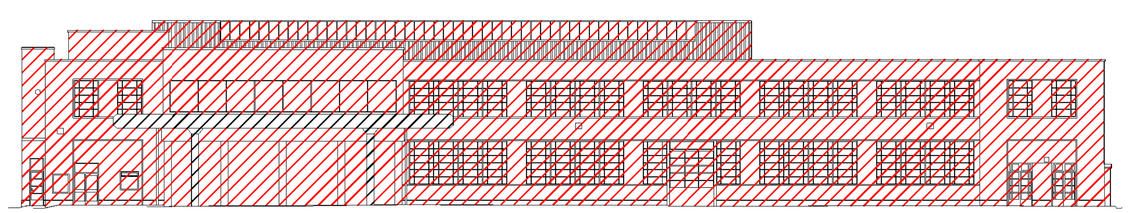
Drawing No: A70

Rev:

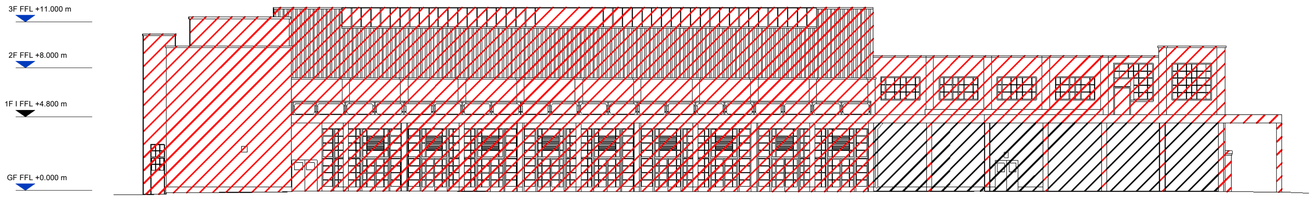


South Elevation - Proposed demolition

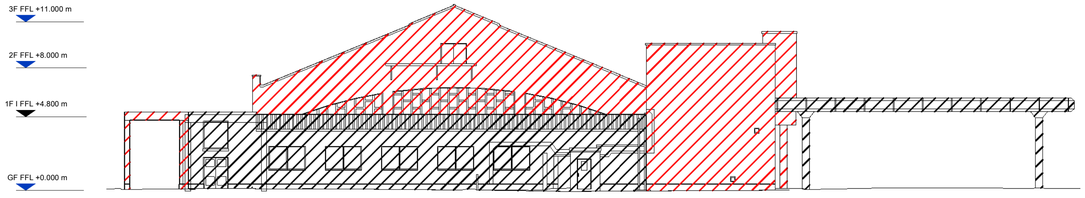




West Elevation - Proposed demolition



East Elevation - Proposed demolition



North Elevation - Proposed demolition

Date	Rev	Description

Legend

Demolished prior to current submission

Proposed for demolition

Notes

Key Plan

0 2 4 6 8 10 metre

1:200 Scale

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Drawn	Checked	Date
MP	JW	13/05/22

Project: Nestle Canteen

Client: Barratt London

Drawing Title: Demolition Elevations

Drawing No: A80

Rev:

APPENDIX C: SURVEY REPORTS

The following reports are appended:

- Report on the investigation of façade steel frame 5049 (June 2022) by GBG
- Intrusive survey investigation report 4689 (October 2020) by GBG

Former Nestle Canteen Building, Hayes

Report on the Investigation of Certain Façade Steel Frame Elements

Final Report – 5049

Barratt London

PROJECT: **Nestle Former Canteen Building, Hayes**

TITLE: **Report on the Investigation of Certain Façade Steel Frame Elements**

CLIENT: **Barratt London**

Final Report No: **5049**

Compiled By: **A Akida MSc Eng & J Dear BEng (Hons)**

Issued on: **8th June 2022**

TABLE OF CONTENTS

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Report on the Investigation of Certain Façade Steel Frame Elements

1.0 INTRODUCTION

1.1. Terms of Reference

Purpose:	To determine certain steel frame element construction details and condition as requested by the Client's Design Team
Location:	North Hyde Gardens, Hayes, UB3 4RF
Consultants:	GB Geotechnics Ltd (GBG)
Instructed by:	Barratt London
Date of Instruction:	19th April & 19th May, 2022

1.2. General

This is the final report of the investigation. It therefore supersedes any previous reports whether written or oral and completes all work currently ordered under this contract.

