Westfield Court & Alexander Drive, EH11 2RJ

Structural Condition Report

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Contents

Appendices

1 Executive Summary

Will Rudd Davidson (WRD) were instructed by The City of Edinburgh Council (CEC) to undertake a building and condition appraisal of existing residential flat units located along Westfield Court & Alexander Drive, Edinburgh. An initial site survey was undertaken alongside the building surveyor team at AtkinsRealis UK Ltd.

The purpose of this survey was to review the following items. This was restricted to a visual inspection of external elevations, internal circulation spaces, rooftop and a selection of void flats:

- Inspect the structure to determine the current condition and identify any existing structural defects which were visible at time of inspection.
- Inspect any defects noted across the buildings, where practical.
- Identify the requirement for intrusive investigations and provide a scope to further understand the existing construction, detailing and which flats could be utilised for these investigations.

This report provides commentary on the structural form, the condition of the structure and identifies any associated issues for future repair, maintenance and usage of the building. Our findings are based on visual inspections recorded during WRD visual surveys and the further investigations which have been undertaken by Capital Testing and Zenith.

We understand the existing high-rise apartments to be 8 storeys with a total of 88 apartments. The ground floor of the building is formed of precast concrete slabs supported by cast in-situ ground beams which are supported from piled foundations. A centrally located basement in Block E contains the building's central boiler and heating equipment. While precast concrete is confirmed at ground level, it’s uncertain if it spans over the basement but this reporting will assume it this is reflected across the full ground floor area.

The building's stability is provided by a monolithic moment-resisting frame formed by “fixed” reinforced beam to column connections instead of shear walls which are typically found in structures of this scale. Internal walls are non-loadbearing infill brickwork panels tied to the main frame while the external façade features cavity wall construction consists of brick inner leaf and profiled concrete "Orlit panels" as the outer leaf tied and supported at each floor level.

Following the review of available historic information, WRD completed a visual inspection to both the exterior elevations and a selection of internal flat units located along Westfield Court & Alexander Drive. The internal communal spaces and service (boiler) room at basement level were surveyed alongside a selection of void flats which were made available, these have been summarised below.

- Flat 1/4
- Flat 2/1
- Flat 5/1

Reference should be given to Appendix A for all surveys and their relevant locations.

A summary of key observations have been provided below and have been expanded upon within this report:

- External balcony areas are in poor condition with cracking and spalling to underside of concrete slab. This can be seen at several balcony locations on the eastern elevation. Balconies are formed of concrete slabs at each floor level which are in turn supported between by an arrangement of steelwork beams and columns. The condition of the steelwork is unknown but it should be noted that the steel balustrades are highlighted to be in poor condition within the Zenith inspection report.
- Canopies surveyed on the west (rear) elevation are in generally poor condition. This is determined due to the spalling recorded at the underside of the concrete slab which forms the canopy structure. This has resulted in bottom reinforcement across the slab being exposed to the external environment and therefore this reinforcement is highly likely to be corroded. This will form an inherent weakness in this structure which will deteriorate without intervention.
- Visual identification from ground level notes cracking to the external Orlit panels on a portion of the west elevation.
- Vegetation growth can be seen primarily to the external leaf on the east gable elevation.
- The drainage system has been blocked off along sections of the roof drainage system. It is unknown why this has been carried out, however, this has led to water ponding across areas of the flat roof.
- Severe water ingress was noted in Flat 5/1 which has damaged plasterboard and exposed concrete underneath. The concrete slab is visibly saturated with water.
- Cracking is present at select landing locations within the stair void. This is noted on multiple floors of block E. These cracks are located at 'weak' points across the concrete slab and are likely a result of thermal shrinkage and relatively common for the age and function of these areas.
- Various patch repairs can be seen on the west and east external elevations. This suggests that there have been Orlit panels removed and replaced. The reason for this is unknown but it can be assumed this is due to maintenance works or poor condition of the panel.
- Rope access survey has identified Orlit panels which are in poor condition, approximately 10% of those surveys with reinforcement in some which are visibly exposed.
- The 'boot' edge of the concrete perimeter beams, also referred to as the 'stringers', are in poor condition in many instances. They are experiencing spalling and cracking which has often resulted in the reinforcement being exposed to the external environment. This element is integral to the perimeter concrete beam and supports the Orlit cladding panels at each floor level. As such, the degradation in condition of these will risk the primary concrete frame and may result in the external panels being inadequately supported. As such, it is critical that the repair of these are addressed.
- Concrete investigations undertaken within Flat 2/1 suggest that the internal elements are in generally good condition with low risk of reinforcement corrosion. Reinforcement ties between key structural elements have been identified and assessed with respect to their ability to satisfy modern disproportionate collapse checks – which they are satisfactory.
- The ground floor concrete slab in Flat 2/1 has significant cracking noted and in various locations. The reason for this is unknown and recommendation for the further review and repair will be provided fully within this report.

- Brick removal within Flat 2/1 has confirmed that there is adequate wall tie embedment between the masonry and external Orlit panels. Windows are regularly fixed back to masonry.
- Wall ties seem to be present generally across the external elevation cavity wall ties. They are noted to be in generally good condition, where observed. In some instances there are no wall ties recorded but it is unknown whether this is due to restricted view or a potential lack of sufficient support.

Recommendations for further monitoring, repairs and next steps will be outlined in detail within this report.

2 Overview

2.1 Brief

Will Rudd Davidson (WRD) have been appointed by City of Edinburgh Council (CEC) to undertake a building and condition appraisal of the main structural frame and the existing building fabric at Westfield Court & Alexander Drive, Edinburgh.

The building, Westfield Court, is a purpose-built high-rise accommodation building which consists of 88 apartments over 8 storeys and is located in the Gorgie area of the city, the building was designed in 1948 and construction was completed in 1952.

This report will look at the essential repairs and maintenance that may be required across the block of flats. A visual condition survey of the external elevations, roof and available void flats were undertaken. An initial visual inspection was undertaken to review the construction of the building, inspect for typical structural defects associated with the type of construction and assess if there are any other features of the building block that may impact on the proposed repairs and maintenance to the building. The internal survey was undertaken within communal spaces, the basement service room, and available void flats allowed the general condition of these spaces to be determined and any structural defects to be highlighted.

This report provides commentary on the structural form and provides summary of the findings from the visual condition surveys and regime of intrusive investigations undertaken internally and externally.

WRD carried out a visual, non-intrusive inspection of the building exterior from ground level and internal survey including roof access on the 27th March 2025. A rope access survey was undertaken by Zenith to inspect the external fabric of this structure and identify any high level defects. This report has been reviewed and the key findings have been summarised within this report, which contribute to the wider structural appraisal of Westfield Court.

Capital Testing in conjunction with Zenith carried out intrusive investigations across the exterior elevations via. rope access. This was undertaken between the 6th and 9th of May and the purpose of these investigations were to determine the frequency and condition of panel ties alongside the condition of concrete ‘stringer’ course. A borescope was utilised to determine information on the panel ties whilst chloride, carbonation and cover readings were obtained to provide indication of the concrete conditions with regards to risk of reinforcement corrosion.

Further investigations were carried out by Capital Testing which include intrusive investigations within void Flat 2/1 between the 6th and 9th of April. The results of these look to inform the presence of robustness tie reinforcement, the general condition of concrete elements, window fixings and embedment condition of ties between the internal masonry structure and external Orlit panels.

2.2 Report Limitations

The survey is limited in scope to structural defects that may impact the proposed repairs and maintenance works.

No advice is given or implied regarding the presence or otherwise of any asbestos in any shape or form within the property. Should any areas be suspected, the Client is advised to follow Health and Safety Executive guidelines.

No site investigation works have been undertaken in respect of foundations or drainage.

No assessment with respect to fire safety is covered within this report.

The presence or otherwise of timber decay or infestation is considered to rest solely within the remit of a specialist survey and not within this report.

No detailed inspection of the structure which is unexposed or inaccessible has been carried out and we are therefore unable to report that any such part of the property is free from defect.

Access to 3 void flats were obtained out of the total 88 units, as such, we cannot comment on the condition of flatted units which have not been inspected, however it is likely that general condition descriptions contained within this report could be generalised and considered representative of the entire building.

2.3 Existing Asset Information

Address: Westfield Court & Alexander Drive,
Edinburgh,
Scotland,
EH11 2RJ,
United Kingdom

The building is an 8-story block of flats which is bound by a public road to the East, Alexander Drive, and a private road to the West, Westfield Court Road, which allows for access to the rear of the building. The building is also bound by landscaped areas with the Gorgie Mills bowling club to the north-east.

2.3.1 Archive information available

The following historical information was made available by the client for review and to assist with the proposed brief;

1. As Built Drawings;
    a. Full set of As Built drawings for Block A
    b. Foundation and Basement drawings for Blocks B, C, D, E, F

2.3.2 As Built Drawing Review

The as built drawing have been supplied by the client which consist of a full set of structural drawings for Block A, and we understand that the same level of information may be available for remainder of the building. It is assumed for the basis of this report that the construction of all other blocks is the same as Block A, with similar floor layouts and structural member sizes. The drawing set was reviewed prior to intrusive investigation works commencing, allowing the specialist team to focus on areas of potential concern, or to confirm specific elements and arrangements of the structural frame.

Our review of the supplied drawings suggests that the main structure of the building is constructed as a cast in-situ reinforced concrete frame throughout. The main structural elements consist of a one-way spanning ribbed slab construction spanning between a series of primary RC concrete beams. These beams are supported by columns which transfer the applied permanent & imposed loadings to foundation level via compression action. The internal walls all appear to be infill panels which do not appear to contribute to the overall stiffness of the building.

In reviewing the structural reinforcement diagrammatic layouts, the connections between the floor slabs to supporting beams and columns all note steel reinforcement continuing through the supporting beam and providing a full lap length. As the drawings do not appear to exhibit steel loops found in precast construction or notes of individual precast elements, this would suggest that the building is of cast in-situ construction.

2.3.3 Form of construction

The structural form of the Westfield Court flats consist of cast in-situ reinforced concrete frame. This frame consists of a series of beams and columns which support a ribbed reinforced concrete slab. The ground floor consists of a series of Precast concrete slabs supported directly by cast in-situ ground beams. All columns and ground beams are supported directly by piled foundations throughout the building footprint.

A basement is located centrally to the building at Block E which houses the existing central boiler and heating equipment for the entire building. An assessment of the historical drawings which have been obtained previously by the client, Precast concrete within the structural frame is only used at ground floor level to form the ground slab, however, it is unknown if whether the precast units also form the ground slab over the basement to Block E. For the purposes of this report, we currently assume that precast slabs are installed throughout the entirety of the ground floor.

The stability of the building appears to be provided by the monolithic frame with moments being resisted by the continuity of steel reinforcement provided in beam to column connections, creating what is effectively a tall portal frame structure. Generally, for a building of this size, shear walls are a common contributor to frame stability however our review of the historical drawing information supplied, particularly at foundation level suggests that lateral stability is provided by moment frame action.

The internal walls consist of infill brickwork panels which are assumed to be tied to the main structural frame. The brickwork panels are non-loadbearing and do not appear to contribute to the vertical or lateral stability of the building. The external wall panels consist of a cavity wall construction comprising of a 100mm brickwork inner leaf, and profiled concrete panels, known as “Orlit panels” which form the outer façade.

These panels are tied back to the inner brickwork leaf using traditional wall ties and supported at each floor level by a profiled edge to the external floor beams.

2.3.4 Cast In-Situ vs Large Precast System (LPS) High Rise Buildings

In assessing a high rise building against accidental loading in which a progressive collapse event could occur, it is particularly important to identify the materials contained within its construction, and the method of its construction particularly when it comes to buildings formed primarily from Reinforced Concrete elements. While both cast in-situ buildings and those containing LPS Precast panels are formed from the same materials, the method of construction and by extension the overall robustness of these building types can be very different.

2.3.5 Cast In-Situ Construction

A Reinforced Concrete structural frame which has been constructed in-situ means that the structural members which form the frame were formed in place on site, rather than being prefabricated off site in a factory and transported to site for erection. This method consists of steel reinforcement bars being assembled on site into cages. These cages which will form the structural members are then tied together using a series of lapping bars which creates a robust connection between elements. Shuttering, a mould formed traditionally from timber boards and joists, is then built around the reinforcement cages to the sizes of the finished concrete beams and columns. The concrete is then poured into the moulds and allowed to cure over a period of time until the concrete meets its designated strength.

As all of the structural members can be formed within a single concrete pour, this form of construction is very robust as it creates a structure which is homogeneous in form. As the joints between members are cast as a single entity these types of structure are highly resistant to permanent, variable and accidental forces which may be applied over the structure's lifetime.

2.3.6 Precast Construction

Buildings which are formed from precast construction, particularly LPS systems, take full advantage of prefabrication methods. This type of construction generally allows for a building to be constructed much quicker as the structure can be formed off site in a controlled factory environment prior to being craned into position on site. It is a very popular method of construction due to the speed in which a building can be constructed and made wind & water tight. This quality of finish is also less susceptible to inclement weather, which does affect cast in-situ construction methods.

Unlike cast in-situ buildings, the detailing at member connections and joints needs to be considered carefully. As each piece of the building is constructed completely separately the method in which they are joined

together is a critical part of the building. Joints between elements normally consist of a series of steel loops which are cast into the member during the prefabrication stage and protrude from the ends of the cast precast section. Steel reinforcement bars are then fed through these loops and are tied to the supporting member before pouring concrete into the joint that ties everything into place. Unlike cast in-situ construction where the structure is formed as a single homogeneous entity, this type of assembly creates a physical joint between the individual precast concrete structural members and the cast in-situ connection. If detailed and executed correctly these types of connections will be sufficiently robust to resist all loadings which the structure is designed against over its intended lifetime. However as there is a significant reliance on site workmanship and checking of successful site execution these joints can become the weak point in what is otherwise a robust structure.

When assessing the effects of accidental loading, such as blast loading from appliances which use gas as a means of supply, the identification of precast elements is particularly important as such weak points may exist within them which could fail under extreme actions. If a building is formed as cast in-situ, there is a higher degree of confidence in the buildings construction due to all joints being continuous and do not exhibit the same potential weakness as those found in precast construction.

3 Visual Survey Observations

3.1 Visual Inspection

WRD visited Westfield Court & Alexander Drive on the 27th March 2025 to undertake a visual condition survey of the external elevations from ground level, internal communal areas, the roof extent and void flats (2/1, 1/4 and 5/1) available at the time of survey. The photos relevant to this survey are presented in Appendix A and are referenced throughout this report.

Figure 1 - Site position and elevation reference

The weather conditions on the day of this survey was mild and overcast.

3.1.1 WRD External Visual Inspection

A visual walk around survey was completed by WRD alongside the building surveyor team at AtkinRealis on the 27th March 2025. Visual observations were recorded externally at the roof and external ground level for all elevations. A summary of the observations made during the survey have been provided below. Refer to Appendix A and B for photo and drawing references.

West (Rear) Elevation Photos

- Orlit panels are cracked through the centre and it appears that they may have slipped out of position (Photo 41, 42 & 43)
- Cracking and spalling are noted across the 'boot' end of the perimeter concrete beam, also referred to as a 'stringer' (Photo 1, 6, 7, 8, 9, 11 & 50).
- Evidence of patch repairs to the 'boot' end of the perimeter concrete beam or 'stringer' (Photo 5).
- Vegetation growth, dampness, and cracking or spalling can be seen to the underside of several canopy locations. (Photo 32, 33, 38, 44 & 47).
- Visible cracking at the jambs of doors (Photo 30 & 31).
- Staining across the Orlit panels which may suggest water ingress and/or damage (Photo 21 & 22).
- Building service penetrations taken through Orlit panels (Photo 46)

North Elevation Photos

- No visual defects noted from ground level observations (photo 1)

East (Front) Elevation Photos

- Cracking and spalling can be seen on to the underside of many balcony locations which are formed of concrete slabs. (Photo 1, 6, 20, 21,22, 32).
- Large areas of vegetation growth are visible across the building elevations (Photo 24, 25).
- Evidence of patch repair to Orlit panel (Photo 31).
- Sandstone cladding feature was observed, suggesting a change in construction at this point along the elevation (Photo 27 & 28).
- Cracking and spalling are noted across the 'boot' end of the perimeter concrete beam or 'stringer' (Photo 24 & 26).

Roof Area Photos

- Water ponding is visible across various parts of the roof (Photo 8, 9, 14, 15, 16 & 31).
- Slight cracking and spalling are present across some of the render to the roof access walls (Photo 10, 11, 22, 30 & 32).
- Water ingress and dampness are visible (Photo 10, 21 & 22).

3.1.2 Internal Inspection

A visual survey was completed internally within the communal spaces, several void flats (1/4, 2/1, 5/1) and the service room/basement. A summary of observations have been provided below.

Communal Area Photos

- Concrete has spalled revealing the concrete slabs reinforcement (Photo 8 & 9).
- Suspected thermal shrinkage cracking on the stair landing which is consistent throughout may of the stair slab locations (Photo 2).
- Cracking was identified to internal walls (Photo 39).

Service room Photos 1-30

- Paint flaking is present throughout the service room (Photo 1,3, 4 & 7).
- Large traditional water boiler with multiple repairs suggested (Photo 19 & 21)

Flat 1-4 Photos 1-21

- The flat has a service a penetration hole through the external wall (Photo 4).
- The flat has a service a penetration hole on through internal ceiling (Photo 19).
- Possible water ingress which has led to paint peeling and flaking (Photo 12 & 13).
- Window surrounds are in very poor condition and brickwork and wall build-up is exposed to the elements (Photo 14)

Flat 2-1 Photos 1-28

- Ground floor slab cracking is present throughout the flat in majority of the room locations. The same cracking is continuous within other rooms and is often adjacent or perpendicular to the external wall elevation (Photo 3, 4, 5, 11, 13, 14, 17, 18 & 19)
- Leaking service pipes in the service riser which indicate possible mould risk in these locations (Photo 23 & 24)

Flat 5-1 Photos 1-4

- Severe water ingress found to the bathroom ceiling area which is causing disrepair of the plasterboard and exposing the concrete slab. Concrete slab is visibly saturated in this location (Photo 1-4)

3.1.3 Zenith Inspection Report

A visual rope access inspection survey was undertaken at Westfield Court by Zenith. This was undertaken to thoroughly inspect the condition of external elevations across the building. Areas of particular focus were the perimeter concrete beam exposed and referred as the ‘stringer’ course, ledges, concrete balconies, steel balcony handrails, windows surrounds, external Orlit panels, and concrete roof terrace. These were inspected at a close eye level via. abseiling techniques and assessed in some cases with a hammer tap survey.

Zenith gained close-up access to all elevations, allowing them to identify various structural and material defects.

These surveys have identified hairline and severe cracks, areas of concrete spalling, and significant corrosion of reinforcement across the ‘stringer’ courses and ledges. The report highlights defects due to long-term water ingress and environmental exposure.

- The Orlit panels were generally stable but showed signs of distress in some locations. Some panels display localised cracking and spalling with reinforcement exposed. No immediate risk of detachment is noted at the time of survey.
- The balconies show concrete spalling and surface cracking where there was noticeable corrosion of the metal handrails which could pose a safety risk if left untreated.
- On the top ledges, previous repairs using flash band appear to be failing with ongoing cracking and water penetration behind the protective bands.
- One of the two concrete canopies were found to be in poor condition showing extensive spalling and exposed reinforcement while the other had only minor surface defects.

This investigation report undertaken by zenith emphasise the requirement for immediate repairs and further assessment across critical areas over these external elevations. This is required to stop the defects from deteriorating especially in the perimeter concrete beam ‘boot’ ends or ‘stringer’ course and ledges where ‘medium to long term’ maintenance is recommended to manage other observed issues and prevent any further damage.

Reference should be given to Appendix B for full reporting from Zenith and associated photos.

4 Intrusive Investigation

Following the visual condition surveys undertaken by WRD, a scope for intrusive investigations were provided and undertaken by Capital Testing. The intrusive investigations included:

- Concrete testing to critical elements within void flat 2/1. Historical testing had been undertaken within void flat 4/1 in 2021 and therefore it was appropriate to carry out similar testing within 2/1 as a comparison. Location of concrete testing captured a selection of key elements across the flat to ensure results provided some indication of concrete condition, compressive strengths and reinforcement ties. It should also be noted that cracking was evident across the ground floor slab within void flat 4/1 but not observed in other void flats.
- Concrete testing was undertaken to external elevations. These were undertaken to determine the condition of the concrete perimeter beam at 'boot' end which is exposed to the external environment.

Capital Testing Ltd were appointed by WRD to undertake opening works of existing structural elements.

The tests were carried out with the recommendations set out in BR 444 which focused on durability of reinforced concrete structures by following the certain aspects below:

1. Recording of any cracking and visible defects following stripping of soft furnishing
2. Recording concrete cover by cover meter surveys
3. Type, diameter and spacing of reinforcement by physical exposure to all testing areas
4. Samples to determine chlorides, chloride profiles and sulphates for laboratory analysis
5. Determine concrete strength, concrete types (including presence of admixtures) from cores
6. Condition of movement joints where available

As a result of building occupancy, the internal intrusive tests were undertaken within one flat, Flat 2-1.

Capital Testing carried out the site works in April 2025 which was limited to Flat 2/1. The works consisted of the following intrusive testing methods which were carried out at various sections of the building:

- Dust drilling
- Core samples
- Concrete breakout
- Review of window fixings
- Review of wall tie embedment internally between masonry leaf and external Orlit panel.

A breakdown of the testing positions in relation to the structure can be found within the Capital Testing report, Appendix B. All commentary provided is an interpretation of the intrusive investigations undertaken by Capital Testing and reviewed based upon the investigation and assessment methods as outlined in the BRE Digest 444 Part 2 documentation. The estimated risk of steel reinforcement corrosion within BRE 444 is as included below for reference.