The report represents the best professional opinions of the Authors, based on the results of the site inspections and their experience of investigating numerous buildings of a similar age and of a similar construction.

1.3. Structure description, background, Scope and Purpose

The Main Factory on the Nestle site was originally built in the 1930's, and has been used throughout its history as an industrial building. The former Canteen building comprises a large open single storey double height central Main Hall area, a double storey Wraparound adjoining the southern and western sides and a single storey Locker Room adjoining the northern end. A single storey Wraparound is present on the eastern side of the Main Hall, although this is also referred to as the Colonnade.

A suite of previous investigative works have been carried out by various parties in order to ascertain the condition of the former Canteen Building, as well as certain construction details. GBG carried out some initial inspections and exploratory work to the former Canteen building in 2016, as well as investigative works to ascertain further information on the construction, condition and material property of the structural elements in 2020, on behalf of the Client's Design Team.

Previous Condition Survey Reports

- W1530 CS001 Condition Survey - Canteen Building
- Elliott Wood's Nestle FINAL Structural Survey
- 0000-S-Z-M-800-00-S101 T2 DEMOLITION STRATEGY
- GBG Report 4097 RevA
- GBG Report 4689

It is understood that in order to re-use the building and to gain a building warranty, the building would need to be certified for a residual design life of 60 years.

Following previous investigations into certain structural elements carried out by GBG (Report 4689) and an assessment of the structures overall condition and repair needs by the Client's Design Team, it is believed this would require a major overhaul of the structure.

Further investigative works were required to inspect the condition of representative Wraparound steel façade elements to assist the Client's Design Team in assessing the extent of repairs required to the façade, and more specifically, to assess the extent of opening up works that will be required to check the effect of corrosion on the capacity of the steel elements and to facilitate the repairs.

The final scope of the investigation agreed, as detailed in GBG proposal document *0422 jd Barratt London Nestle Canteen P01,* is summarised below.

Columns

We allowed for targeting a total of 4No. façade columns that exhibit cracking to the encasement.

At each column location we were to carry out the following:

- Shallow trial pit in order to expose the base of the column.
- Locally removing the encasement to expose the base of the steel column and baseplate for inspection.
- Locally removing the encasement to the column at a height of around 1m above ground f.f.l. to expose the steel column for inspection.
- At each column/baseplate exposure location; locally removing the corrosion product such that the extent of corrosion and residual section size of the steel can be measured. An estimate of the loss in the cross sectional area of the steel due to corrosion was also be provided along with photographs of interest. This was to enable an assessment to be made by the Client's Structural Engineers as to whether the residual capacity of the columns needs to be assessed and whether any strengthening works are required along with repair.
- An intumescent paint was to be applied to the exposed steel to provide temporary fire and corrosion protection. The trial pits were to be backfilled and compacted to the ground f.f.l. as a temporary measure.

Beams

We allowed for targeting a total of 2No. first floor façade beams that exhibit defects to the encasement.

At each beam location we were to carry out the following:

- Locally removing the encasement to expose the steel beam for inspection.
- At each beam exposure location; locally removing the corrosion product such that the extent of corrosion and residual section size of the steel can be measured. An estimate of the loss in the cross sectional area of the steel due to corrosion was also to be provided along with photographs of interest. This was to enable an assessment to be made by the Client's Structural Engineers as to whether the residual capacity of the columns needs to be assessed and whether any strengthening works are required along with repair.
- An intumescent paint was to be applied to the exposed steel to provide temporary fire and corrosion protection.

2.0 THE SURVEY

2.1. General

Survey Dates:	24th, 25th, 27th, 30th and 31st May 2022 – five daytime survey sessions (5 x c.8 hours duration)
Personnel:	2 to 4-person survey team

2.2. Methodology

The main investigative techniques used were trial pit excavation, traditional intrusive breakouts, physical/direct and in-direct measurement, enabling both on-site interpretation as well as a more detailed analysis of the data off site.

Trial Pit Excavation

Trial pits were excavated using a combination of electrical breakers and hand tools, after first scanning the floor areas for services using a C.A.T. scanner. A specialist Licenced Asbestos Contractor was employed to remove sub-base material where Asbestos Containing Materials (ACMs) were identified during the investigated.

Traditional Intrusive Breakouts

Traditional intrusive inspection techniques were employed to expose the steel façade columns and beams for sizing and inspection. This was generally achieved using a combination of light electrical breakers/drills and hand tools. Angle grinders or high speed drills fitted with wire brush attachments were used to locally remove corrosion product back to sound steel to allow residual steel thickness measurements to be made.

Physical/Direct and Indicrect Measurement

Element sizes and spacing's were measured using a combination of Vernier callipers, tape measures and laser distance measurers. An ultrasonic thickness gauge was used to estimate the thickness of column and beam components where direct access was not available, such as the webs and some plates.

Reinstatement & Waste

An intumescent paint was applied to the exposed steel columns and beams to provide temporary fire and corrosion protection. The trial pits were to be backfilled and compacted to the ground f.f.l. as a temporary measure. Any Asbestos Containing Material waste was removed by the licensed Asbestos contractor ahead of backfilling.

2.3. Access, Areas Surveyed and Site Relocation

Access to the site was provided by the Client and generally available throughout the external areas to be surveyed. The building was vacant throughout the investigation period. The high level elements were accessed via a tower provided by GBG or Mobile Elevated Working Platform (MEWP) provided by the Client.

All results and survey locations are referenced to the layouts shown on the survey drawings provided to us by the Client, which are reproduced within Appendix 1.

3.0 FINDINGS

3.1. Presentation of Results

The results of the construction detailing and comments on the condition of the elements inspected/exposed at the survey locations are presented in full on the survey drawings in Appendix 1 (as outlined in the table below) and summarised under the heading **3.2 Observations**. A selection of photographs of interest is presented within this report and on the survey drawings to help illustrate the findings of the survey. An electronic copy of the photographs has also been provided separately.

Drawing Content	Drawing Reference
Details of Ground Floor Column Construction and Condition	5049-1
Details of Ground Floor Column Construction and Condition Below Ground Level	5049-2
Details of First Floor Beam Construction and Condition	5049-3

Glossary of key words used in the report in reference to corrosion of steel

Light surface corrosion:

Onset of corrosion evident in places but no section loss

Moderate surface corrosion:

Further developed surface corrosion, but no measurable section loss

Heavy surface corrosion:

Heavy corrosion deposits and flaking evident, with onset of section loss (<10%)

Severe corrosion:

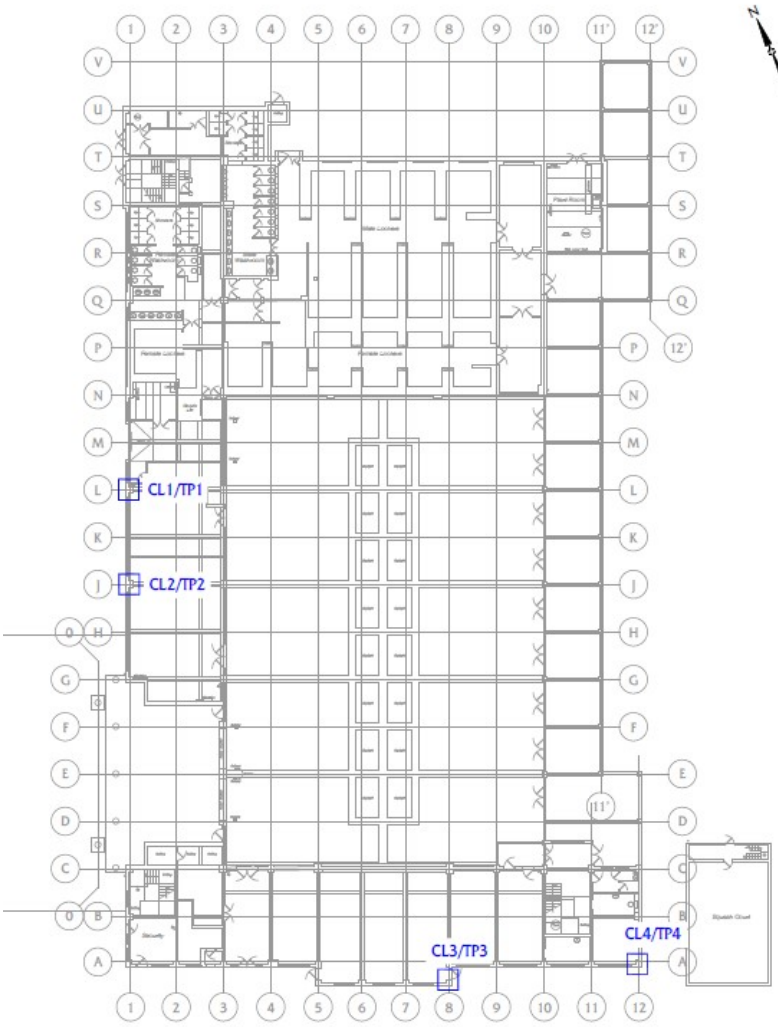
Clear significant loss of section (>10%)