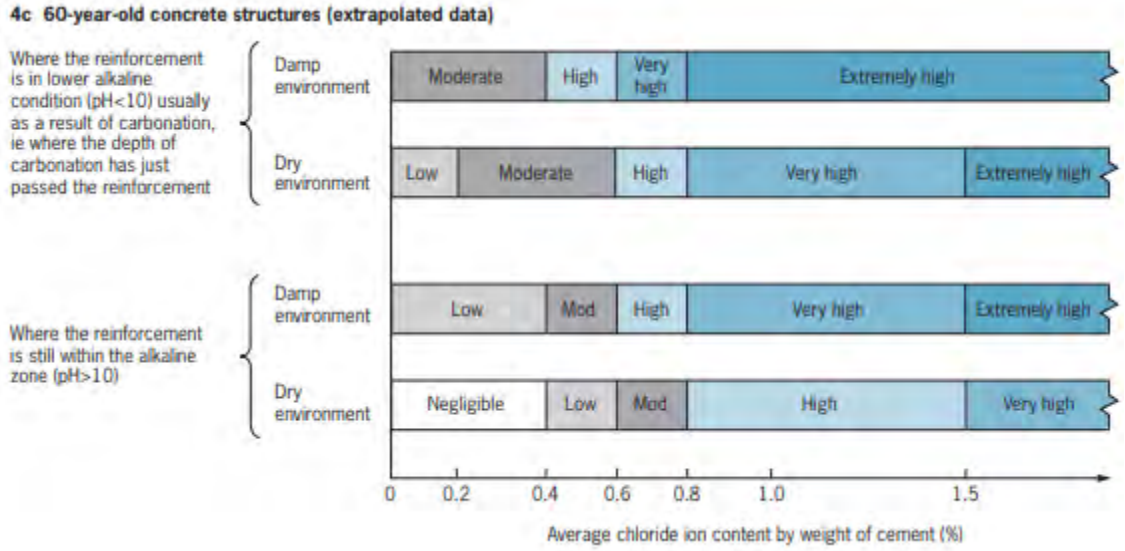

Figure 2 - Extract from BRE444 (Figure 4) describing estimated risk of steel reinforcement corrosion

A summary of findings concluded from concrete investigations have been provided below, based upon the Capital Testing reporting. Commentary will be provided in the following report pages to expand on the observations recorded for each area. All samples undertaken were returned with chlorine samples less than 0.15% with negligible risk of reinforcement deterioration from built-in chlorides

A total of three core samples, five concrete break outs and dust sampling were carried out to the internal concrete frame within Flat 2/1. The 93mm diameter cores were recovered from three different locations of concrete frame within Flat 2/1 and were submitted for laboratory testing to determine the concrete's material properties.

Elements from the investigatory work, such as concrete cover will be checked in relation to current design standards. Guidance in Eurocode 2, clause 4.4 states the minimum concrete cover should satisfy the following:

$$C_{min} = 15\text{mm or } Ø + \Delta c_{dev}$$

Where:

- Ø is the bar diameter
- Δc_{dev} is the allowance for deviation, usually taken a 10mm

Flat 2/1 Westfield Court, Edinburgh				
Sample Ref.	**Location**	**Cover**	**Carbonation Depth**	**Chloride Result (% by mass of cement)**
D1	Beam	18mm	0-2mm	0.06
D2	Column	18mm	0-2mm	0.06
D3	Column	40mm	0-2mm	0.01
D4	Floor slab	87mm	0-2mm	0.03
D5	Beam	33mm	2-4mm	0.15
D6	Floor slab	87mm	0-2mm	0.01
Refer to Capital Testing report for full reporting and locations				

4.1.1 Internal Columns

The core samples undertaken at column locations measured compressive strength of 25.8N/mm^2 and 17.7N/mm^2. This is a lower compressive strength than what would typically be adopted in modern design but is considered relatively normal for the time in which the property was constructed. The concrete cores undertaken confirm concrete was well compacted and suggests that the concrete frame was constructed to a reasonable standard.

The concrete cover varies between 18mm and 40mm. These are sometimes lower than modern standards but it should also be recognised that this is an older structure. The depth of carbonation does not exceed the cover in areas tested, regardless of the lower cover value.

The risk of corrosion for the majority of internal concrete frame locations were found between 'negligible' and 'low' with depth of carbonation ranging between 0mm to 2mm. As suggested within the BRE 444 guidance, concrete at 'low' risk indicates that with normal maintenance that no significant corrosion is likely to occur.

The following reinforcement was notes within the concrete column elements.

- 25mm diameter smooth round bar reinforcement were noted at the living room columns
- 25mm diameter smooth round vertical reinforcement were noted at mid height living room column
- 25mm diameter smooth round reinforcement were noted vertically through the bedroom column location.

4.1.2 Internal Floor Slab

The concrete testing undertaken at floor slab confirms a cover to reinforcement depth of circa 87mm.

The depth of carbonation is nominal at maximum 2mm. This suggests that there is no risk of corrosion to reinforcement due to chloride content.

However, extensive cracking has been noted across the ground floor slab within Flat 2/1. It is understood from archive drawings, that the ground floor slab may be precast concrete construction. It is possible that movement in the ground floor slab causing cracking may be a result of movement between the precast concrete floor and supporting substructure.

The cause and certainty of this is unknown but may be as result of ground shrinkage or vegetation growth across the external elevation. Further investigations should be considered to fully determine the cause of cracking with monitoring undertake across a period of time which might determine if this movement is ongoing or stabilised. An effort should be made to determine if this issue has occurred elsewhere across the ground floor slab, within occupied flat units. This will help determine whether the issue is widespread or local to Flat 2/1.

4.1.3 Beams

A concrete core sample was taken from a beam element and analysed with a measured compressive strength of 35.2N/mm^2. This is a relatively high compressive strength and typical of what may typically be adopted in modern design. Material distribution is good with good concrete compaction noted. This suggests that the quality of concrete is good within the beam structure was installed with standard construction practices and relatively good standards.

The concrete cover varies between 18mm and 33mm across samples taken. These are lower than modern standards but it should also be recognised that this is an older structure. The depth of carbonation varies between 2mm – 4mm which suggests that there is low risk of reinforcement corrosion despite the lower concrete cover.

- Two square twisted reinforcement longitudinal bars were noted in the living room beam locations. These were 15mm and 20mm diameter.
- 20mm square twisted reinforcement longitudinal bar were noted to the bedroom location beam

4.1.4 Column to Beam connection

Capital testing have undertaken breakouts within the void flat to confirm reinforcement ties between primary column and beam elements. These have confirmed continuous square twisted reinforcement bars which tie between beam and column elements.

These are provided as a minimum 20mm diameter bar, however, in one location there is a pair of 20mm and 15mm square twisted reinforcement bars recorded. The reinforcement bars are recorded to be in good condition with no corrosion highlighted within the Capital Testing report. There was no concrete spalling or

cracking visible across the primary frame elements which also suggests that the reinforcement is not as risk of corrosion, at the time of inspection.

4.1.5 Localised Brick Removal

Two Brick removals were undertaken by Capital Testing to inspect the wall tie embedment within the inner masonry leaf. This has revealed a wall cavity depth of 85mm. This closely correlates to what has been reported within the external elevation investigations (See section 4.2). There is a deviation of 10mm between cavity depths recorded which may suggest difference in cavity width across parts of the building elevation.

This revealed steel galvanized fish tail wall ties which were circa 105mm long. These were identified between the external Orlit panels and the inner masonry leaf. Inspection of the wall ties verified that these were in generally good condition with an embedment of 85mm. This is greater than the typical minimum required which is considered to be 50mm.

Window fixings were exposed and these were confirmed present, all which appear in reasonable condition.External Elevation Investigations

Investigations were undertaken across all external elevations to provide more certainty on the general condition of the external fabric. The following investigations which have been summarised were undertaken by Zenith via. rope access with the reporting and lab results processed by Capital Testing:

- Borescope investigations to external wall cavities were undertaken in order to identify the presence and condition of wall ties between Orlit panels and the internal masonry structure. The coverage and condition of ties were recorded where feasible.
- General commentary on the cavity width and any notable defects. In some cases, remedial ties may be anticipated as archive drawings suggests that remedial works have been undertaken historically.
- Concrete testing was undertaken to the external stringer courses to collate preliminary information on the chloride, carbonation and cover values across these samples. The results of these tests provide an indication of the risk to reinforcement corrosion within these stringer courses.

Reference should be made to Appendix C for the Capital Testing report on (external) cavity wall ties and concrete elements for methodology of works and investigation scope drawings.

4.1.6 External Borescope Investigations and Concrete Testing

A summary of findings have been collated below to inform the condition of external wall cavities and ties, as viewed from the building elevation. The investigation locations were chosen to provide a spread of data within the time constraints set forth for rope access drops. It does not look to provide detailed results for each panel location but should identify any areas of defects or weaknesses which should be suggested for ongoing maintenance works.

4.2.1.1 Rear (West) Elevation

The investigations B1 to B14 were carried out across the rear elevations. There was no insulation identified across these locations.

The majority of sample locations report an external wall cavity of 75mm depth. An exception to this is within sample 'B12' which reports a 75mm and 50mm cavity. It is understood that this location is in region of a structural concrete column and therefore we may expect a junction detail between inner masonry leaf and concrete which results in a change to the cavity width locally at this area.

Generally, where ties have been identified between inner masonry and external Orlit panel, these are described in 'good' condition and noted as 'steel galvanised flat tie'. The quantity of ties vary across each location.

In some instances (B3/B4/B7/B8/B9/B13/B14) debris or mortar bridging have been noted within the cavity of the Orlit panel.

Location B5 notes cracking to outer face of the Orlit panel. Ties have been noted to the top edge of this Orlit panel and there is no indication of what has caused the cracking at this location. Reference should be made to Appendix C for photograph documentation of this defect.

There are no ties visible at position B12, however, it does note that this panel is positioned at existing concrete column. It is noted elsewhere on this survey that the cavity width is smaller at concrete column locations and therefore the ties may be present but not visible during borescope survey. There has not been movement noted, however, remedial ties should be considered if there is any concern that this panel is moving or damaged.

Panels identified at B10 and B11 note locations where historic remedial repairs have been installed via. Helifix type ties to secure the panels. This would suggest that these have been loose in the past or that there has been previous concern regarding the fixity of these panels. At location B11, there appears to be 'missing' ties and would suggests why remedial repairs have been undertaken.

4.2.1.2 Front (East) Elevation

The borescope investigations B15 to B36 were carried out across the front elevations. There were no insulation identified across these locations.

The majority of sample locations report an external cavity of 75mm depth with narrower cavity depths, in the region of 35-45mm, where a concrete column is visible. In some cases, the cavity restricts the view of the

cavity zone and therefore no ties have been recorded. It is unknown how the cladding panels are tied back to the concrete columns in these instances.

The number of ties recorded vary between 1-6 across the different sample locations. This suggests a variety in the original installation of these but we are unable to confirm if these are missing or simply not visible from the limited borescope view.

Mortar bridging on ties and debris within the cavity is noted at various locations.

Panels identified at B17 and B26 note locations where historical remedial repairs have been installed via. Helifix type ties to secure the panels. This would suggest that these have been loose in the past or that there have been previous concerns regarding the fixity of these panels.

4.2.1.3 North Gable

Borescope testing was undertaken across a sample of locations at the North Gable. This assisted a review of the 'Orlit' panel condition and whether these are adequately tied back to the inner masonry leaf. These were observed across sampled B37 to B42.

There are various locations (B40 and B41) where remedial ties have been applied. The survey records that ties appear to be missing at these locations which could suggest why remedial ties have been installed. The lack of ties are concerning but it is noted that where these are identified, that these ties are in 'good' condition. There are a couple of instances noted where ties appear to be missing at top and bottom (B37/B38).

Most of the samples record a cavity of 75mm with a lower 45mm cavity recorded at B42, where a concrete column is present.

4.2.1.4 South Gable

Borescope testing was undertaken across a sample of locations at the South Gable. This assisted a review of the 'Orlit' panel condition and whether these are adequately tied back to the inner masonry leaf. Testing samples for this elevation are described between B44 and B50.

In some instances, ties have been recorded at top and bottom of panels and are in stated 'good' condition. There are various positions across the south gable which indicate remedial repairs (B45/B46/B48/B49/B50). This would suggest that these have been loose in the past or that there have been previous concerns regarding the fixity of these panels.

Where ties are identified, they are noted to be in a good condition. Some mortar bridging is noted at B46 and B48 locations.

It should be noted that at locations, such as B49, a tie is present at concrete column location which has been 'bent back against the concrete surface.' It is not known whether this was the design intent or a site 'work around' at the time - therefore the adequacy of this is not fully known. These areas should be considered when considering future cladding panel surveys to ensure they do not become loose.

4.2.1.5 Concrete 'Stringer' Course

Concrete testing was undertaken across a sample of locations to determine the risk of corrosion to the external perimeter beam 'boot' edge which forms the 'stringer' course feature around the perimeter of the building. This concrete element is integral to the concrete framing around the perimeter of the structure and supports the weight of Orlit panels above each floor level, as such it plays a critical role in the concrete structure but also the cladding support. This concrete element functions in a similar manner to a brick relief angle which may be used in a masonry cladding system.

The results of these have been summarised below and can reviewed in full with Appendix C of this report. Results summarise are in addition to the locations highlighted within the Zenith external cladding inspection which have experienced visible spalling or exposure of reinforcement.

In many instances below, the concrete sits within a 'negligible to low' risk of reinforcement corrosion. However, it should be noted that these must be monitored to identify any future disrepair given the exposed nature of this feature.

Sample D6 highlights a 'very high risk' of estimated reinforcement corrosion in line with the BRE 444 guidance. It is therefore likely that the embedded reinforcement is corroded and this could translate to concrete spalling or cracking at the face of the concrete boot in these locations. This sample is positioned at window locations, which could be expected due to the exposed nature of these positions.

Sample D11 highlights a 'moderate risk' of estimated corrosion in line with the BRE 444 guidance. It is therefore recommended that this area is monitored in case corrosion is suggests through cracking or spalling of concrete in these locations.

The information tabulated is based on a sample of locations and illustrative of the general condition, however, it cannot comment definitely on all areas of concrete stringer. Monitoring and repair works will need to be deployed proactively to ensure that disrepair is identified and remediated as soon as feasible.

External Concrete Testing on Westfield Court, Edinburgh				
Sample Ref.	**Location**	**Cover**	**Carbonation Depth**	**Chloride Result (% by mass of cement)**
D1	West Elevation – Stringer course	35mm	0-2mm	0.28
D2	West Elevation – Stringer course	37mm	8-10mm	0.08
D3	West Elevation – Stringer course	38mm	0-2mm	0.25
D4	West Elevation – Stringer course	35mm	15-20mm	<0.01
D5	West Elevation – Stringer course	27mm	2-4mm	0.27
D6	East Elevation – Window Sill	9mm	10mm	0.62
D7	East Elevation – Stringer course	16mm	2-4mm	0.20
D8	East Elevation – Stringer course	42mm	0-2mm	<0.01
D9	East Elevation – Stringer course	32mm	10-12mm	0.04
D10	East Elevation – Stringer course	42mm	15-20mm	0.06
D11	East Elevation – Stringer course	38mm	30mm	0.43
D12	South Elevation – Stringer course	18mm	2-4mm	0.24
D13	South Elevation – Stringer course	23mm	0-2mm	0.06
Refer to Capital Testing report for full reporting and locations.				

5 Disproportionate Collapse Review

Robustness is defined in BS EN 1991-1-7 as 'the ability of a structure to withstand events like fire, explosions, impact or the consequences of human error, without being damaged to an extent disproportionate to the original cause'.

It is generally understood that a building designed with robust principles will not collapse in a disproportionate nature.

Progressive collapse is a term used to describe an incident where the failure of a single element results in a 'chain reaction' to which further member failures occur. This continues to occur to a point where the total number of failed elements and thus damage is disproportionate to the initial failure which had occurred.

A prominent example of progressive collapse is the Ronan Point disaster in 1968, where a 22-storey building partially collapsed two months after completion. The loadbearing walls were blown out from the force from a gas explosion which caused the collapse of an entire corner of the building. The building incorporated the use of Precast Concrete Large Panel Systems (LPS) throughout.

The resulting force from the gas explosion caused the critical connections between the precast panels to fail which resulted in a progressive collapse event. It was later discovered that due to poor workmanship and design that the connections between the panels were not designed to withstand accidental loading such as blast loading from an explosion.

This event resulted in major changes to the Building Regulations and how buildings are designed with respect to accidental loading.

Following the incident, the 1970 UK Building Regulations were revised so that any new buildings were required to take risk of progressive collapse events into consideration during their design stage. This principle is still a major consideration of any modern building design. Current regulations categorise risk by the building type, number of storeys and occupancy rate which then informs the requirements for robustness in building design.

Westfield Court pre-dates this requirement and progressive collapse is unlikely to have been assessed as a major influence within the original design as the regulation for doing so did not exist. However, this doesn't imply that the building does not have sufficient robustness to withstand an accidental loading scenario. As stated by the ISTRUCTE guidance on the appraisal of existing structures 'many existing structures were not designed to meet current requirements but nevertheless provide an acceptable level of safety. An appraisal

of any existing building is reliant on engineering judgement, testing and assessment of a selection of considerations.'

As the structural frame of the building has been established as a cast in-situ beam and column structure, rather than formed from Precast LPS panels found at Ronan Point. Therefore the risk of a progressive collapse event occurring from similar accidental loading is already reduced due to the buildings structural form.

5.1 Assessment of Building for Risk – ALARP/SFARP

In assessing risk of a progressive collapse event occurring reference is made to the *BRE Special Digest 526 – Structural Assessment of Existing LPS Dwelling Blocks for Accidental Loads*. Although this building is not formed of an LPS system, the document is still relevant with regards to the assessment criteria for high rise buildings, generally, when assessing against accidental loading such as blast loads.

In line with the ALARP/SFARP principle, the document recommends that a risk-based approach is used to determine the through-life management and associated measures taken with the goal of eliminating hazards where practicable. The document goes on to recommend that risks should remain controlled and reduced as far as practicable for buildings which are considered to be of low or acceptable risk.

Previous Faithful & Gould (now AtkinsRealis) reporting for this building suggests that an external gas supply pipework was installed to the rear elevation of the building which presumably feeds kitchen appliances at each flat location. However, application of ALARP/SFARP to the introduction of new gas fed Combi Boilers at each apartment creates an increase in risk rather than reduction of risk to the building. A reduction of risk would involve the removal or partial removal of gas from this building. As previously recommended, the following measures would go as far to eliminate accidental blast loading occurring from a gas explosion;

1. Removal of gas from the building internally
2. Adopting electrical appliances in kitchens such as heat induction cookers etc
3. Install a new centralised boiler or CHP system externally which would feed hot water for heating purposes into each apartment.

It is not known whether the provision of gas to these apartments have been removed since the previous building survey undertaken at Westfield Court. If not, the above points should be immediately considered. It should be noted that an alterative approach could be considered.

BRE Special Digest 526 suggests an alternative approach which involves the assessment of the existing building in order to evaluate its ability to satisfy the requirements with regards to the design of new structures. In the context of an existing building, it would be reasonable to adopt a similar approach which

would deem to satisfy the construction of a new building. It is therefore reasonable to adopt this approach when assessing the building.

5.2 Numerical Approach to Progressive Collapse Events

A detailed assessment based on the individual void flat 2/1 was investigated and the impact of element removal for progressive collapse damage on the floors above and below this apartment. As we have very little information for the superstructure of the remaining areas of this building, we assume at this stage that all other blocks are of similar structural layout and construction.

All buildings designed to modern codes of practise are designated a Risk Group Category depending on the buildings function, occupancy and storey height. These risk groups are noted in section 1.2.2 of the Non-Domestic Building Regulations for Scotland 2023. An extract of this clause is provided below where Westfield Court is categorised as a Class 2B Building – "*residential buildings exceeding 4 storeys but not exceeding 15 storeys"*.

Table 1
Building classes and corresponding tying requirements

Class	Building type and occupancy	Summary requirements
1	• House not exceeding 4 storeys. • Agricultural buildings. • Buildings into which people rarely go.	• No additional measures are likely to be necessary.
2A	• 5 storey single-occupancy houses. • Hotels, apartments and other residential buildings not exceeding 4 storeys. • Offices not exceeding 4 storeys. • Industrial buildings not exceeding 3 storeys. • Retailing premises not exceeding 3 storeys of less than 2000 m^2 floor area in each storey. • Single-storey educational buildings. • All buildings not exceeding 2 storeys to which members of the pubic are admitted and which contain floor areas exceeding 2000 m^2 at each storey.	• Horizontal ties, OR • Effective anchorage of floors to walls, as described in the codes of practice.
2B	• Hotels, apartments and other residential buildings exceeding 4 storeys, but not exceeding 15 storeys. • Educational buildings greater than 1 storey, but not exceeding 15 storeys. • Retail premises greater than 3 storeys but not exceeding 15 storeys. • Hospitals not exceeding 3 storeys. • Offices greater than 4 storeys but not exceeding 15 storeys. • All buildings to which members of the pubic are admitted and which contain floor areas exceeding 2000 m^2 but less than 5000 m^2 at each storey. • Car parking not exceeding 6 storeys.	• Horizontal ties and vertical ties as described in the codes of practice, OR • Show that the removal of a wall or column will cause only limited damage, OR • Design as 'key elements'.
3	• All buildings defined above as Class 2A and 2B that exceed the limits on area and/or number of storeys. • All buildings, containing hazardous substances and/or processes. • Grandstands accommodating more than 5000 spectators.	• Systematic risk assessment.
Note Basement storeys may be excluded provided they meet Class 2B criteria		

Figure 3 - Building Class Table

The rules in Fig. 3 informs the designer of the requirements for additional measures to design against progressive collapse events from occurring under accidental loading. Buildings designated as Class 2B have the following options available for the designer to consider;

1. Provide effective horizontal and vertical ties in compliance with tie forces as derived in Codes of Practice

2. Where removal of a structural element (floor, wall, beam column etc) will cause only limited damage; limited to 15% of the total floor area; and will only affect the next adjacent storey
3. Where removal of a member exceeds the requirement for limited damage, the member must be designed as a key-element.