3.2. Observations

Columns

A total of 4No. steel façade columns (CL1 to 4) were selected for investigation based on the areas identified by the Client's Design Team, where cracking had been observed to the external render finish/masonry. Columns CL1 and CL2 were selected on the western façade whilst CL3 and CL4 were selected on the southern façade. Initially, each of the columns were locally exposed for inspection at a height of around 1m above ground f.f.l, prior to carry out a trial pit excavation and localised exposure of the base of each column at the interface with the concrete foundation.

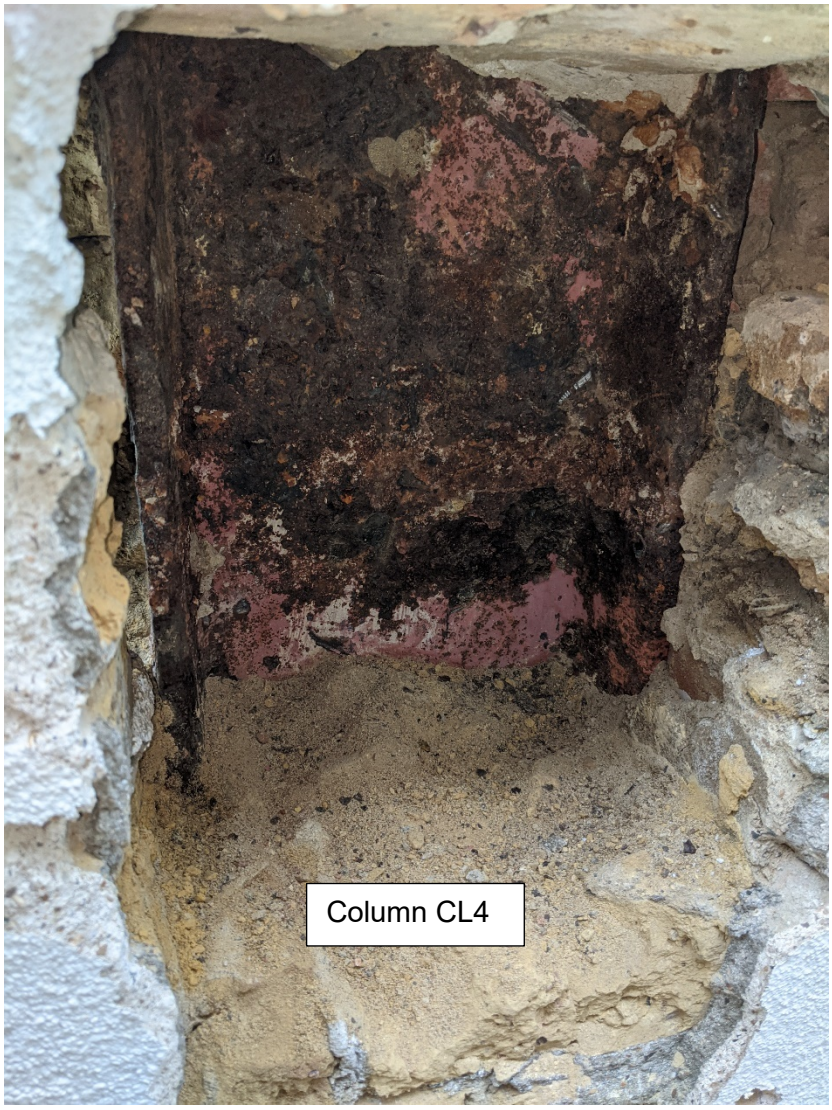
FIG.1: PLAN OF GROUND FLOOR SHOWING LOCATIONS OF COLUMNS SURVEYED NOT TO SCALE



Above ground level, each of the columns are encased in solid brickwork masonry, with a render finish to the external façade.

The steel columns locally exposed above ground level on the western façade (CL1 and CL2) exhibited no more than light surface corrosion.

On the southern façade, the steel column locally exposed above ground at CL3 exhibited moderate surface corrosion (further developed surface corrosion, but no measurable section loss), whilst the column locally exposed at CL4 exhibited moderate to heavy surface corrosion (heavy corrosion deposits and flaking evident, with onset of section loss, <10%).