In cast in-situ buildings, the reinforcement provided for other purposes may be used as the reinforcement acting as ties within the concrete. In most cases it will be found that no additional reinforcement is required to ensure a robust structure. The normal detailing rules that are applied to reinforcement ties are generally a nominal requirement to ensure sufficient anchorage into the supporting element. Horizontal ties are generally achieved in beam to column connections by ensuring the bottom two bars in each direction pass directly through the reinforcement contained within the supporting column.

The rules stated in both the British Standard (BS 8110-1:1997) and Eurocode 2 (BS EN 1992-1 and its national annex) effectively apply the same rules for the design of horizontal and vertical tie forces, and are aligned to the derivation of tie forces applied. As Eurocodes employ high-yield grades of reinforcement in the calculation suite which did not exist when the Westfield Court was constructed, the British Standard derivation of tie forces are used for the purpose of our analysis. Although the documentation of British Standards is mostly withdrawn, the codes can still be used for the assessment of modern-day structures. Calculations relating to the derivation of tie forces are provided within Appendix F of this report.

5.3 Conclusions of Numerical Approach to Progressive Collapse Events

The following assessments were carried out to determine the building elements robustness to progressive collapse events:

1. Determining tie force requirements applicable to structural elements and the known reinforcement capacity to resist tie forces applied.
2. Assessment of known central column reinforcement quantities for element to act as key element

Based on methods contained within BS 8110-1:1997 cl. 3.12.3, it was calculated that a minimum tie force of 60kN is applicable to all horizontal ties throughout the building, and 161 kN is applicable to vertical ties at 1st floor level.

Based on the results of the intrusive investigation works with void flat 2/1 it is known that horizontal ties exist between all of the beam to column connections investigated on site, formed from a single 20mm square twist bar or in some instances a 20mm and 15mm square twist bar pair. This is in line with the minimum detailing requirements as noted within BS 8110-1:1997 amendment 3 described in section 4.2 of this report.

The tensile resistance of the tie connection for a single 20mm square twist bare is found to be 70kN, providing an overall safety factor of 1.15 as a worst case. However, we note that it is as high as 1.8 in some cases.

The reinforcement contained within columns were noted on site to be an estimated 400 x 400mm square column with minimum 4No. 25mm reinforcement bars and 8mm shear links at maximum 250mm centres. As the area of steel reinforcement contained within the column is much greater than that contained within the beam to column connections, but with a similar tie force applied, the minimum requirements for tie forces are achieved by inspection.

The above does rely on minimum lap lengths being achieved within the detailing of the reinforcement. The extracts from As Built drawings below denote locations of laps within slabs and beams with reinforcement detailed as continuous through each of the supporting elements.

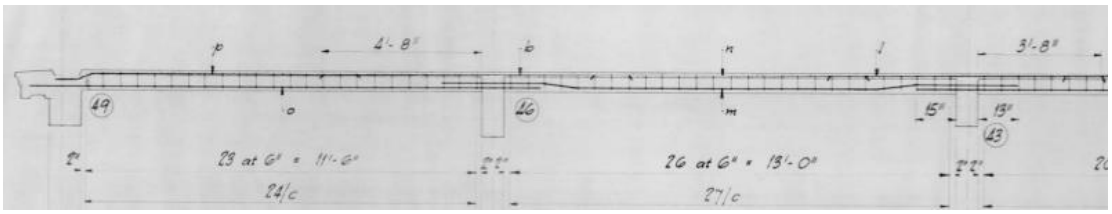

Figure 4 – Typical Reinforcement Detailing of Ribbed Slabs. Note Continuous Reinforcement Through Beams

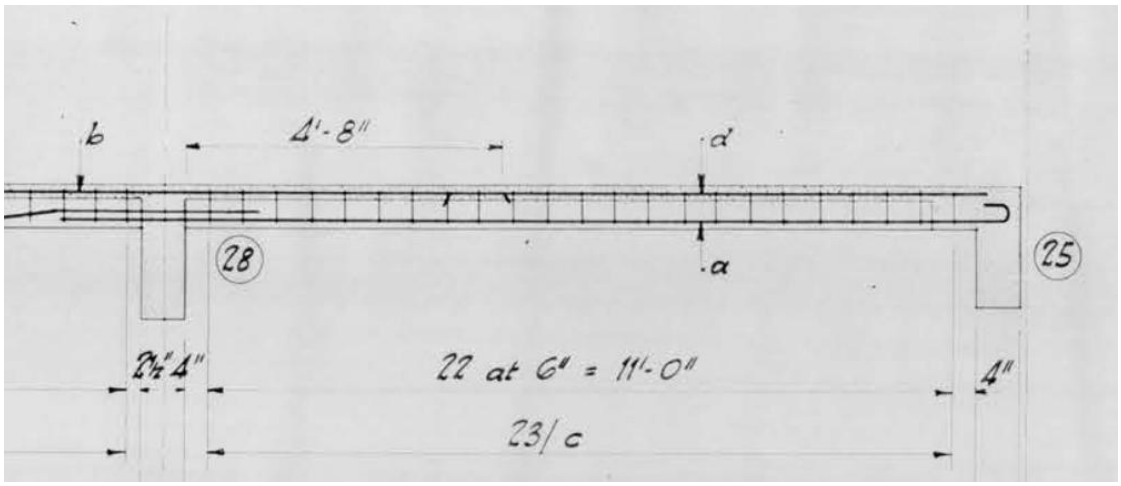

Figure 5 – Typical Reinforcement Detailing of Ribbed Slab Edge Showing Curtailment of Reinforcement

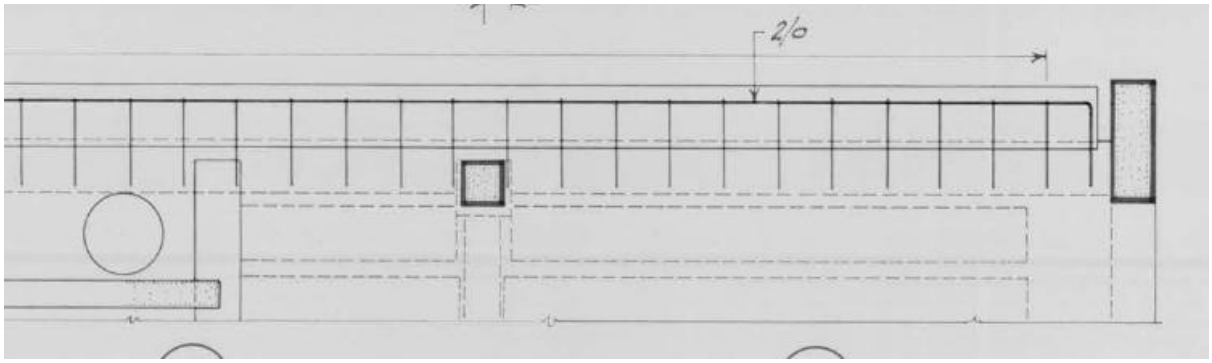

Figure 6 – Plan on Slab Edge Denoting Peripheral Ties

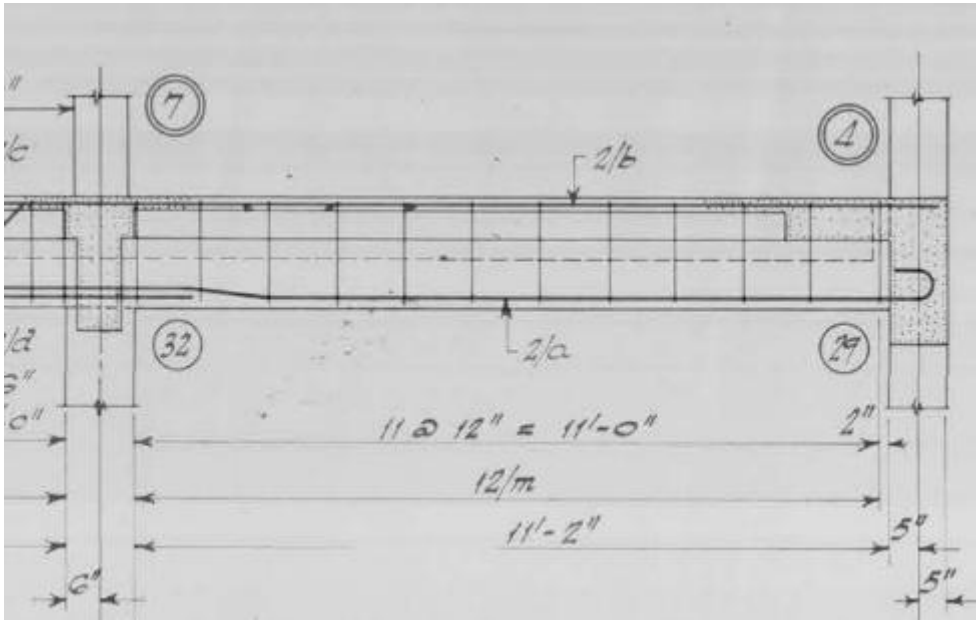

Figure 7 – Typical Section Through Beam-Column Connection Noting Continuous Reinforcement Through Column Positions.

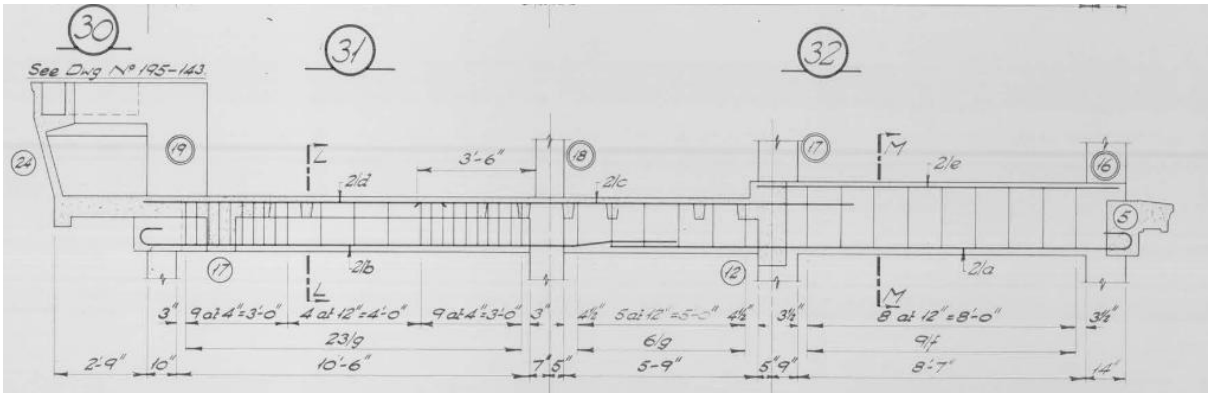

Figure 8 – Section Through Beams From Front to Rear Elevation Noting Continuous Reinforcement and Anchorage Lengths of Main Reinforcement Through Columns.

The conclusions of the intrusive investigations appear to reflect the As Built design of the reinforcement arrangements on site. When considered alongside the minimum requirements for horizontal and vertical ties which appears compliant with BS 8110:1-1997, it is concluded that the risk to progressive collapse damage to the building is low.

This conclusion is based on the building being of the same condition and reinforcement detailing as the apartment to which intrusive works were carried out.

It should also be noted that prior investigations which were carried out within void flat 4/1 have yielded similar results which should provide some reliability that these construction conditions are consistent across the different blocks.

6 Conclusions & Recommendations

6.1 Conclusions

6.1.1 Visual Inspection of External Elevations

The external walls at ground floor appear to be in poor condition, with cracking & spalling observed on balconies and canopies in additions to vegetation growth across the Orlit panels, this is present on the east and west elevation.

Repair work will be required to the isolated areas of exposed reinforcement at junctions at external ground level. Further investigation should be undertaken to this area to determine the appropriate concrete repair works.

The Orlit panels on west elevation show signs of visible cracking, damage, and staining, with evidence of ineffective patch repairs. However, reference should be made to the Zenith Ltd report for repair and maintenance recommendations. These should be carried out as early as possible to omit risk of deterioration or detached panels.

The perimeter concrete edge beam 'boot' ends which are also referred to as the stringer, exhibit extensive spalling and cracking. This is visible across both western and eastern elevations. These are critical to the support of 'Orlit' panels at every floor level and play and integral part of the concrete framing. As such, remedial repairs and maintenance must be agreed and adopted, as soon as possible. Further deterioration may result in damage or risk of collapse of external cladding.

The roof at some locations displays signs of inadequate drainage. It appears that areas of drainage points have been blocked which has resulted in water ponding. A further review of this would be required to determine why this has occurred and any remedial action.

6.1.2 Visual Inspection of Internal Spaces

A visual inspection of void flat 5/1 highlighted an area of severe water ingress, within the bathroom space. The wall finishes were removed and the exposed concrete slab appeared completely saturated.

There were no items to note within void flat 4/1 as the space was partially decorated with evidence of previous concrete testing repairs throughout the flat space. It is understood that testing has been undertaken previously within this space with wall ties inspected at balcony level.

Survey of Flat 2/1 revealed extensive cracking across the ground floor slab. Cracks run parallel and perpendicular to the external wall line with some spanning across rooms or between vertical structure. It is not known how long these cracks have been present or if there has been any noted deterioration over any period of time.

There were few items noted elsewhere in Flat 2/1 from visual inspection. Intrusive investigations were undertaken within Flat 2/1 to determine condition of the structural framing.

6.1.3 Intrusive Investigation

Intrusive investigations were conducted within void flat 2/1 and across external elevations to determine the condition of cavity and concrete 'stringer' element which support Orlit cladding panels at each level.

The testing undertaken within void flat 2/1 have confirmed that reinforcement ties are present between primary column and beam elements. This also confirms that tie reinforcement appears to be in good condition with progressive collapse calculations ascertaining that the reinforcement observed can suitably withstand the tension applied within a disproportionate collapse event. The concrete cover varies and can be relatively low at minimum 18mm, however, the depth of carbonation is nominal and members are at low risk of corrosion with review against the BRE 444 guidance. Concrete cores confirm that the concrete is compacted well with no significant voids, this suggests that the structure was constructed to reasonable standards.

Concrete testing was undertaken across the perimeter concrete beam 'boot' end which forms the 'stringer' course feature. It is known from the visual inspections that there are many instances of the stringer course being described in a poor condition at these locations. The carbonation and chloride results vary across samples with areas of the front (east) elevation highlighting high to moderate corrosion risk to reinforcement. The high risk area, sample D6, is located in proximity to the window and will continue to deteriorate due to the increase exposure in this position. The cover is extremely low at 9mm which suggests the reinforcement will soon be at risk of complete exposure. We understand from the rope access visual survey, that there are several areas of external concrete in a similar condition.

6.2 Recommendations

A list of recommendations have been summarised below for consideration. These are concluded across all the reporting provided in both visual and instructive surveys:

- Regular survey and maintenance to be undertaken to monitor the condition of external elevations. A point cloud point survey is suggested to record each Orlit panel for detailed records of the condition at each panel. This will enable an accurate and targeted maintenance strategy to be adopted moving forward. This should also include the maintenance and repair of concrete 'stringer' course.
- The concrete beam which forms the perimeter 'stringer' at each floor level is in poor condition. This concrete member is partially exposed to the external environment and has been subject to various degrees of spalling and disrepair. In some cases the reinforcement has been exposed and likely corroding. This member performs a primary function in the support of 'Orlit' cladding panels above and if eroded further may cause collapse. It is recommended that concrete repair works are undertaken to this feature in the short term (within 6 months)
- Detailed review and concrete repair solutions to be explored for any concrete canopy or balcony which is experiencing damage or disrepair, as noted within the report. We recommend this is completed within the short term (6 – 12 months)

- Steelwork handrails at balcony levels, reported as corroded within the Zenith inspection report, must be assessed individually to ascertain the current condition and implication to resident's safety. These should be repaired or replaced to satisfy the relevant health and safety requirements. This should be done in tandem with works to the balcony soffit structures.
- Disrepair to the concrete base at building ground level should be reviewed and a concrete repair specified to avoid further deterioration.
- Concrete repairs and maintenance should be considered for any location highlighted within this report.
- Further investigation and monitoring works to be undertaken across the ground floor slab in Flat 2/1. This should determine the caused and proposed repair for the slab in this area. Where possible, effort should be made to understand whether this cracking has been reported elsewhere at ground floor level. Investigations to determine the cause for cracking may involve trial pits undertaken at the external wall line to ascertain the substructure and ground conditions within this area.
- Condition of concrete to be monitored within the basement spaces.