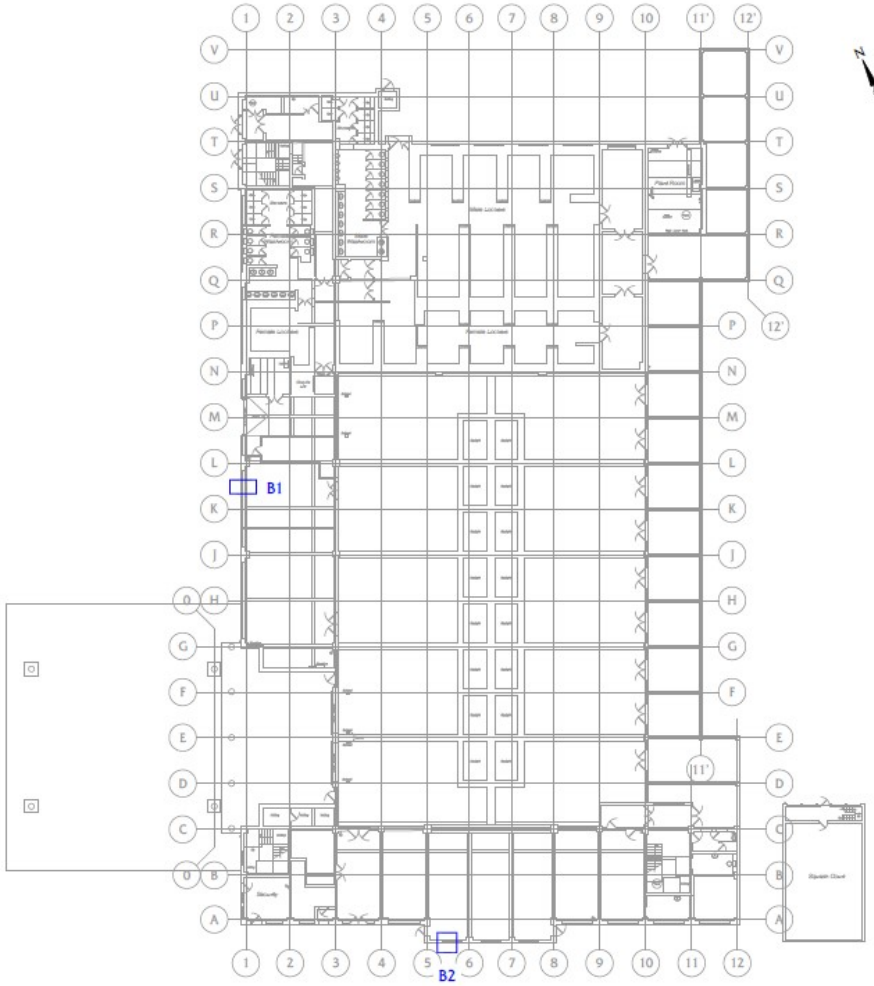
At each of the four column locations a portion of the base of the column and gusset plates/angles were locally exposed. Any base plate is fully embedded within the top of the concrete foundation and was not disturbed/exposed. The lower portions of the gusset plates/angles are typically encased in concrete, whilst the upper portions of the gusset plates/angles are encased in a mixture of concrete and brickwork. The bases of the column sections are typically encased in masonry.

At each of the four locations the gusset plates/angles and connecting rivet and bolt heads exposed (typically encased in concrete) exhibited no more than light surface corrosion. However, the base of the column sections typically exhibited moderate surface corrosion (further developed surface corrosion, but no measurable section loss). The base of the column section at location CL1 exhibited heavy surface corrosion (heavy corrosion deposits and flaking evident, with onset of section loss, <10%).