Appendix A – Photographs

External – East

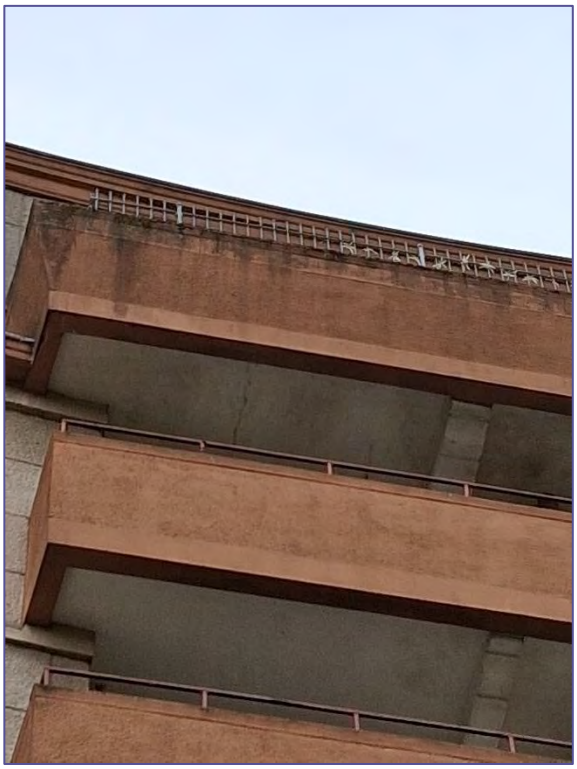

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

Photo 7

Photo 8

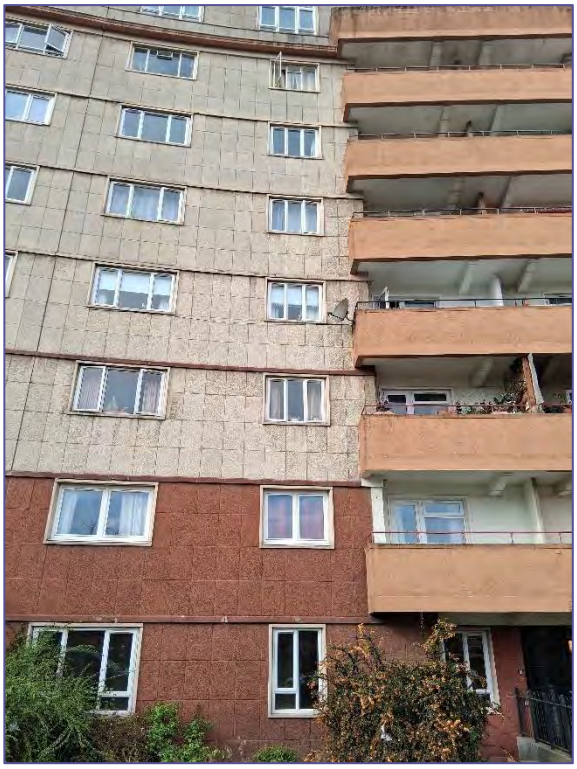

Photo 9

Photo 10

Photo 11

Photo 12

Photo 13

Photo 14

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Photo 17

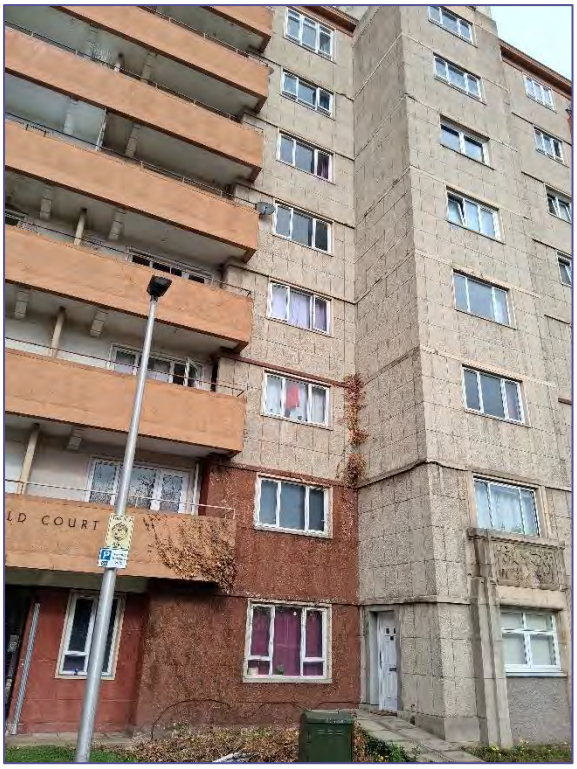

Photo 18

Photo 19

Photo 20

Photo 21

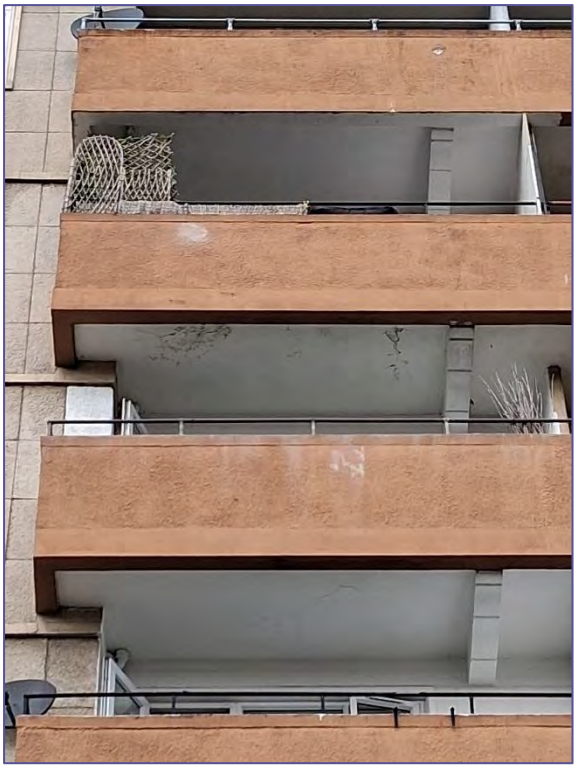

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Photo 31

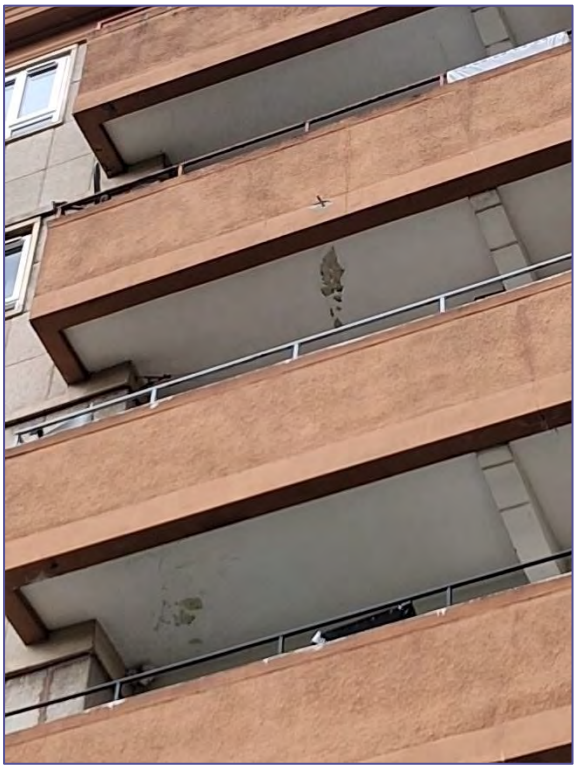

Photo 32

Photo 33

Photo 34

Photo 35

Photo 36

Photo 37

Photo 38

Photo 39

Photo 40

External – North

Photo 1

External – Roof

Photo 1

Photo 2

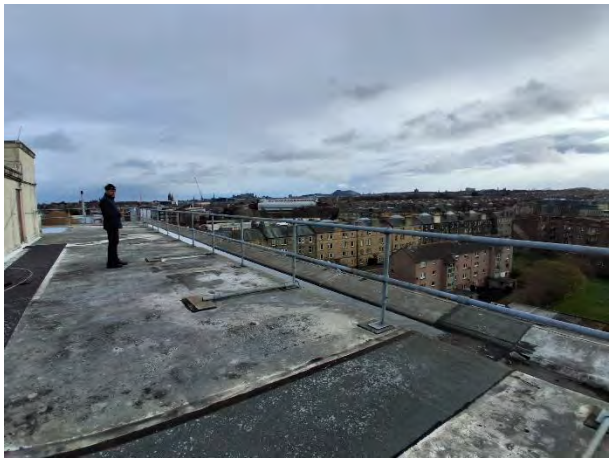

Photo 3

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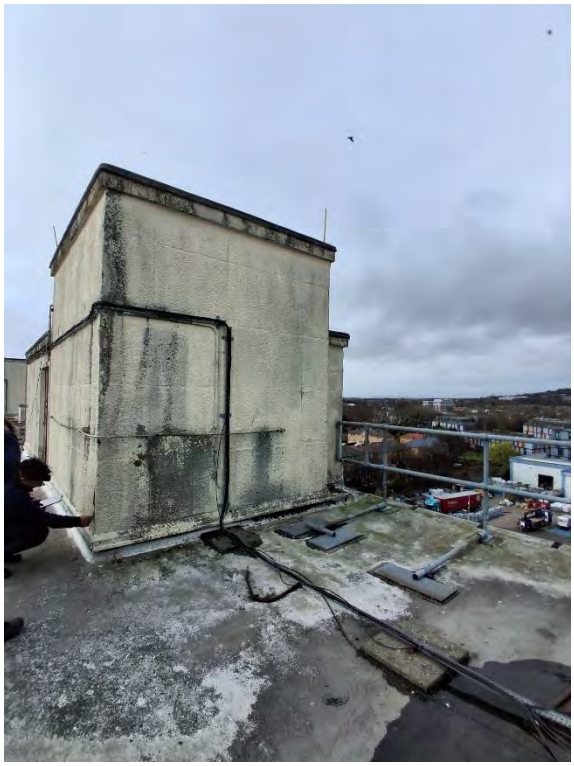

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Photo 11

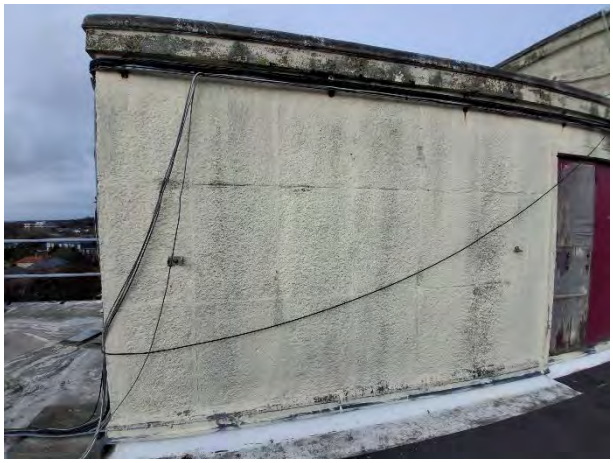

Photo 12

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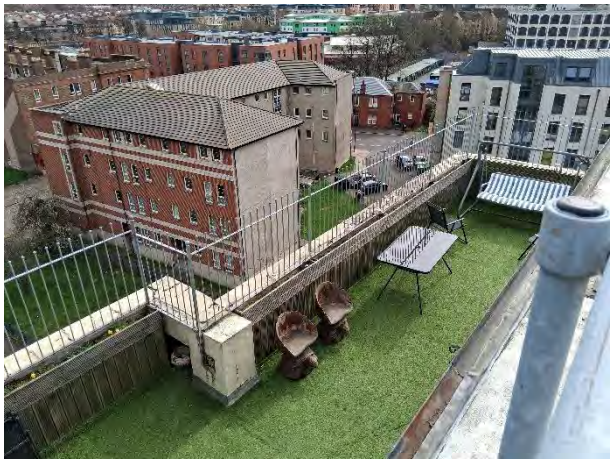


Photo 28

Photo 29

Photo 30

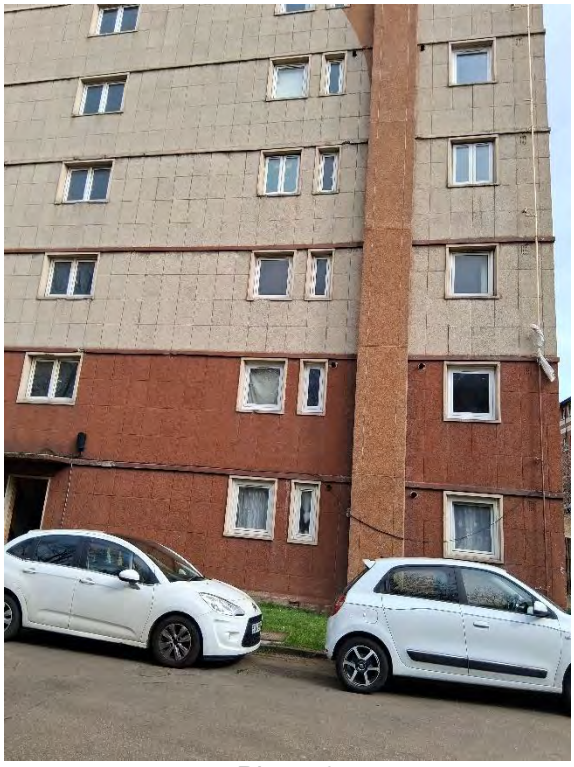
Photo 31

Photo 32

External – West

Photo 1

Photo 2



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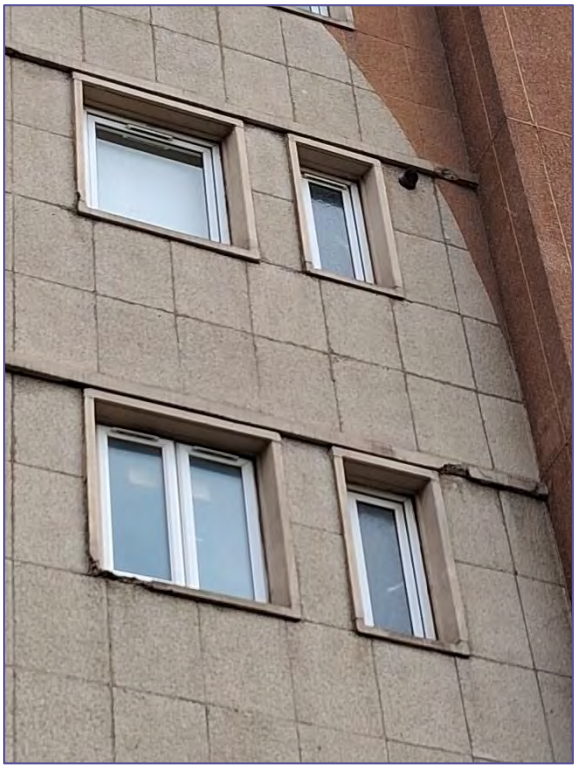

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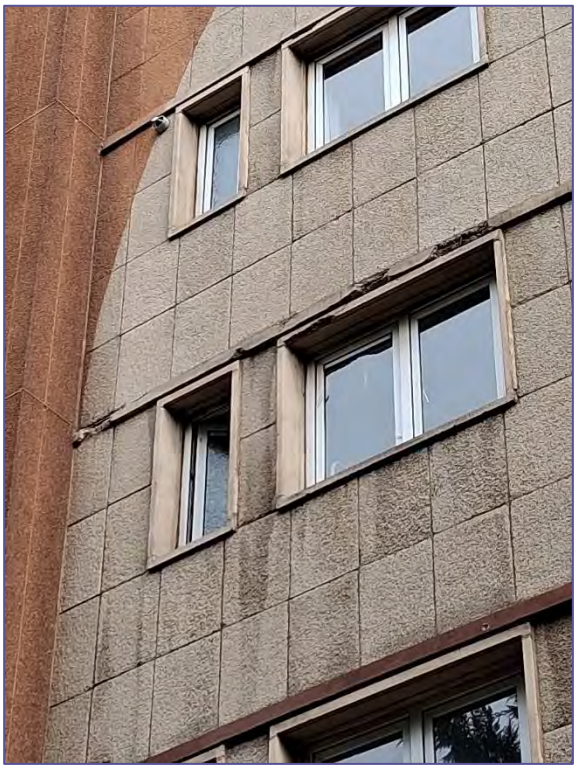

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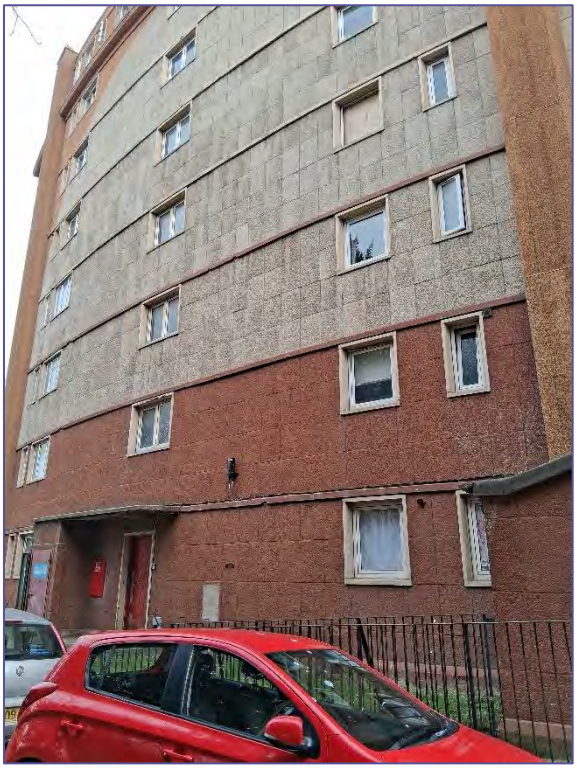
Photo 17



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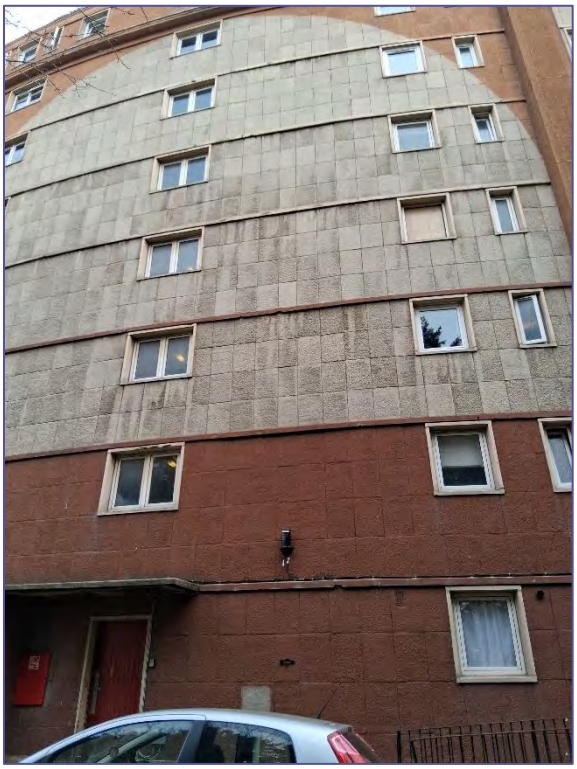

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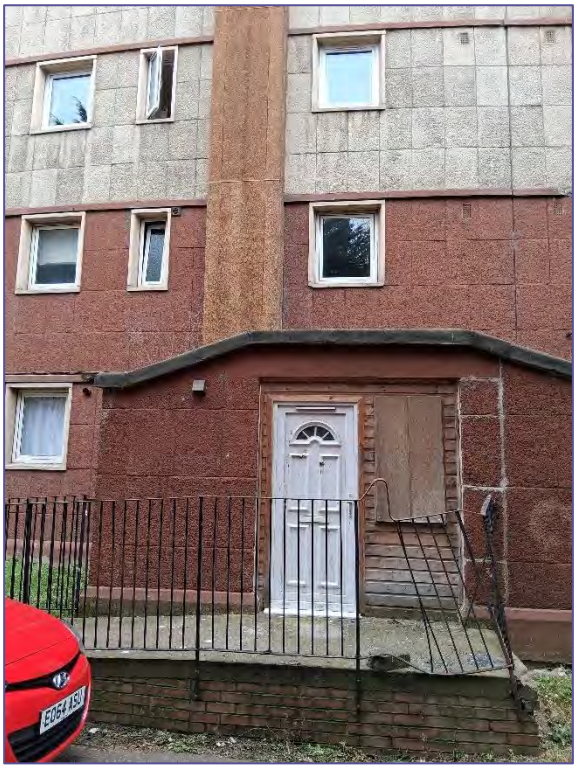

Photo 21

Photo 22

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Photo 41

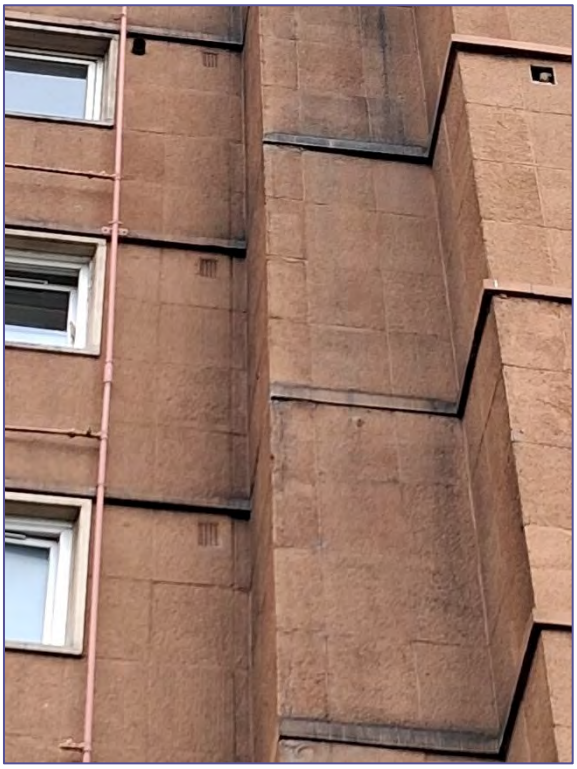

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Photo 43

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Photo 45

Photo 46

Photo 47

Photo 48

Photo 49

Photo 50

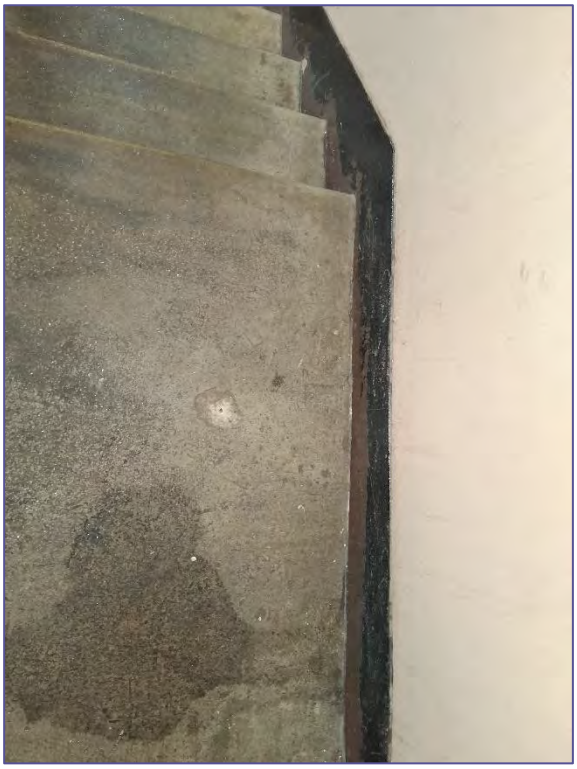
Internal – Communal Areas

Photo 1

Photo 2

Photo 3

Photo 4



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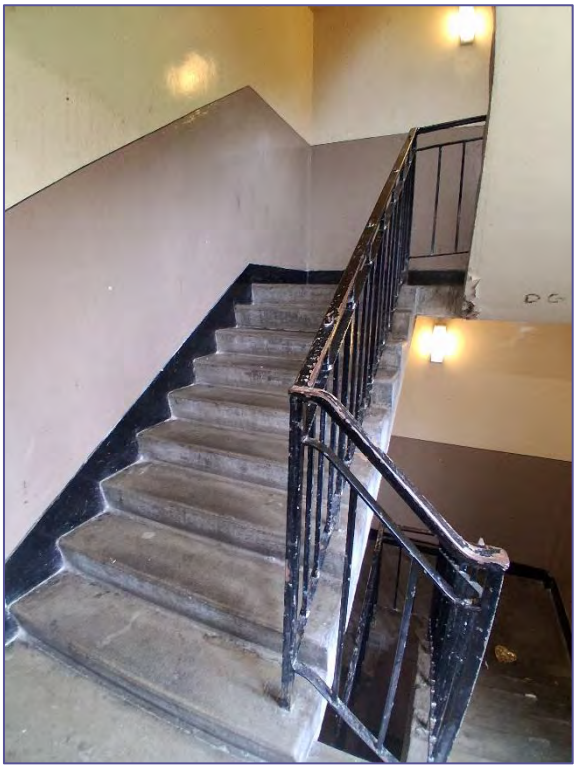


Photo 6

Photo 7

Photo 8

Photo 9

Photo 10

Internal – Service Room

Photo 1

Photo 2

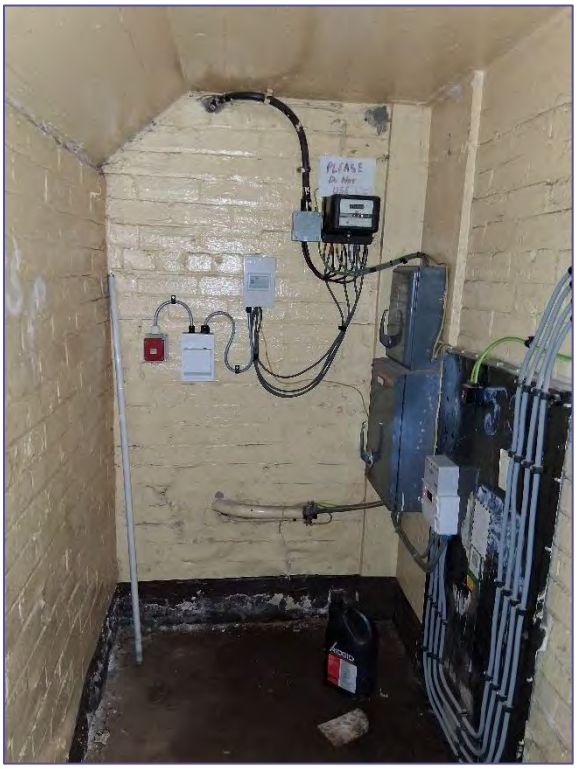
Photo 3

Photo 4

Photo 5

Photo 6

Photo 7



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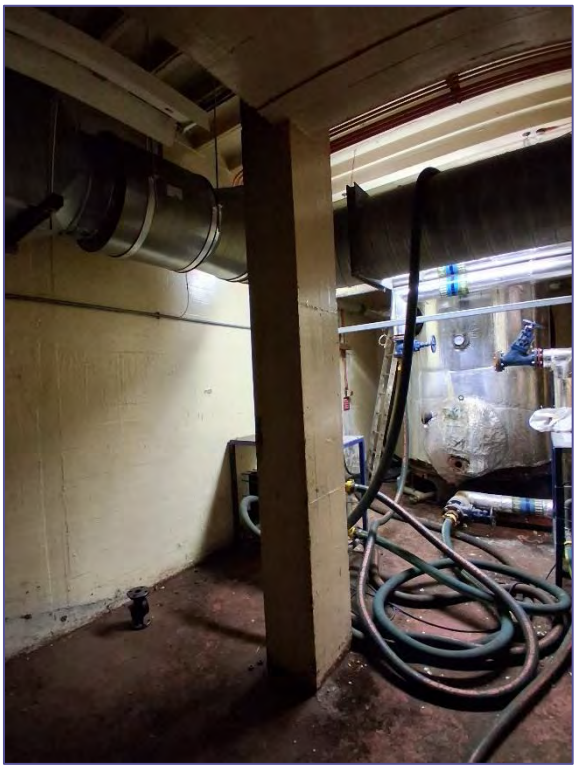