Beams

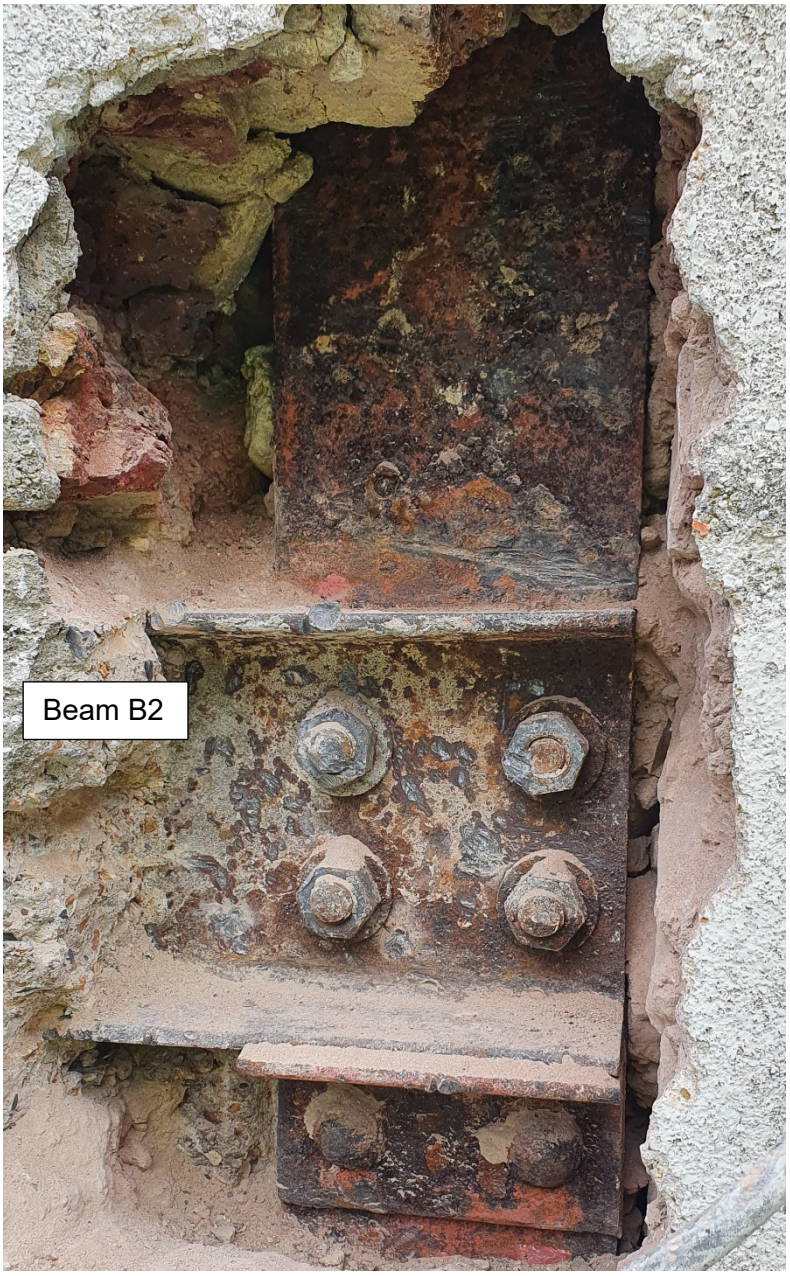
A total of 2No. first floor steel façade beams (B1 and 2) were selected for investigation based on the areas identified by the Client's Design Team, where cracking had been observed to the external render finish. Beam B1 was on the western façade whilst beam B2 was on the southern façade. Each of the beams were locally exposed for inspection.

FIG.3: PLAN OF GROUND FLOOR SHOWING LOCATIONS OF BEAMS SURVEYED NOT TO SCALE



Each of the beams were found to be encased in concrete, with a render finish to the external façade.

The steel beams locally exposed (B1 and 2) exhibited no more than light surface corrosion.



3.3. Recommendations

The residual capacity of the columns that exhibit heavy surface corrosion should be assessed by the Client's Structural Engineer.

As part of any repair of the steel frame elements and masonry encasement materials, it is imperative to mitigate further water ingress.

Given the variability in the condition of the small sample of steel column sections investigated at low and below ground level (where encased in masonry), it should be expected that there are other low level areas around the façade where the columns exhibit heavy surface corrosion, or potentially more severe corrosion. It is therefore recommended that, prior to any repairs, the lower portions of the columns and the column bases below ground level are opened up and similarly inspected. Any significantly corroded sections will need to be cleaned and repaired/protected and/or strengthened as directed by the Client's Structural Engineer, prior to any encasement repairs.

The steel columns should also be exposed for inspection at higher levels where cracking is evident to the external render/masonry (following the line of the column). It would also be prudent to inspect any steel beam locations where cracking is identified to the concrete encasement (following the line of the beam), although the steel beams are expected to be in better condition throughout where encased in concrete.

It should also be borne in mind that any repair warranty periods will be such that regular inspection and maintenance of the repaired and unrepaired areas should be expected over the required future design life of the building (60 years).

The installation of an impressed current cathodic protection system within the masonry could reduce the future levels of corrosion of the embedded steel and also reduce the regularity of future repairs. Anodes are installed into the brickwork externally to protect the steel columns and beams through an electronically impressed current.