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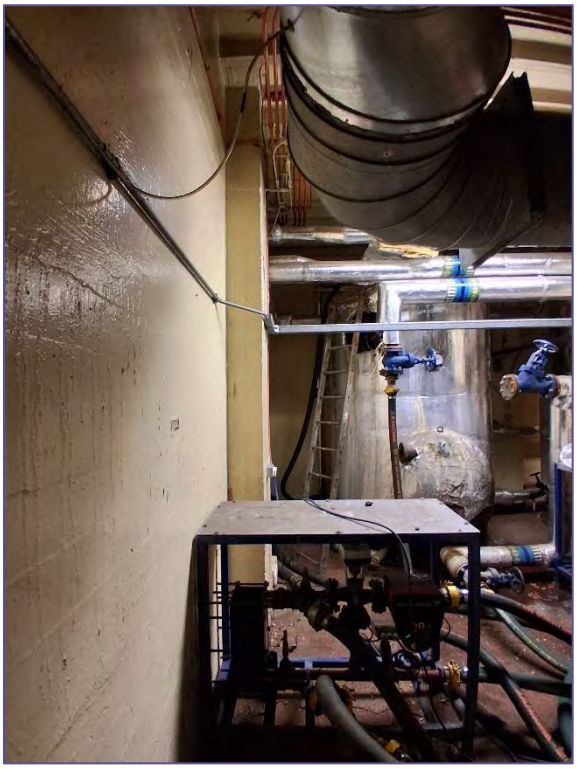

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Photo 15

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Photo 17

Photo 18

Photo 19

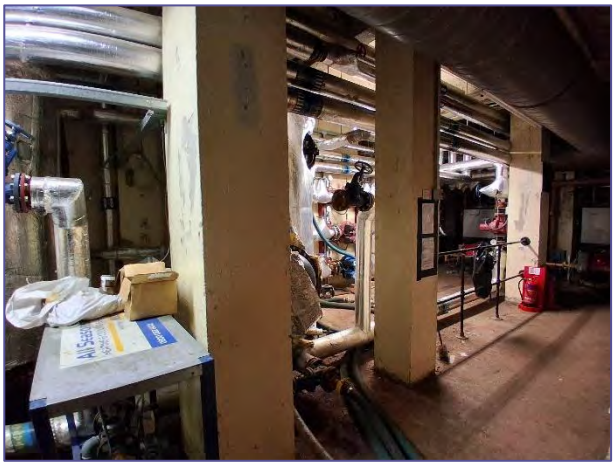

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Photo 24

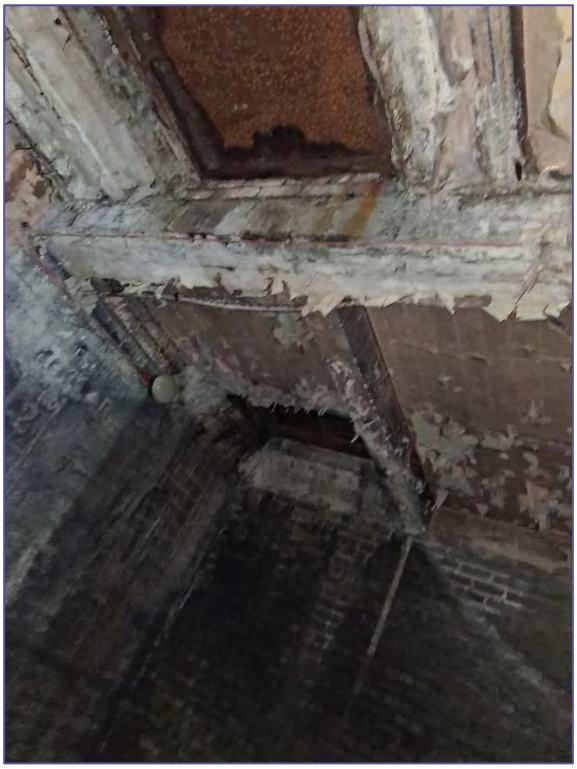

Photo 25

Photo 26

Photo 27

Photo 28

Photo 29

Internal – Flat 1-4

Photo 1

Photo 2


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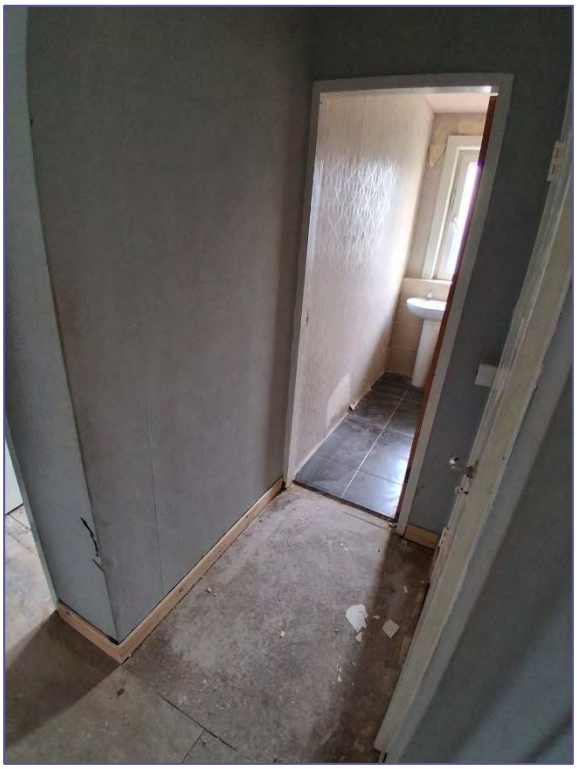

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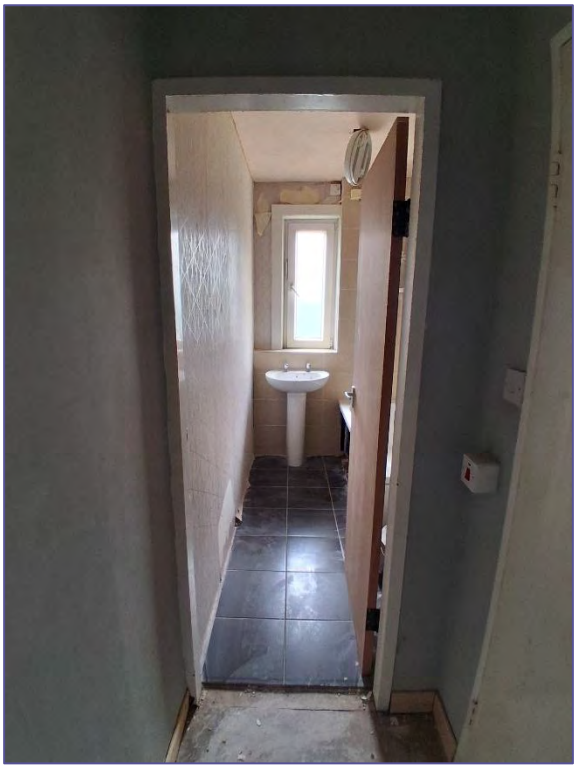

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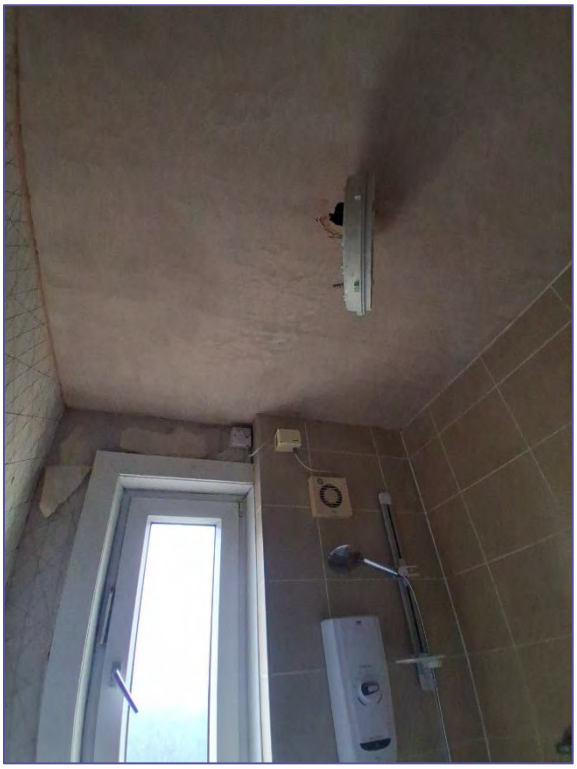

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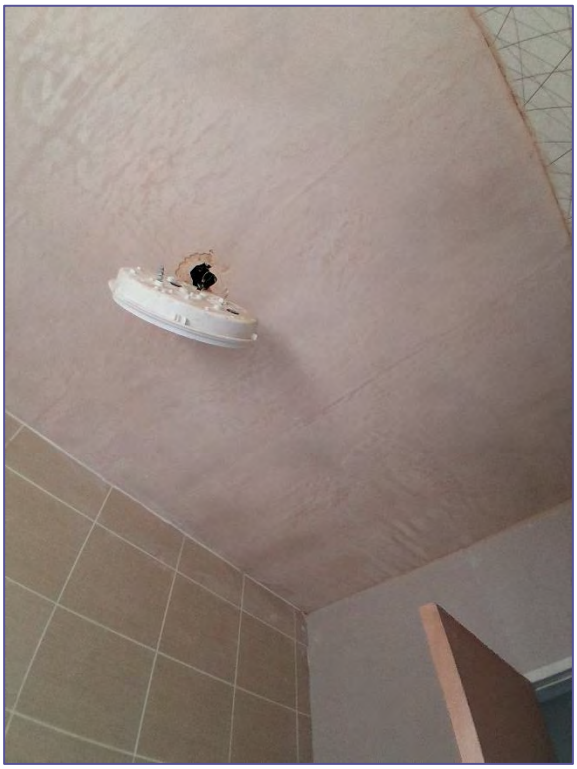

Photo 19

Photo 20

Photo 21

Internal – Flat 2-1

Photo 1

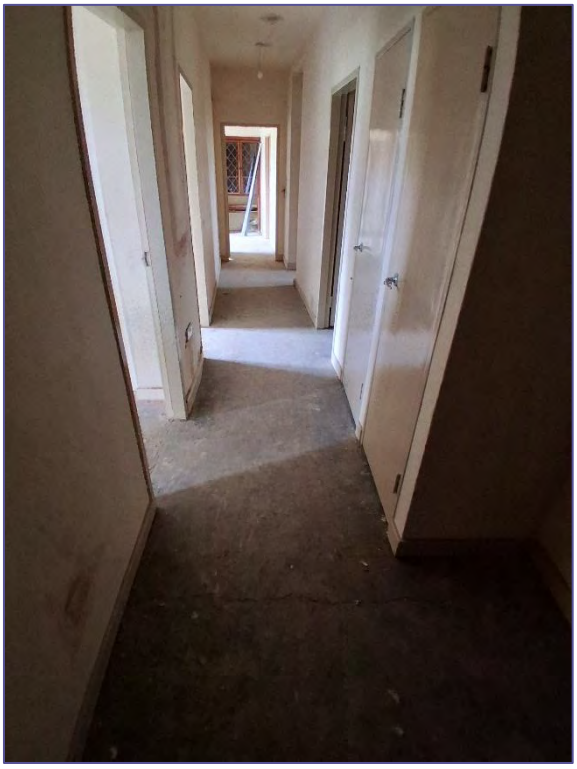

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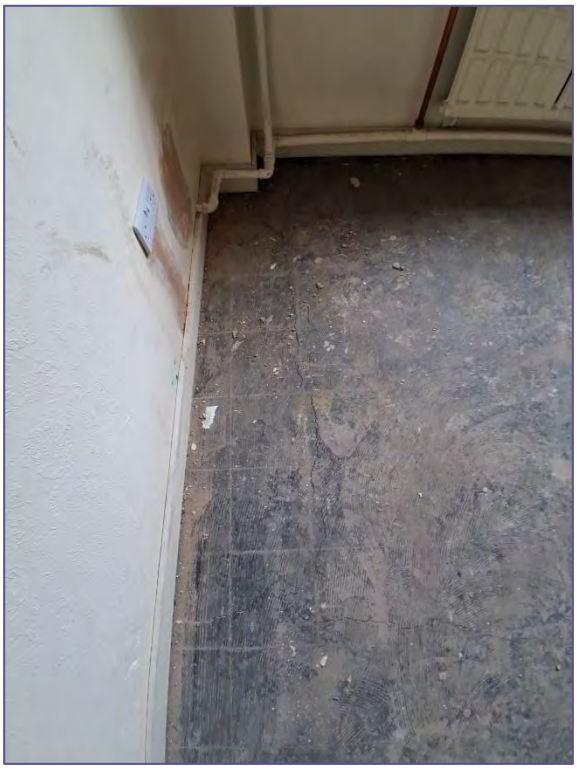
Photo 9

Photo 10



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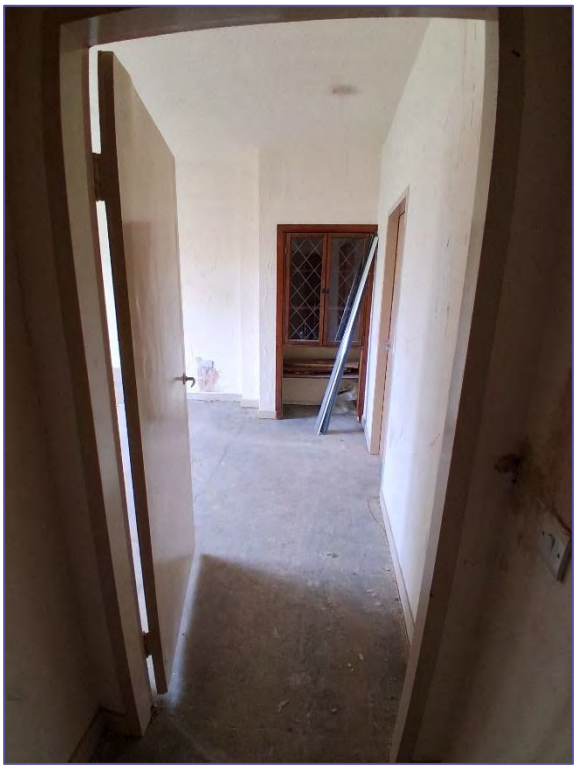

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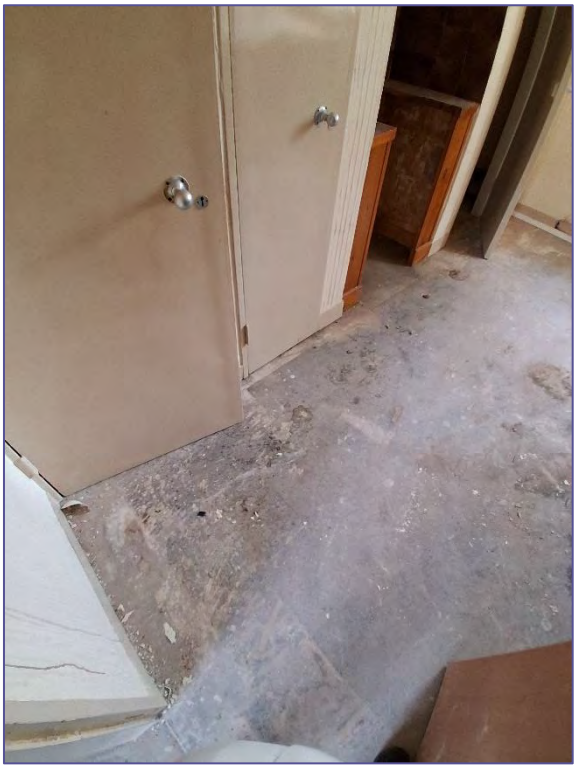

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Photo 19

Photo 20

Photo 21

Photo 22

Photo 23

Photo 24

Photo 25

Internal – Flat 5-1

Photo 1

Photo 2

Photo 3

Photo 4

Appendix B – Zenith Survey Inspection Report

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Atkins Realis
Westfield Court, Edinburgh

W21751
Inspection Report

Reference:	W21751
Issue No.:	01
Issue Date:	30/04/2025
Status:	FINAL
Prepared By:	[redacted]
Checked By:	
Authorised By:	

Company Number:
SC250415

VAT Registration No:
GB 916 2388 17

INNOVATION
EXCELLENCE

Structural Survey Report

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Template Data Zenith Use Only	
Ref No	CON011
Issue Date	18/10/2024
Rev No	3

Structural Survey Report

1. Introduction

Zenith Property Conservation has been assigned to carry out a rope access survey of the properties, focusing on the external elevations. The survey's goal is to identify any structural and fabric defects present, and the results will be compiled into a comprehensive report. This report will feature elevation drawings of the properties with each identified defect clearly recorded. These drawings will be cross-referenced with photographs for clarity, allowing for a thorough documentation of each issue.

The severity of the defects will be categorized into various levels, with specific attention given to the following areas:

- **Hairline and Severe Defects**: These will be classified according to their size and extent, ranging from minor, barely noticeable cracks (hairline) to larger, more significant fractures or damage (severe).
- **Exposed Reinforcement**: Any areas where reinforcement bars are visible due to damage to the masonry or concrete will be noted, as this can indicate significant structural weaknesses.
- **Levels of Corrosion**: The report will identify areas where corrosion of metal components (such as steel reinforcement) is evident, including an assessment of the extent and severity of the corrosion.
- **Boss Render Areas**: Any sections of boss (rough, irregular) render, which may be prone to cracking or degradation, will be highlighted.
- **General Vertical Cracking**: Vertical cracks will be surveyed, as these are typically indicative of settlement or structural movement. The report will assess their severity and potential impact on the structure's integrity.

By meticulously documenting these issues with precise drawings and photographs, the report will serve as an essential resource for planning repairs and ensuring the long-term stability of the properties.

2. Description

1. Introduction:

This report outlines the proposed approach for conducting a high-level rope access inspection of the facade at Westfield Court, located at 15 Alexander Drive, Edinburgh. The primary aim of this inspection will be to assess the overall condition of the building's exterior, including the balconies, windows, service elements, and Orlit panels, and identify any areas requiring maintenance or repair.

---

2. Building Overview:

- **Building Name:** Westfield Court
- **Construction Date:** Early 1950s
- **Structure:** The building is an eight-storey residential tower block with a unique curved design.
- **Materials:** The facade consists of concrete and brick, with metal-framed windows, south-facing balconies, and Orlit panels.
- **Historical Significance:** Westfield Court is one of Edinburgh's first multi-storey residential buildings and features a rooftop terrace offering panoramic views of the city. The building originally included a rooftop nursery school with an outdoor play area.

---

3. Areas to be Inspected:

- **Balconies:** South-facing, metal-framed with railings on each floor.
- **Windows:** Large, metal or uPVC-framed windows across the building.
- **Facade:** North-facing facade, which may contain service elements like ash chutes.
- **Orlit Panels:** Precast concrete panels, commonly used in post-war construction, which may show signs of weathering, cracking, or other deterioration.
- **Roof:** Rooftop terrace area, including original structural elements from the nursery school design.

---

4. Proposed Inspection Details:

4.1 Balconies:

- **Proposed Focus:** Inspect the condition of the balcony railings, flooring, and connections to the main structure for any signs of corrosion, damage, or structural instability.
- **Key Areas:** Balcony railings, connection points, flooring integrity, and overall safety.

4.2 Windows:

- **Proposed Focus:** Check the condition of window frames and seals, looking for signs of weathering, cracks, or deterioration.
- **Key Areas:** Window seals, frame attachments, and potential water ingress points.

4.3 Orlit Panels:

- **Proposed Focus:** Assess the condition of the Orlit panels, checking for cracks, weathering, and potential issues that could impact structural integrity or cause water ingress.
- **Key Areas:** Panel joints, surface condition, and any signs of deterioration or disrepair.

4.4 Roof and Roof Terrace:

- **Proposed Focus:** Inspect the rooftop terrace, including protective barriers, enclosures, and structural integrity of the original nursery area components.
- **Key Areas:** Condition of roof barriers, surface wear, and potential structural concerns.

---

5. Conclusion:

This proposed inspection aims to provide a comprehensive assessment of the high-level facade of Westfield Court, focusing on identifying areas of concern, particularly those related to structural integrity and weathering, including the Orlit panels. The goal is to ensure the building remains safe, well-maintained, and free from potential hazards.

3. Procedure and Methods

The inspection was conducted by operatives from Zenith Property Conservation - Rope Access, prioritizing thoroughness and safety throughout the process.

3.1.1.1. Access and Inspection Techniques
Access to the roof was facilitated via a door located on the top floor of the building, providing direct entry to the inspection area. The team employed abseiling techniques, commonly referred to as rope access, to perform a detailed visual examination of the building's exterior surfaces. This method allowed operatives to access hard-to-reach areas and closely inspect various elements of the roof and external structure.

3.1.1.2. Concrete Assessment
The concrete surfaces (string course) underwent a hammer tap survey, a technique designed to detect areas of delamination (the separation of layers within the concrete, often caused by moisture or corrosion

3.1.1.3. Defect Recording and Categorization
All identified defects were carefully documented on elevation drawings and cross-referenced with photographs taken during the inspection. These defects were categorized into the following key areas:

- Hairline and Severe Cracks: Hairline cracks were noted for their potential to develop into more significant issues, while severe cracks indicated substantial damage or instability.
- Exposed Reinforcement and Corrosion: Areas where internal reinforcement (e.g., steel bars or mesh) was exposed to the elements were identified, as this often leads to corrosion and compromises the structural integrity of the concrete
- Boss Render: The textured or rough exterior surface finish was inspected for signs of wear or damage.
- General Vertical Cracking: Vertical cracks, often indicative of structural shifts or settling, were recorded as a critical defect requiring attention.