Maintenance of this type of system's electronics would be expected at c.5-10-year intervals, although maintenance of the system electronics is unobtrusive and can be carried out remotely (but on site).

Specialist advice should be sought from a Corrosion Engineer with regards to the installation of cathodic protection systems.

APPENDIX 1
SURVEY DRAWINGS (INCLUDING PHOTOGRAPHS)

DETAILS OF GROUND FLOOR COLUMN CONSTRUCTION AND CONDITION
NESTLE FORMER CANTEEN BUILDING, HAYES

FIG.1: PLAN OF GROUND FLOOR SHOWING LOCATIONS OF COLUMNS SURVEYED NOT TO SCALE

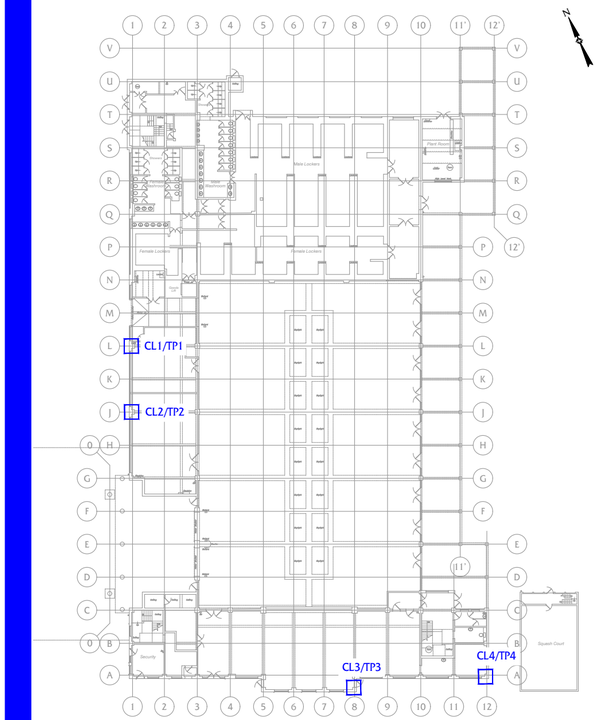
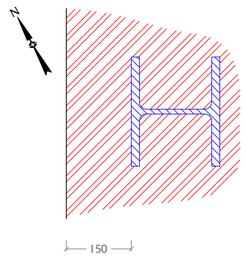


FIG.1a: PART PLAN SHOWING COLUMN CL1 CONSTRUCTION DETAILS AND CONDITION (1m ABOVE GROUND F.F.L.) SCALE 1:10



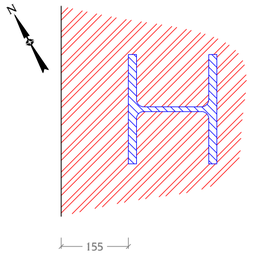
COLUMN CL1 RESIDUAL SECTION SIZE:

D: 252mm
B: 204mm
T: 18.7mm
t: 11mm

NOTES:

CRACKING OBSERVED TO RENDER. STEEL COLUMN EXPOSED EXHIBITS LIGHT SURFACE CORROSION (ONSET OF SURFACE CORROSION BUT NO SECTION LOSS)

FIG.1b: PART PLAN SHOWING COLUMN CL2 CONSTRUCTION DETAILS AND CONDITION (1m ABOVE GROUND F.F.L.) SCALE 1:10

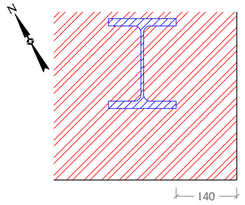


COLUMN CL2 RESIDUAL SIZE:
D: 253mm
B: 207mm
T: 19.6mm
t: 10.6mm

NOTES:

CRACKING OBSERVED TO RENDER. STEEL COLUMN EXPOSED EXHIBITS LIGHT SURFACE CORROSION (ONSET OF SURFACE CORROSION BUT NO SECTION LOSS)

FIG.1c: PART PLAN SHOWING COLUMN CL3 CONSTRUCTION DETAILS AND CONDITION (1m ABOVE GROUND F.F.L.) SCALE 1:10

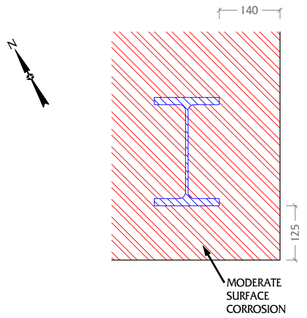


COLUMN CL3 RESIDUAL SECTION SIZE:
D: 207mm
B: 156mm
T: 16.8mm
t: 6.2mm

NOTES:

CRACKING OBSERVED TO RENDER. STEEL COLUMN EXPOSED EXHIBITS MODERATE SURFACE CORROSION (FURTHER DEVELOPED CORROSION, BUT NO MEASURABLE SECTION LOSS)

FIG.1d: PART PLAN SHOWING COLUMN CL4 CONSTRUCTION DETAILS AND CONDITION (1m ABOVE GROUND F.F.L.) SCALE 1:10



COLUMN CL4 RESIDUAL SECTION SIZE:

D: 250mm
B: 150.5mm
T:16.7mm
t: 5.7mm

NOTES:

CRACKING OBSERVED TO RENDER. STEEL COLUMN SECTION EXPOSED EXHIBITS MODERATE TO HEAVY SURFACE CORROSION (HEAVY CORROSION DEPOSITS AND FLAKING EVIDENT IN PLACES WITH ONSET OF SECTION LOSS)

P1a: CL1 COLUMN EXPOSURE

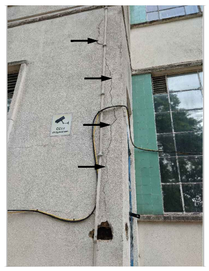
P1b: CL1 COLUMN FLANGE

P1c: CL1 CLOSE UP OF COLUMN FLANGE

P1d: CL1 REAR COLUMN FLANGE

P1e: CL2 COLUMN EXPOSURE

P1f: CL2 CLOSER VIEW OF COLUMN FLANGE



P1g: CL3 COLUMN EXPOSURE AND CRACKING

P1h: CL3 COLUMN EXPOSURE

P1i: CL3 COLUMN FLANGES AND WEB

P1j: CL3 COLUMN FLANGE

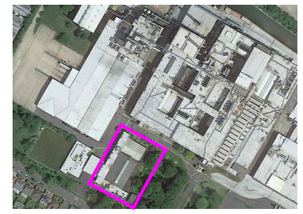
P1k: CL4 EXPOSURE TO COLUMN FLANGE

P1l: CL4 EXPOSURE TO COLUMN FLANGE AND WEB

P1m: CL4 CLOSER VIEW OF COLUMN FLANGES WEB

P1n: CL4 CLOSER VIEW OF COLUMN FLANGE

AERIAL VIEW OF SITE



SYMBOLS USED

PLAN EXTENT OF BUILDING SURVEYED

AREA SURVEYED

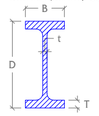
MATERIAL TYPES

STEELWORK

BRICKWORK

CONCRETE

STEEL MEASUREMENT DETAILS (BEAM / COLUMN)



PROJECT DETAILS

GBG REPORT No. 5049 ACCOMPANIES THIS DRAWING.

STRUCTURE INVESTIGATED	TWO STOREY STEEL FRAMED FORMER CANTEEN BUILDING
LOCATION	NORTH HYDE GARDENS, HAYES, UB3 4RF
PURPOSE OF INVESTIGATION	TO DETERMINE CERTAIN STEEL FRAME ELEMENT CONSTRUCTION DETAILS AND CONDITION AS REQUESTED BY THE CLIENT'S DESIGN TEAM

THIS DRAWING HAS BEEN PREPARED USING EXISTING DRAWINGS AND/OR PRINTS OF DRAWINGS AS SUPPLIED BY THE CLIENT AND SUPPLEMENTED BY MEASUREMENTS TAKEN ON SITE. ALL DIMENSIONS THEREFORE ARE TO BE CHECKED ON SITE PRIOR TO PREPARING DRAWINGS OR COMMENCING ANY WORK.

0 METRES 5

AT A SCALE OF 1:100 - ORIGINAL DWG SIZE A2 (420mm x 594mm)

REF.	REVISION	DATE

ALL ORIGINAL DRAWINGS ARE PRODUCED IN COLOUR

Project: NESTLE FORMER CANTEEN BUILDING, HAYES

Client: BARRATT LONDON

Title: DETAILS OF GROUND FLOOR COLUMN CONSTRUCTION AND CONDITION

Drawn	Date	Scale	Dwg. No. 5049-1
VC	MAY 22	AS SHOWN	
CAD	PM	APP	

GBG INNOVATION IN STRUCTURAL INVESTIGATION

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