3.1.1.4. Safety and Compliance
All repair and maintenance activities were conducted in strict adherence to Zenith Property Conservation's Risk Assessment and Method Statement (RAMS). These documents ensured all operations, including the use of abseiling techniques, were planned and executed with proper safety measures in place.
The rope access techniques specifically followed the IRATA (Industrial Rope Access Trade Association) guidelines, guaranteeing that all work adhered to the highest safety and professional standards.

3.1.1.5. Borescope Investigation
A borescope investigation was carried out to determine the type, frequency, condition, and embedment of ties between the internal masonry leaf and external concrete Orlit panel. All drill

holes or opening-up works must be reinstated to a suitable standard with appropriate concrete repair.

3.1.1.6. Panel Condition and Notification
Any panel identified as loose or damaged during the rope access survey must be clearly marked, and the Structural Engineer (SE) must be informed. The position for the borescope investigation is shown indicatively below. Drill holes should not be undertaken in any panel that is in poor condition or deemed unsuitable for repair. The location of the drill hole should be selected to optimize the view of the existing wall ties.

3.1.1.7. Asbestos Records and Intrusive Works
The client is required to provide asbestos records and confirm that no risks are associated with the proposed intrusive works.

Summary

The inspection was conducted by Zenith Property Conservation's rope access team, using abseiling techniques to assess the building's exterior and roof's structures. A detailed visual examination was performed, focusing on concrete surfaces, cracks, exposed reinforcement, and damage to the Orlit panels and elevation. Defects were documented and categorized into hairline and severe cracks, corrosion of exposed reinforcement, boss render wear, and general vertical cracking.

A hammer tap survey was used to detect areas of concrete delamination (especially on string course).

4. Survey Results

String Courses and Ledges:
The string courses and horizontal ledges throughout the façade exhibit widespread deterioration. Numerous areas display concrete spalling, with extensive exposure of embedded reinforcement. The exposed rebar in these locations is heavily corroded, indicating prolonged ingress of moisture and loss of passivation. Additionally, there are numerous linear and transverse cracks present, ranging in length from 10mm up to approximately 1000mm. These defects are dispersed across all elevations, suggesting systemic degradation consistent with age-related wear and environmental exposure.

Spalling and exposed rebar on the string course

Orlit Panels:
Based on visual inspection and tap testing, the majority of Orlit panels did not exhibit movement and show no immediate risk of detachment. Approximately 10% of the panels show signs of distress, including surface cracking and localised spalling. However, a full assessment of their structural condition will only be possible after a borescope inspection has been carried out.

Spalling and exposed rebar on the Orlit panel

Top Ledges:
The top perimeter ledges of the building have undergone previous remedial work, evidenced by the application of flashband across multiple sections. While these interventions appear to have slowed active water ingress, some ledges still exhibit ongoing spalling and cracking, particularly at interfaces and junctions.

Previous flash band repairs.

Balconies:
Several balcony slabs and soffits show signs of minor spalling and surface cracking. Although not currently posing a structural hazard, these defects should be monitored, and preventative maintenance is recommended to avoid progression. Additionally, there is visible corrosion to the handrails, which should be assessed and treated to prevent potential safety issues and material degradation.

Spalling on the balcony.

Concrete Canopy:
One of the canopies is in poor condition, exhibiting spalling and exposed reinforcement, while the other is in reasonable condition with minor defects and no immediate risk.

Concrete Canopy.

5. Conclusions and Recommendations

The condition of the building's external reinforced concrete elements indicates progressive and widespread deterioration consistent with environmental exposure, aging construction materials, and potentially inadequate past repair methods. Key conclusions are as follows:

String Courses and Ledges
The presence of extensive concrete spalling, long linear cracking, and heavily corroded reinforcement across the string courses and ledges highlights a significant breakdown in the concrete cover's protective function. The recurring nature of these defects suggests systemic failure due to prolonged water ingress and carbonation-induced corrosion. The structural integrity of these elements is compromised in numerous areas, requiring urgent remedial attention. **There is a high risk of falling concrete, and these issues must be rectified as quickly as possible to ensure public safety and prevent further deterioration.**

Orlit Panels
Given that the Orlit panels are stacked above the string courses at each floor level, significant deterioration of these ledges presents not only a falling concrete hazard but also a risk to the structural support of the panels themselves. Even where panels are adequately tied back, failure of the bearing ledge may compromise overall stability.

Top Ledges
The presence of flashband across the top ledges indicates prior attempts to control water ingress; however, this method is not a long-term structural solution and appears to be failing in several areas. Water penetration likely continues behind the flashband, contributing to ongoing deterioration.

Balconies
Several balcony slabs and soffits show signs of minor spalling and surface cracking. Although these defects do not currently pose a structural hazard, they should be monitored, and preventative maintenance is recommended to avoid further deterioration. Additionally, there is visible corrosion to the handrails, which should be assessed and treated to prevent potential safety issues and material degradation.

Concrete Canopy.

One of the concrete canopies is in poor condition, exhibiting significant spalling and areas of exposed reinforcement. The other canopy remains in reasonable condition, with minor spalling and cracking observed; however, there is currently no apparent risk of material detachment or structural failure.

Recommendations

Immediate Repairs (High Priority)

String Courses & Ledges:

- Remove all loose and delaminated concrete.
- Carry out full exposure of corroded reinforcement.
- Clean and treat rebar with corrosion inhibitor or replace where section loss exceeds 25%.
- Reinstate using compatible repair mortar (EN1504 compliant) with adequate cover depth.
- Apply anti-carbonation protective coating post-repair.

Orlit Panel (Moving):

- Conduct intrusive inspection to determine cause of movement.
- Secure or repair the affected panel depending on severity. Full replacement should only be considered following assessment after a borescope inspection has been carried out
- Repair any spalled or cracked areas using compatible patch repair methods.

Planned Maintenance (Medium Priority)

Remaining Orlit Panels:

- Monitor for progressive cracking or new movement.
- Apply protective coatings to prevent moisture ingress and UV degradation.

Balconies:

- Patch repair areas with surface spalling using concrete repair mortar.
- Consider application of waterproofing membrane or protective sealant.
- The corroded handrails should be cleaned to remove rust (e.g., wire brushing or sandblasting), treated with a rust-inhibiting primer, and repainted with a suitable weather-resistant coating. Severely affected sections should be further assessed for structural integrity and replaced if necessary. Regular inspections and maintenance are advised to prevent recurrence.

Top Ledges:

- Remove flash band and inspect underlying substrate.
- Reinstate defective sections and install a more durable weatherproof flashing or capping system.

Preventative Works (Low Priority)

Concrete Canopy:

For the canopy in poor condition:

- Remove all loose and delaminated concrete.
- Clean and treat exposed reinforcement to remove corrosion.
- Reinstate concrete section using a suitable structural repair mortar in accordance with *BS EN 1504*.
- Consider engaging a structural engineer to assess for any underlying structural concerns.
- Implement protective measures to prevent further deterioration (e.g. waterproof coatings, improved drainage if applicable).

For the canopy in reasonable condition:

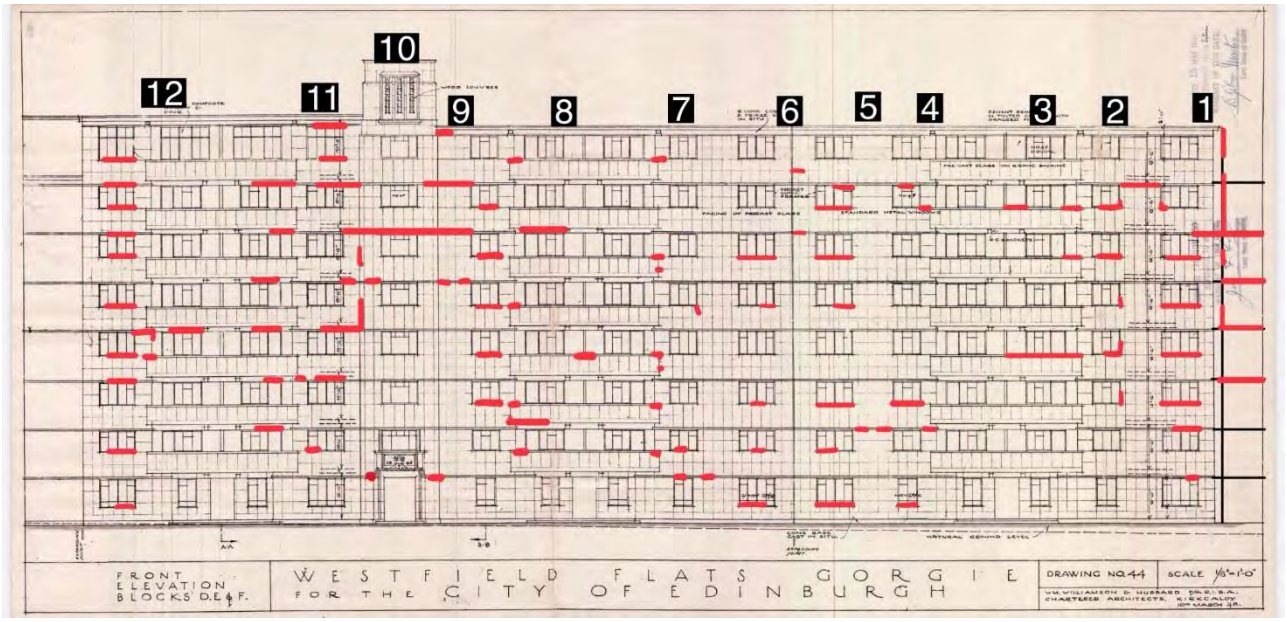
- Carry out minor patch repairs to areas with spalling and cracks to prevent further degradation.
- Use appropriate crack injection or surface repair techniques depending on the crack type and depth.
- Include the canopy in a routine inspection and maintenance programme to monitor for any changes in condition.

General Recommendations:

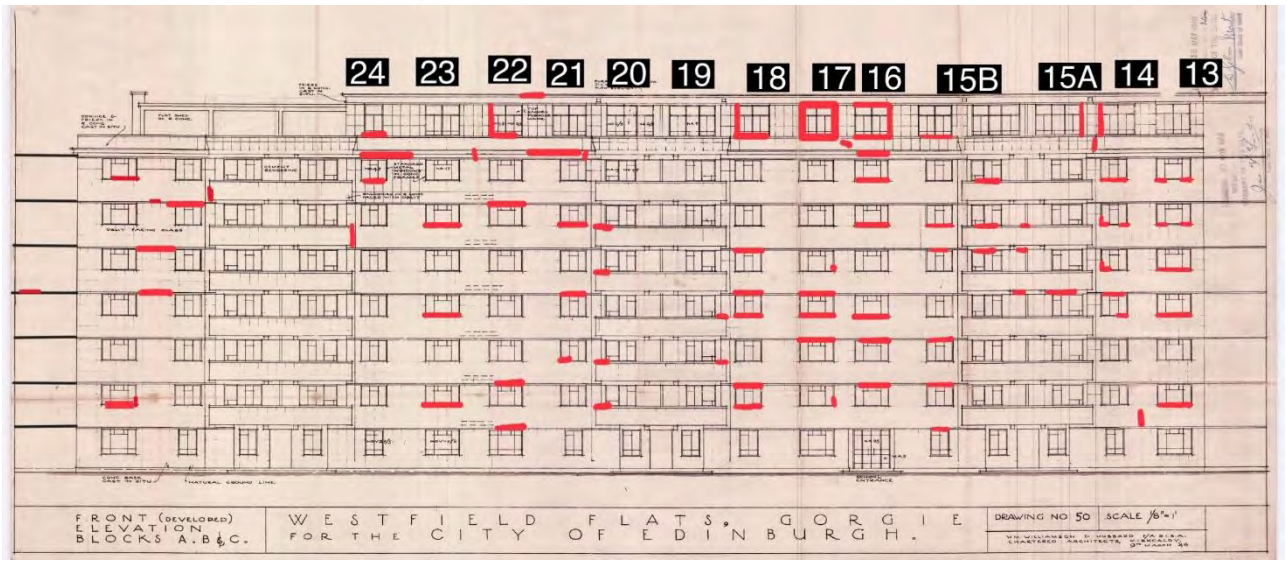
- Conduct a full structural condition survey annually, or sooner if defects worsen.
- Establish a planned preventative maintenance (PPM) schedule incorporating inspections, cleaning of ledges/gutters, and protective coatings reapplication every 5–7 years.
- Carry out a water ingress diagnostic assessment to identify any active leaks behind facades.

Drawings

Front Elevation D, E, F



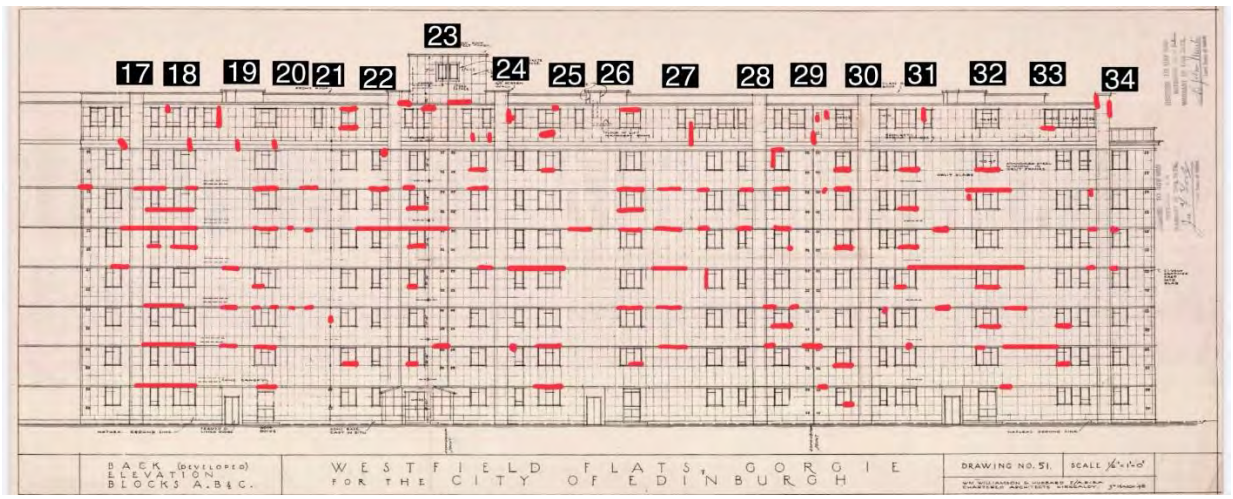
Front elevation A, B, C



Spalling and Exposed Rebars

Back Elevation D, E, F

Back Elevation A, B, C



Spalling and Exposed Rebars

Front Elevation.

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Defects Observation Sheet

No.
00794

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
4	East elevation 2 1.	N/A	P2	220x220 size of the corner wall is missing	To clean area Apply mortar Smooth up and tidy up	
5	South elevation 1	N/A	P2	Slight cracking in top spollen	To re-seal And tidy up	

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No.
00794

Defects Observation Sheet

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
6	South elevation 1.	300x300	P2	Cracking down the corner of the building , tap tested and safe	To clean area And repair	
7	South elevation	220x220	P2	Damage is same as shown on east elevation 2 corner is missing and showing re-bar	To clean area And apply Mortar to seal up area Tidy up job	

Structural Survey Report

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Defects Observation Sheet

No.
00794

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
9	South elevation 1.	N/A	P2	Multiple chunks missing on sill	To clean area Apply mortar and smooth off Tidy job	
10	South elevation	N/A	P2	Chunks missing out of spollen in multiple areas	To clean area Apply mortar smooth off Tidy area	

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Defects Observation Sheet

No.
00794

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
7	South elevation 1.	N/A	P2	Same as item 5	Same as item 5	
8	South elevation	N/A	P2	Hairline cracks running along multiple balcony's	To clean area To repair the cracks Tidy job	

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Defects Observation Sheet

No.
00794

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
11	South elevation 2 2.	N/A	P2	Moderate size of sill missing , re-bar exposed	To clean area Seal and fix the cracks Fill out sill Tidy area	
12	South elevation	250 x250	P2	Moderate size of spollen is missing and some cracks	To clean area Seal and apply mortar to fill in gap Tidy area	

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Defects Observation Sheet

No.
00794

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
12	South elevation 2	N/A	P2	Multiple hairline cracks throughout sill	To clean area Seal up hairline cracks running along sill Tidy area	
13	South elevation 3 3.	130x130	P2	Balcony is missing a corner section , cracks running along the side	To clean area Apply seal to cracks and area Apply mortar to build back up and smooth off Tidy area	

ZENITH
PROPERTY CONSERVATION

No.
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Defects Observation Sheet

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
15	South elevation 4 4.	200x200	P2	Section of spollen is missing and few cracks	To tidy area Build out spollen and seal cracks running along Tidy job	
16	South elevation	N/A	P2	Part of sill missing	Clean area To build out sill seal any cracks smooth off Tidy job	

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Structural Survey Report

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Defects Observation Sheet

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Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
14	South elevation 4.	170x170	P2	Missing section of spollen and few cracks	To clean area Build back the spollen and seal cracks Tidy area	
14	South elevation	N/A	P2	Multiple cracks on corner of balcony	To clean area Apply a seal , smooth area Tidy job	

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Defects Observation Sheet

No.
00796

Inspection Details

Job No.:	Client:	Location:
W21751	Edinburgh council	South 5
Structure:	**Inspection Date:**	**Inspector Initials:**
Building	2025/04/08	GC

Priority Works: P1 – Essential Maintenance, P2 – Urgent Maintenance, P 3 – Routine Maintenance

Defects Log

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
1	South 5 5.	2m	P2	Damaged lintel (example image)	Carry out concrete repair	

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Defects Observation Sheet

No. 00796

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
2	South 5	2m	P2	Damaged lintels and ledges (example image) x8 window blocks	Carry out concrete repairs	
3	South 6 6.	2m x 2m	P2	Hairline cracks running through 5x sills , 2x of which have chunks missing	To clean area Seal cracks and mortar necessary parts smooth off Tidy job	

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Defects Observation Sheet

No. 00796

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
4	South 6	200 x 200	P2	Chunk missing of wall	To clean area Fill in missing section Tidy job	
5	South7 7.	Various patches	P2	Cracked concrete / exposed rebar (example image)	Carry out concrete repairs	

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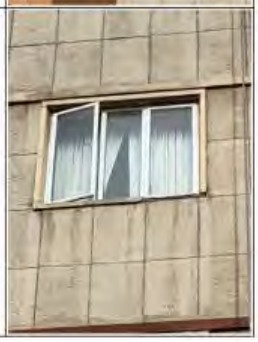
Defects Observation Sheet

No. 00796

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
6	South7	300mm	P2	Defective concrete on balcony	Carry out concrete repair	
7	South 8 8.	2m	P2	6x sill all contain hairline cracks through out 2x of which have chunk missing	Clean area Seal cracks and fill missing sill Tidy job	

Structural Survey Report

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Defects Observation Sheet

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Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
8	South 8	100 x 100	P2	Corners on balcony have cracks x3	To clean area Fill cracks and smooth off Tidy job	
9	South9	3m	P2	X6 Defective render / concrete and exposed rebar (example image)	Carry out render / concrete repairs	

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PROPERTY CONSERVATION

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Defects Observation Sheet

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
10	South9	300mm	P2	Defective render / concrete and exposed rebar	Carry out concrete repair	
11	South9	N/A	P2	Defective stringcourse / exposed rebar	Carry out concrete repair	

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PROPERTY CONSERVATION

Defects Observation Sheet

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Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
12	South10 10.	300mm	P2	X6 areas have defective concrete / exposed rebar (example image)	Carry out concrete repairs	
13	South 10	300mm	P2	Defective concrete / exposed rebar (example image)	Carry out concrete repairs	

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Defects Observation Sheet

No.
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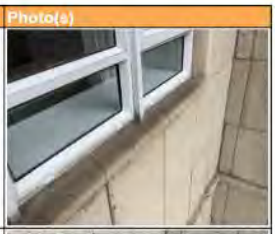
Inspection Details

Job No.	Client:	Location:
W21751	Edinburgh Council	Westfield Flats
Structure:	**Inspection Date:**	**Inspector Initials:**
Building	2025/04/09	AS

Priority Works: P1 – Essential Maintenance, P2 – Urgent Maintenance, P 3 – Routine Maintenance

Defects Log

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
1	South 11 	2m	P2	Multiple hairline cracks running through sill x4 Also same for base of roof ledge x1	Tidy area Fill cracks and smooth off Tidy job	
2	South 11	200x200	P2	3x moderate sized chunks missing out of wall	Carry out concrete repairs Tidy job	

Structural Survey Report

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00794

Defects Observation Sheet

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
17	South elevation	N/A	P2	Multiple cracks run along balcony	Tidy area Apply sealant to cracks and clean up job	
18	South elevation	N/A	P2	Multiple cracks on corner of balcony	Clean area Apply sealant or mortar to fill in cracks Tidy area	

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No.
00797

Defects Observation Sheet

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
3	South 11	300mm	P2	1x large chunk missing	Carry out concrete repairs Tidy job	
4	South 12 12.	2m	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Carry out concrete repairs Tidy job	
5	South 12	300mm	P2	Balcony corner is missing chunk	Carry out repairs Tidy job	

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Defects Observation Sheet

No.
00797

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
6	South 13 13.	2m	P2	6x window sills hairline cracks and some chunks missing	Carry out concrete repairs Tidy job	
7	North 11	200x 20	P2	Corners of building has cracks running vertically x3	Carry out concrete repairs	

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Defects Observation Sheet

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00797

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
22	South 14 14.	150 x 150	P2	Various ledges and lintels have defective concrete	Carry out concrete repairs	
14	South 14	100 x 50	P2	Connor of buildings exposed x 3	Carry out concrete repairs	

Structural Survey Report

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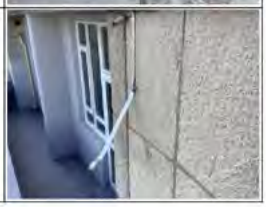
Defects Observation Sheet

No. 00797

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
15	South 15 15.	2m	P2	Various ledges and lintels have chunks out of them bottom lintel 4x and the side has 1x	Carry out concrete repairs	
16	South 15	N	P2	On the top balcony the l\c has been cut and is no longer working	Carry out repair or replace	

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Defects Observation Sheet

Inspection Details

Job No:	Client:	Location:
W21751	Edinburgh council	Westfield Flats
Structure:	**Inspection Date:**	**Inspector Initials:**
Building	2025/04/10	Sa

Priority Works: P1 – Essential Maintenance, P2 – Urgent Maintenance, P 3 – Routine Maintenance

Defects Log

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
1	South 15 b **15.b**	2m	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Clean area Strip out any loose/ broken debris, replace/repair any broken sills Tidy job	

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Defects Observation Sheet

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Ref	Location	Size	Priority	Defect	Recommended Action	Photograph
2	South 16 **16.**	2m	P2	Various ledges and lintels have defective concrete and exposed rebar example image x5	Clean area Strip out any loose/ broken debris, replace/repair any broken sills Tidy job	
3	South 16	300mm	P2	Multiple hairline cracks along the upper floor slabs	Tidy area Strip out any loose/ broken debris, replace/repair any broken sills Tidy job	

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Defects Observation Sheet

No. 00798

Ref	Location	Size	Priority	Defect	Recommended Action	Photo(s)
4	South 17 17.	2m	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Tidy area Strip out any loose/ broken debris, replace/repair any broken sills Tidy job	
5	South 17	10m x 300mm	P2	Level 8 string course , failed flashband covering, missing patches	Remove loose material Apply new covering to ledge	

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Defects Observation Sheet

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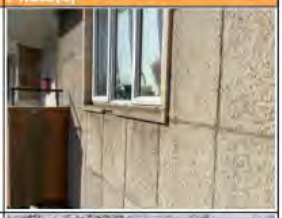
00798

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
6	South 18 18.	2 m each	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Clean area Strip out any loose/ broken debris, replace/repair any broken sills Tidy job	
7	North 20	200x200	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Remove any loose/broken debris then replace/repair concrete damage	

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Defects Observation Sheet

No. 00799

Inspection Details

Job No.:	Client:	Location:
W21751	Edin Council	Westfield Court
Structure:	Inspection Date:	Inspector Initials:
Building	2025/04/11	MB

Priority Works: P1 – Essential Maintenance, P2 – Urgent Maintenance, P 3 – Routine Maintenance

Defects Log

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
1	South 19 19.	300mm	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Carry out concrete repairs	

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Defects Observation Sheet

No.
00799

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
2	South 20 20.	2m x3	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Remove broken debris and clean the area then either rapid the broken parts or replace the broken sills	
3	South 20	150x150n x 3	P2	Multiple hairline cracks on 3 different balconies	Remove old/broken debris and clean the work area then carry out concrete repairs	

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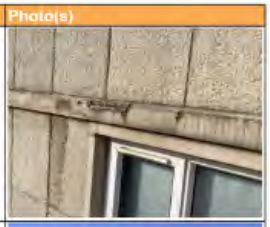
Defects Observation Sheet

No. 00799

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
4	South 21 21.	2m	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Tidy area remove any loose debris Carry out concrete repairs and smooth and smooth off Tidy job	
5	South 21	300 x 300	P2	Paint is flaking off inn various places	Treat area and apply new paint to cover patches	

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Defects Observation Sheet

No. 00799

Ref	Location	Size	Priority	Defect	Recommended Action	Photo(s)
6	South 22 22.	2m x3	P2	Multiple sills have defective concrete and exposed rebar example image	Remove any loose/broken debris then clean the area then repair or replace the sills that are broken	
7	South 22	300mm	P2	String course/ ledge is missing a fair amount of mastic	Fill the mastic gap after removing any loose debris	

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Defects Observation Sheet

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00799

Ref	Location	Size	Priority	Defect	Recommended Action	Photo(s)
8	South 23 23.	2m	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Tidy area remove any loose debris seal cracks and apply concrete repairs Tidy job	
9	South 24 24.	150x150	P2	1 small chunk out of the concrete on the balcony but it's right down to the rebar	Remove any loose/damaged debris clean the work area and then Carry out concrete repairs	

Back Elevation.

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Defects Observation Sheet

No. 00796

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
28	North1 1.	300mm	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Carry out concrete repairs	
29	North elevation	N/a	P2	Various exposed gas pipes (no vandal guards fitted)	Install guards	

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Defects Observation Sheet

No.
00796

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
26	North3 3.	300mm	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Carry out concrete repairs	
27	North2 2.	200mm x 200mm	P2	Plastic vent cowl missing	Install vent cowl and point up area	

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Defects Observation Sheet

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00796

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
24	North4 4.	300mm	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Carry out concrete repairs	
25	North elevation	N/a	P2	Various exposed gas pipes (no vandal guards fitted)	Install guards	

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Defects Observation Sheet

No. 00796

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
22	North5 **5.**	300mm	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Carry out concrete repairs	
23	North4 **4.**	300mm	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Carry out concrete repairs	

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Defects Observation Sheet

No
00796

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
20	North6	300mm	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Carry out concrete repairs	
21	North6	300mm	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Carry out concrete repairs	

6.

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Defects Observation Sheet

No
00796

Ref	Location	Size	Priority	Defect	Recommended Action	Photo(s)
18	North7	300mm	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Carry out concrete repairs	
19	North7	300mm	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Carry out concrete repairs	

7.

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No.
00796

Defects Observation Sheet

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
16	North9 9.	N/a	N/A	Unable to inspect due to parked cars below		
17	North8 8.	300mm	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Carry out concrete repairs	

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Defects Observation Sheet

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00796

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
14	North 10 10.	300mm	P2	Various ledges and lintels have defective concrete and exposed rebar (example image)	Carry out concrete repairs	
15	North 10	300mm	P2	Various ledges and lintels have defective concrete and exposed rebar (example image) x4	Carry out concrete repairs	

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Defects Observation Sheet

No.
00797

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
6						
7	North 11 11.	200x 20	P2	Corners of building has cracks running vertically x3	Carry out concrete repairs	
8	North 12 12.	2m	P2	3x hairline cracked sills 1 chunk missing	Carry out concrete repairs Tidy job	

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Defects Observation Sheet

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00797

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
9	North 12	200x150	P2	1x larder vent grating missing	Replace	
10	North 13 13.	2m	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Carry out concrete repairs Tidy job	

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Defects Observation Sheet

No.
00797

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
11	North 13	200 x 200	P2	Corner of floor slab is missing	Carry out concrete repairs	
12	North 13	300mm	P2	Underside of door roofing has spallon revealed re bar	Carry out concrete repairs	

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Defects Observation Sheet

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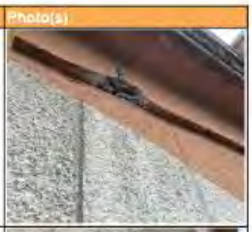
Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
13	North 14 14.	150x150	P2	3x areas on wall are missing chunks	Carry out concrete repairs Tidy job	
14	North 15 15.	150 x 150	P2	Corners of building on left defective and need repaired	Carry out concrete repairs	

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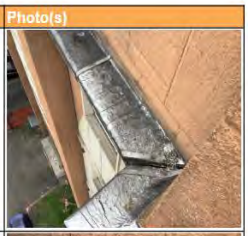
PROPERTY CONSERVATION

Defects Observation Sheet

No.
00797

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
17	North 16 16.	150x150	P2	Busing overhang has split where it should meet	Carry out repair	
18	North 17 17.	2m	P2	Various ledges and lintels have defective concrete and exposed rebar example image x6 lintels	Carry out concrete repairs	

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Defects Observation Sheet

No.
00797

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
15	North 16 **16.**	150 x 150	P2	Corners of building are faulty and need repaired	Carry out concrete repairs	
16	North 16	150x150	P2	Building overhang has split in the corner where both bits meet	Carry out repair	

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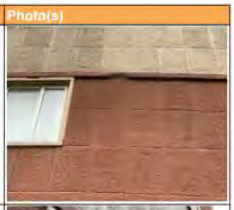
Defects Observation Sheet

No.
00797

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
19	North 18 **18.**	200	P2	4x chunks out of wall	Carry out concrete repairs	
20	North 19 **19.**	2m	P2	Various ledges and lintels have defective concrete	Carry out concrete repairs	

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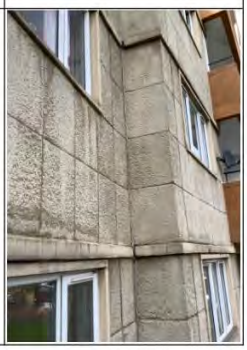
PROPERTY CONSERVATION

Defects Observation Sheet

No.
00797

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
21	North 19 20.	150 x 100	P2	Under door roof slight damage	Carry out concrete repairs	
22	South 14					
14	South 14	100 x 50	P2	Connor of buildings exposed x 3	Carry out concrete repairs	

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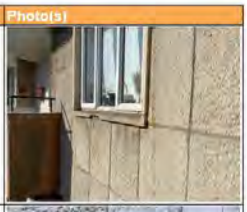
Defects Observation Sheet

No. 00798

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
6	South 18	2 m each	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Clean area Strip out any loose/ broken debris, replace/repair any broken sills Tidy job	
7	North 20	200x200	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Remove any loose/broken debris then replace/repair concrete damage	

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PROPERTY CONSERVATION

No.
00798

Defects Observation Sheet

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
8	North 21 21.	2m	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Clean out area , remove any loose debree apply mortar repair / seal cracks Tidy job	
9	North 21	300 x 300	P2	Missing flashband	Carry out temporary repair or clean area and apply sealant and new flashband	

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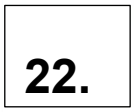
Defects Observation Sheet

No. 00798

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
10	North 22 	2m x 5	P2	5x sills with broken/damaged concrete down to the rebar	Take out any broken/damaged debris clean the area then carry out the concrete repairs or replace the sills.	
11	North 22	300x200n	P2	Spalling surrounding extractor fan is damaged	Take out any damaged/broken debris and clean the work area then replace the missing concrete	

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Defects Observation Sheet

No. 00798

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
12	North 23 **23.**	5m	P2	Roof edge has cracks with tree growing out , edge has split open	To remove any debris or plants , seal cracks or mortar reapply the 5m edge	
13	North 23	2m	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Tidy area Clean our debris or loose parts the carry out concrete repairs as see fit Sill x3	

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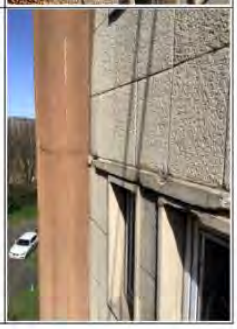
Defects Observation Sheet

No.
00798

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
14	North 24 **24.**	150x150	P2	Missing extractor fan cap	Take out old fan cap casing and fit new extractor fan cap	
15	North 24	300	P2	Spalling in corner of building re-bar is exposed	Tidy area Remove and loose debris Carry out concrete repairs and smooth off Tidy job	

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Defects Observation Sheet

No. 00798

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
16	North 25 **25.**	2m	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Remove all loose debris , prep area and Carry out concrete repairs / seal cracks	
17	North 25	250	P2	Spalling on wall revealing re-bar	Carry out concrete repairs	

ZENITH

Defects Observation Sheet

No.
00738

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
18	North 26 **26.**	2m x 5	P2	5 sills all very damaged showing all the way down to the rebar	Remove any excess broken or damaged debris clean the area then repair or replace the sills	

ZENITH

Defects Observation Sheet

No. 00799

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
10	North 27 27.	300 x 300	P2	Various ledges have defective concrete and exposed rebar example image	Clean out area remove any loose debris and Carry out concrete repairs	
11	North 27	150 x 150	P2	ledges and lintels have defective concrete and exposed rebar example in image	Remove old/ broken debris clean work area then Carry out concrete repairs.	

ZENITH

Defects Observation Sheet

No.
00799

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
12	North 27	500 x 150	P2	Spalling on wall panel	Remove any broken/loose debris then clean the work area then carry out concrete repairs or replace wall panel	
13	North 28 28.	2m x 1	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Remove any loose/ broken debris then clean the work area then replace or repair concrete damage	

ZENITH

Defects Observation Sheet

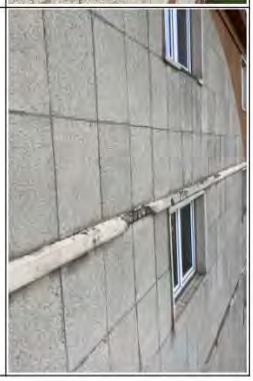
No. 00799

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
14	North 29 29.	300mm x 300	P2	Various sections of the wall have defective concrete and exposed rebar example image	Clean area and remove any loose debris then Carry out concrete repairs Tidy job	
15	North 29	200x100n	P2	Topmcourse of building ledge has split and is missing filling	Clean area remove any loose material then seal and refill , then tidy the job	

ZENITH
PROPERTY CONSERVATION

No.
00801

Defects Observation Sheet

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
3	30 north 30.	300mm	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Remove any loose material, apply coating to rebar and carry out concrete repairs	
4	31north	300mm	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Remove any loose material, apply coating to rebar and carry out concrete repairs	

ZENITH

Defects Observation Sheet

No.
00799

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
16	North 30	2m	P2	Various ledges and lintels x 5 have defective concrete and exposed rebar example image also walls have sporing in different locations	Clean area remove any loose debris , seal any areas if necessary Carry out concrete repairs and smooth off Tidy job	

ZENITH

Defects Observation Sheet

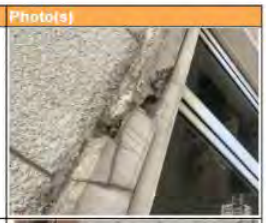
No.
00801

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
5	31 north 31.	300mm	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Remove any loose material, apply coating to rebar and carry out concrete repairs	
6	32 north 32.	300mm	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Remove any loose material, apply coating to rebar and carry out concrete repairs	

ZENITH

Defects Observation Sheet

No. 00801

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
7	32 north	300mm	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Remove any loose material, apply coating to rebar and carry out concrete repairs	
8	32 north	400mm	P2	Cladding panel has slight movement due to stringcourse deteriorating	Point up areas after stringcourse has been repaired to secure panel into place	

ZENITH

Defects Observation Sheet

No. 00801

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
9	33 north 33.	300mm	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Remove any loose material, apply coating to rebar and carry out concrete repairs	
10	33 north	300mm	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Remove any loose material, apply coating to rebar and carry out concrete repairs	

ZENITH

Defects Observation Sheet

No. 00801

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
11	34north 34.	300mm	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Remove any loose material, apply coating to rebar and carry out concrete repairs	
12	34north	300mm	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Remove any loose material, apply coating to rebar and carry out concrete repairs	

ZENITH

Defects Observation Sheet

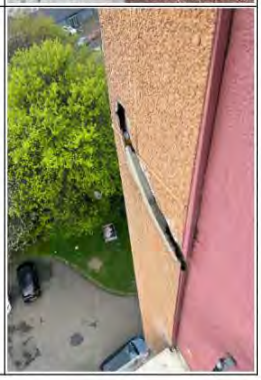
No. 00801

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
13	34 north	300mm	P2	Various ledges and lintels have defective concrete and exposed rebar example image	Remove any loose material, apply coating to rebar and carry out concrete repairs	
14	34 north	N/a	P2	Cladding panel damaged	Remove damaged panel, replace and point up area	

ZENITH
PROPERTY CONSERVATION

Defects Observation Sheet

No.
00801

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
15	34 north	5m	P2	Mastic sealer deteriorated and Coming away from building	Remove defective mastic and apply new to prevent leaks	
16	34 north	N/a	P2	Cladding panel damaged	Remove damaged panel, replace and point up area	

East/West Elevation.

ZENITH
PROPERTY CONSERVATION

Defects Observation Sheet

No.
00794

Inspection Details

Job No.:	Client:	Location:
W21751	Atkins Realis	Westfield Court, 15 Alexander Road,Edinburgh
Structure:	Inspection Date:	Inspector Initials:
Building	2025/04/07	AS

Priority Works: P1 – Essential Maintenance, P2 – Urgent Maintenance, P 3 – Routine Maintenance

Defects Log

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
1	East elevation 1	N/A	P2	Overview	N/A	

2FE040A5-7F20-4AAF-9AAE-4AA35D449622

ZENITH

No.
00794

Defects Observation Sheet

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
2	East elevation	200 x 200	P2	Multiple cracks on side of floor slab	To morter or seal creaks back up	
3	East elevation	150L x 150	P2	Previous spollen missing 150x150 chunk	To clean area Reapply morter Tidy up job	

2FE040A5-7F20-4AAF-9AAE-4AA35D449622 2

ZENITH
PROPERTY CONSERVATION

Defects Observation Sheet

No.
00802

Inspection Details

Job No.: Client: Location:

Structure:
Building

Inspection Date: Inspector Initials:

Priority Works: P1 – Essential Maintenance, P2 – Urgent Maintenance, P 3 – Routine Maintenance

Defects Log

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
1	West Elevation	N/A	N/A	Overview		

97AA18D0-6973-4F54-9043-9EF5A4EF3457

ZENITH
PROPERTY CONSERVATION

Defects Observation Sheet

No.
00802

Ref.	Location	Size	Priority	Defect	Recommended Action	Photo(s)
2	As above	1000mm x 200mm	P2	Spalled and cracke string course	Remove all loose concrete and repair	

97AA18D0-6973-4F54-9043-9EF5A4EF3457 2

Appendix C – Capital Testing External Investigation Report

Capital Testing Services Ltd
Structural Investigation

REPORT ON INVESTIGATION OF CAVITY WALL TIES & CONCRETE ELEMENTS WESTFIELD COURT, EDINBURGH

Report Reference: 25/3045/3359

Date: 22/05/2025

Site: WESTFIELD COURT
ALEXANDER DRIVE
EDINBURGH

Prepared by

Approved by

Prepared for: Will Rudd Edinburgh
43 York Place, Edinburgh,
Scotland EH1 3HP

Capital Testing Services Ltd
Units 13/14 Laverock Road
Stirling Road Industrial Estate
AIRDRIE
ML67UD

CONTENTS

1. INTRODUCTION

1.1. Further to the instructions from Will Rudd Edinburgh consulting engineers , Capital Testing Services Ltd have carried out borescope inspection on external wall cavities at Westfield Court Edinburgh. The purpose of the investigation was to provide details of the tie coverage/condition and embedment.

1.2. Investigation works and sampling was also carried out to determine the properties of concrete as part of an assessment being carried out by Will Rudd Edinburgh.

1.3. The investigation was carried out between the 6th – 9th May 2025 .

1.4. Access, Cavity Inspections and Concrete Testing was carried out by rope access team provided by Zenith.

2. EXTENT OF INVESTIGATION

2.1. At locations of the wall externally, an area of the wall cavity was surveyed to assess the wall ties within each location.

2.2. Covermeter surveys of the reinforcement in the concrete elements were conducted as indicated on the location plan contained in Appendix A.

2.3. Concrete dust samples were taken for the purpose of chemical analysis.

2.4. Depth of Carbonation survey results were recorded at concrete dust sampling locations

3. INSPECTION PROCEDURES

3.1. The survey was carried with out at various wall locations by drilling a 12mm access hole through the external "Orlit" Panels using an 36v percussion drill fitted with the appropriate drill bit. A right-angled viewing endoscope was inserted at these access points to view the immediate area of the wall cavity. Video footage was then taken at each location for reporting purposes.

3.2. At each covermeter survey location, reinforcement bars were located and cover to reinforcement was recorded.

3.3. Dust samples were obtained using a 36v cordless percussion drill fitted with a 20mm drill bit. The samples were bagged and given a unique reference number. The dust samples were sent for testing in accordance with BS 1881: Part 124:2015 Determination of Chloride Content.

3.4. Carbonation assessment of the concrete was carried out by phenolphthalein spray to BRE IP 6/81 on freshly exposed concrete.

4. OBSERVATION RECORDS

4.1. Locations of the cavity wall investigation are presented in Appendix A.

4.2. Observation records made during the survey are presented in Appendix B .

4.3. Video footage and photographs taken during the investigation are presented in a separate folder.

5. TEST RESULTS

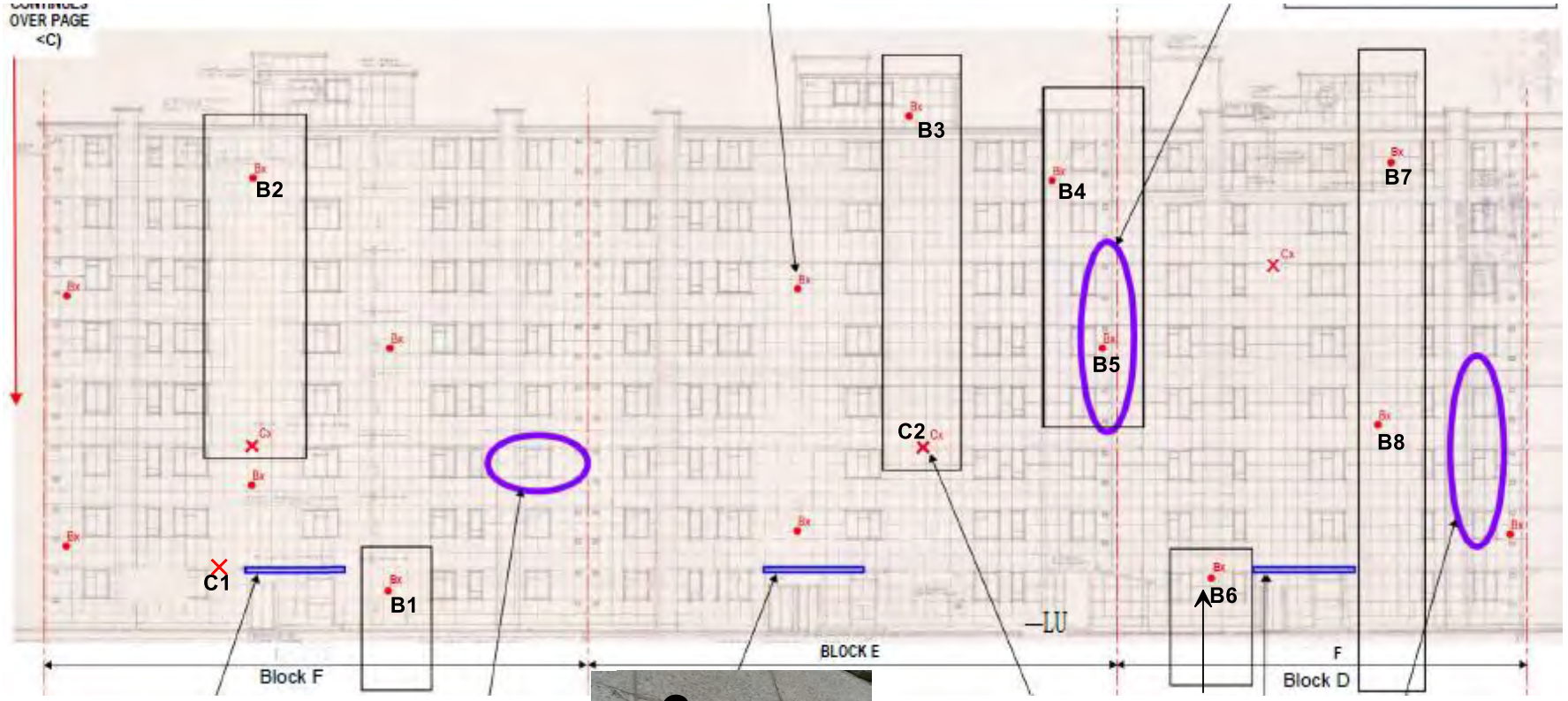
5.1. Chloride content results table and BRE corrosion risk assessment are Presented in Appendix C.

5.2. The Determination of Chloride Content test certificates are presented in Appendix D.

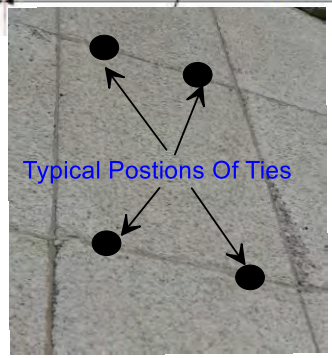
Appendix A

Investigation Locations

INVESTIGATION LOCATIONS REAR ELEVATION



SOME TEST LOCATIONS RE-LOCATED
FOR EASE OF ACCEESS FROM ROPE DROP
POSITION



SERVICE DUCT
FIBREGLASS CLADDING
DOUBLE BRICK THICKNESS

B1 ● :- Borescope & Wall Tie Survey Locations

C1 ✕ :-Concrete Sample Locations

NOT TO SCALE

Capital Testing Services Ltd Units 13/14 Laverock Road Stirling Road Industrial Estate Airdrie	PROJECT: Westfield Court	CLIENT: Will Rudd Davidson	PREPARED BY: DATE: MAY 2025 SHEET NO.: 001

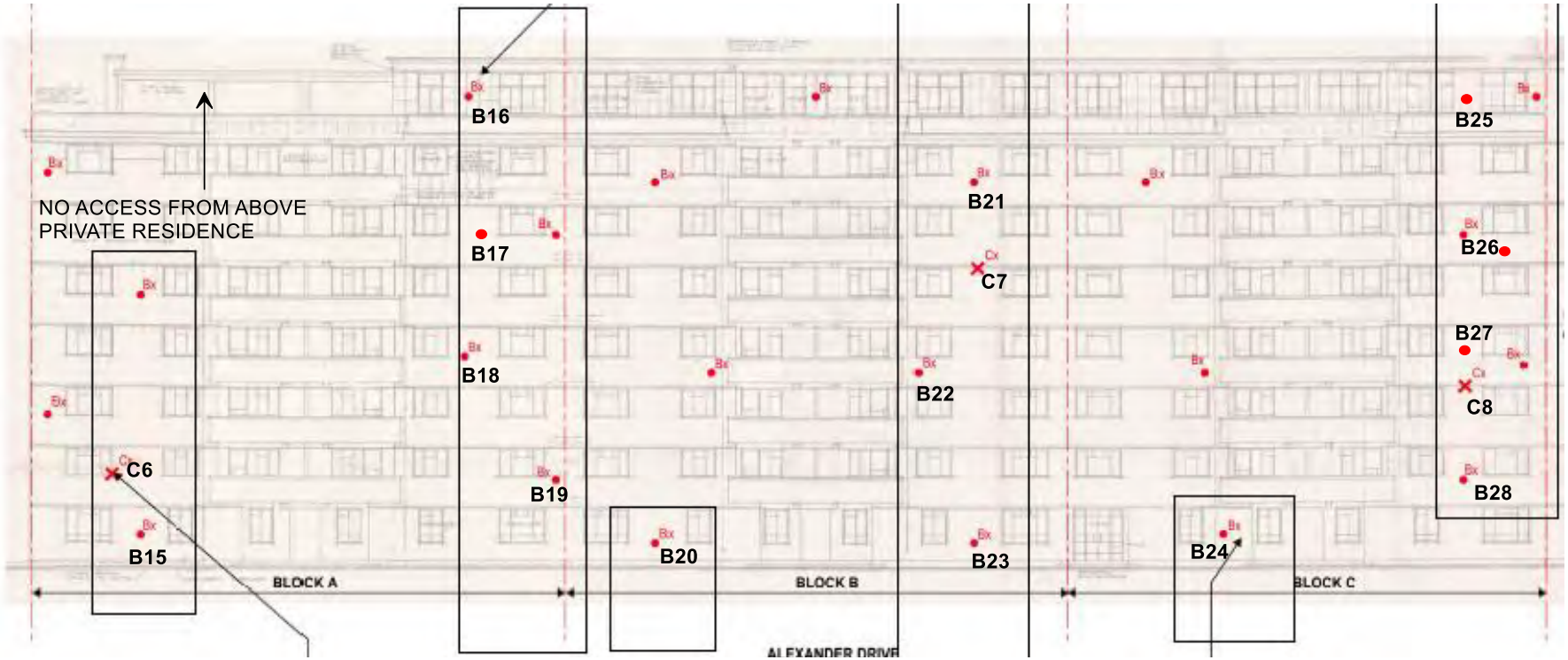
INVESTIGATION LOCATIONS REAR ELEVATION

SOME TEST LOCATIONS RE-LOCATED
FOR EASE OF ACCEESS FROM ROPE DROP
POSITION

B1 ● :- Borescope & Wall Tie Survey Locations **C1** ✕ :-Concrete Sample Locations **NOT TO SCALE**

Capital Testing Services Ltd Units 13/14 Laverock Road Stirling Road Industrial Estate Airdrie	PROJECT: Westfield Court	CLIENT: Will Rudd Davidson	PREPARED BY: DATE: MAY 2025 SHEET NO.: 002

INVESTIGATION LOCATIONS FRONT ELEVATION



SOME TEST LOCATIONS RE-LOCATED
FOR EASE OF ACCEESS FROM ROPE DROP
POSITION

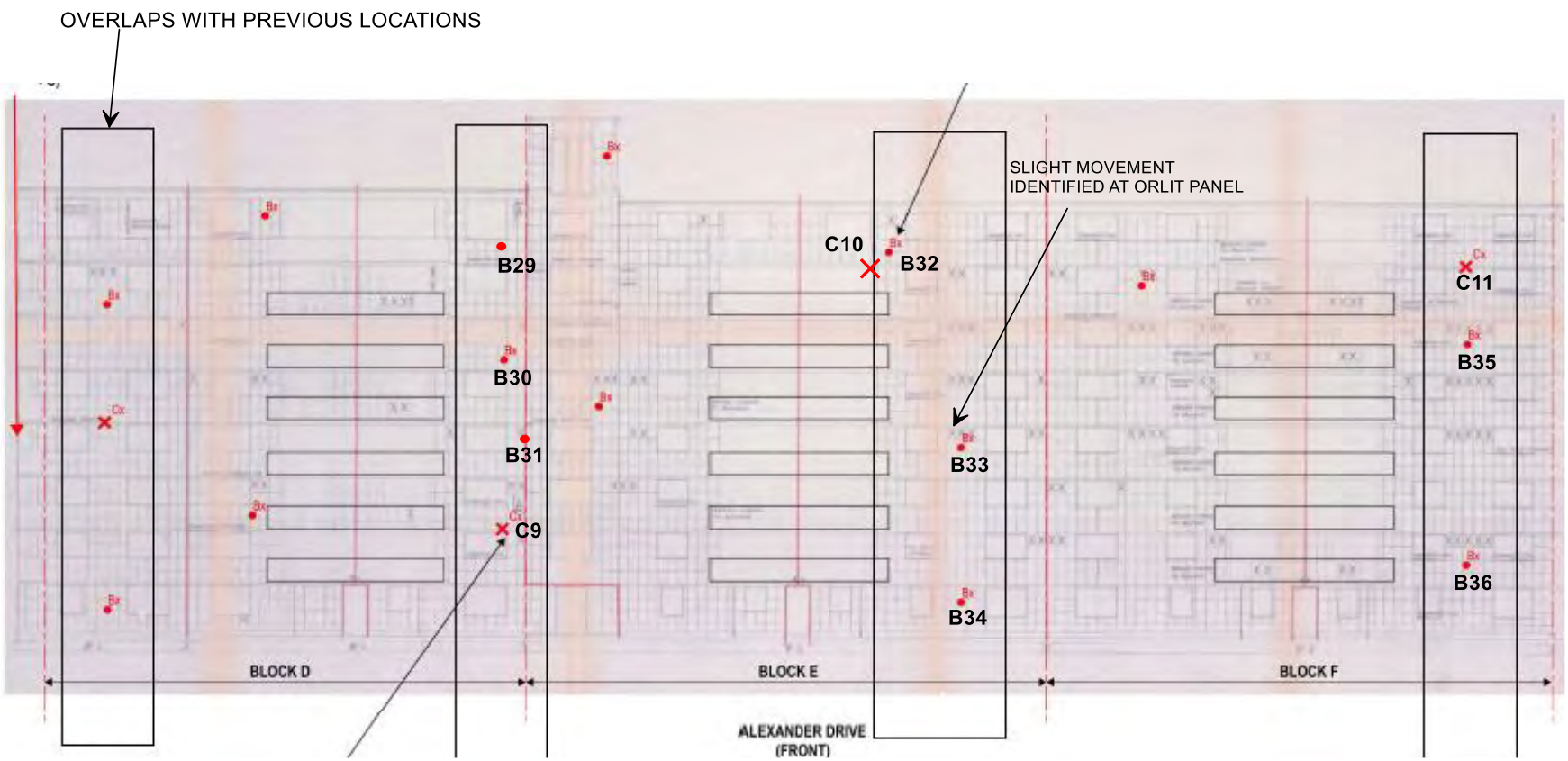
B1 ● :- Borescope & Wall Tie Survey Locations

C1 ✕ :-Concrete Sample Locations

NOT TO SCALE

Capital Testing Services Ltd Units 13/14 Laverock Road Stirling Road Industrial Estate Airdrie	PROJECT: Westfield Court	CLIENT: Will Rudd Davidson	PREPARED BY: DATE: MAY 2025 SHEET NO.: 003

INVESTIGATION LOCATIONS FRONT ELEVATION

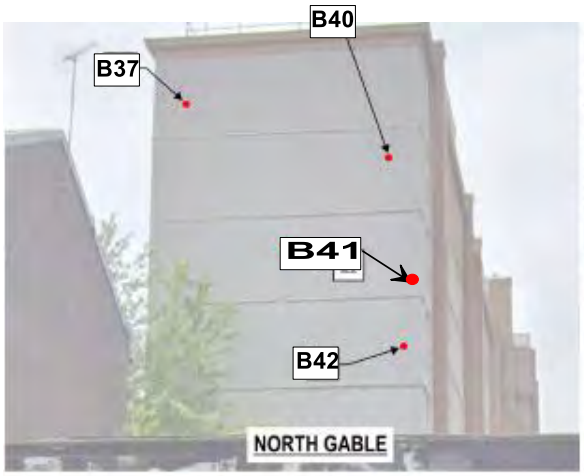


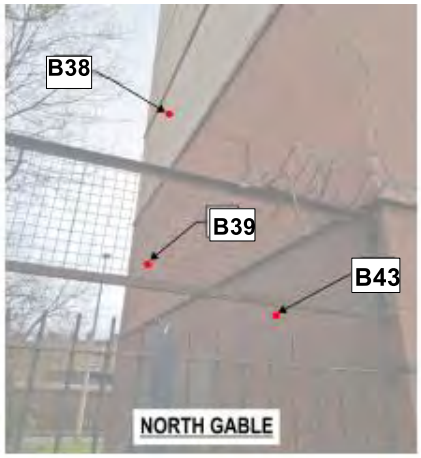
SOME TEST LOCATIONS RE-LOCATED
FOR EASE OF ACCEESS FROM ROPE DROP
POSITION

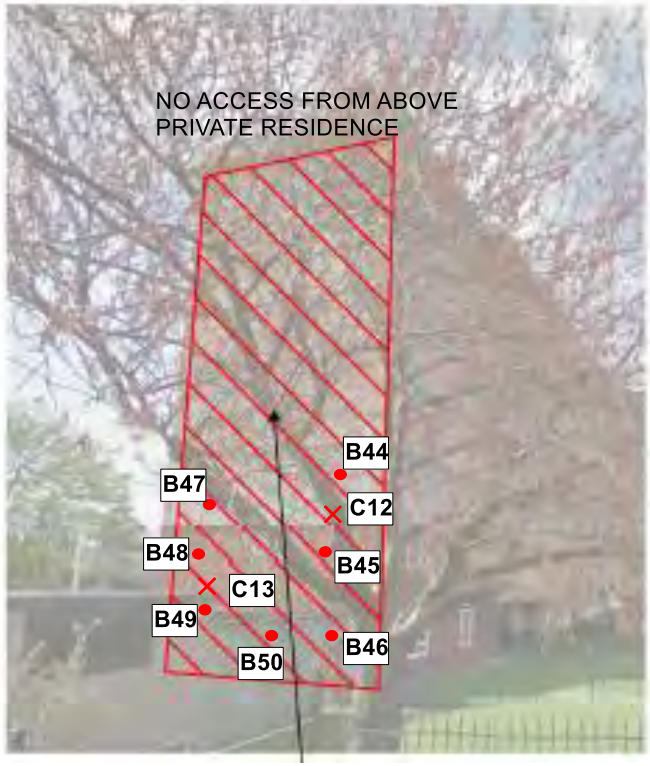
B1 ● :- Borescope & Wall Tie Survey Locations **C1** ✕ :-Concrete Sample Locations **NOT TO SCALE**

Capital Testing Services Ltd Units 13/14 Laverock Road Stirling Road Industrial Estate Airdrie	PROJECT: Westfield Court	CLIENT: Will Rudd Davidson	PREPARED BY: [redacted] DATE: MAY 2025 SHEET NO.: 004

INVESTIGATION LOCATIONS NORTH & SOUTH GABLES







SOME TEST LOCATIONS RE-LOCATED
FOR EASE OF ACCEESS FROM ROPE DROP
POSITION

B1 ● :- Borescope & Wall Tie Survey Locations

C1 ✕ :-Concrete Sample Locations

NOT TO SCALE

Capital Testing Services Ltd Units 13/14 Laverock Road Stirling Road Industrial Estate Airdrie	PROJECT: Westfield Court	CLIENT: Will Rudd Davidson	PREPARED BY: [redacted] DATE: MAY 2025 SHEET NO.: 005

Appendix B

Observation Records
Borescope Survey of Wall Cavity

Will Rudd Davidson Consulting Engineers Ltd Location: Westfield Court , Rear Elevation

Date	Location Ref	Borescope Video Ref	Insulstion Type	Inner	Outer mm	Cavity mm	Tie Type & Condition	Comments
06/05/2025	**B1**	001	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 4 Ties Visible Evenly Spaced at Top and Bottom of Orlit Panel Ties viewed are in good condition and appear central within cavity.	
06/05/2025	**B2**	002	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 2 Ties Visible Evenly Spaced at Top of Orlit Panel Ties viewed are in good condition and appear central within cavity.	
06/05/2025	**B3**	003	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 6 Ties Visible Evenly Spaced at Top and bottom of Orlit Panel Ties viewed are in good condition and appear central within cavity.	Mortar Bridging on Ties
06/05/2025	**B4**	004	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 2 Ties VisibleAT Bottom of Orlit Panel Ties viewed are in good condition and appear central within cavity.	View obscured by debris in cavity Concrete Column visible, with what appears to be Tie Bent back Against concrete surface.
06/05/2025	**B5**	005	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 3 Ties Visible Evenly Spaced at Top of Orlit Panel Ties viewed are in good condition and appear central within cavity.	Photos 98-101 Cracking at outer face
06/05/2025	**B6**	No Video						Photo 102 See Note On Location Drawing

Will Rudd Davidson Consulting Engineers Ltd Location: Westfield Court , Rear Elevation

Date	Location Ref	Borescope Video Ref	Insulstion Type	Inner	Outer mm	Cavity mm	Tie Type & Condition	Comments
06/05/2025	**B7**	006	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 4 Ties Visible Evenly Spaced at Top and Bottom of Orlit Panel Ties viewed are in good condition and appear central within cavity.	Mortar Bridging on Ties
06/05/2025	**B8**	007	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 5 Ties Visible Evenly Spaced at Top and Bottom of Orlit Panel Ties viewed are in good condition and appear central within cavity.	Mortar Bridging on Ties
06/05/2025	**B9**	008	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 4 Ties Visible Evenly Spaced at Top and Bottom of Orlit Panel Tie also on Vertical Edge Ties viewed are in good condition and appear central within cavity.	Mortar Bridging on Ties
06/05/2025	**B10**	009	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 5 Ties Visible Evenly Spaced at Top and Bottom of Orlit Panel Ties viewed are in good condition and appear central within cavity. Remedial Helifix Type Tie Visible	
06/05/2025	**B11**	010	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 1 Tie Visible at Top of Orlit Panel Ties appear to be missing where viewed at previous locations. Remedial Helifix Type Tie Visible	
06/05/2025	**B12**	011	None Present	Brick & Concrete	Pre Cast Concrete "Orlit" Panel	75 &50	No Ties Visible	Survey Location At Concrete Column

Will Rudd Davidson Consulting Engineers Ltd Location: Westfield Court , Rear Elevation

Date	Location Ref	Borescope Video Ref	Insulstion Type	Inner	Outer mm	Cavity mm	Tie Type & Condition	Comments
06/05/2025	**B13**	012	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 4 Ties Visible Evenly Spaced at Top and Bottom of Orlit Panel Ties viewed are in good condition and appear central within cavity.	Mortar Bridging on Ties
06/05/2025	**B14**	013	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 2 Ties Visible Ties viewed are in good condition and appear central within cavity.	Mortar Bridging on Ties Views Partially Obscured By Concrete Column

Will Rudd Davidson Consulting Engineers Ltd Location: Westfield Court , Front Elevation

Date	Location Ref	Borescope Video Ref	Insulstion Type	Inner	Outer mm	Cavity mm	Tie Type & Condition	Comments
07/05/2025	**B15**	014	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 2 Ties Visible at Top of Orlit Panel Ties appear to be missing at bottom of panel .	Views Obscured By Debris in Cavity
07/05/2025	**B16**	015	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 2 Ties Visible, Ties viewed are in good condition and appear central within cavity.	Concrete Column visible, with what appears to be Tie Bent back Against concrete surface.
07/05/2025	**B17**	016	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 5 Ties Visible Evenly Spaced at Top and Bottom of Orlit Panel Ties viewed are in good condition and appear central within cavity. Remedial Helifix Type Tie Visible	Mortar Bridging on Ties
07/05/2025	**B18**	017	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 1 Tie Visible at Top of Orlit Panel Tie viewed is in good condition and appeasr central within cavity.	Short Video only part of full 360 degree view recorded.
07/05/2025	**B19**	018	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 2 Ties Visible Ties viewed are in good condition and appear central within cavity.	Concrete Column Visible
07/05/2025	**B20**	019	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 5 Ties Visible Evenly Spaced at Top and Bottom of Orlit Panel Ties viewed are in good condition and appear central within cavity	Concrete Column Visible

Will Rudd Davidson Consulting Engineers Ltd Location: Westfield Court , Front Elevation

Date	Location Ref	Borescope Video Ref	Insulstion Type	Inner	Outer mm	Cavity mm	Tie Type & Condition	Comments
07/05/2025	**B21**	020	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 4 Ties Visible evenly spaced at Top and Bottom of Orlit Panel Ties viewed are in good condition and appear central within cavity.	Mortar Bridging On Ties Concrete Column Visible
07/05/2025	**B22**	021	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 3 Ties Visible evenly spaced at Orlit Panel. Tie Missing at Bottom of Orlit Panel Ties viewed are in good condition and appear central within cavity.	Concrete Column Visible
07/05/2025	**B23**	022	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 3 Ties Visible Ties viewed are in good condition and appear central within cavity. Bottom Tie appers to be missing	Mortar Bridging on Ties
07/05/2025	**B24**	024	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 6 Ties Visible evenly spaced at Top and Bottom of Orlit Panel Ties viewed are in good condition and appear central within cavity.	Concrete Column Visible
07/05/2025	**B25**	025	None Present	Concrete	Pre Cast Concrete "Orlit" Panel	35	No Ties Visible Very Narrow Cavity At Column Position Which Limits the Depth of Field View from Borescope	Concrete Column Visible
07/05/2025	**B26**	026 027	None Present	Concrete & Brick	Pre Cast Concrete "Orlit" Panel	45 75	1 No Remedial Helifix TypeTie Visible Column-Orlit Panel Narrow Cavity At Column Position Which Limits the Depth of Field View from Borescope 2 Ties Visible 1 No Remedial Helifix TypeTie Visible to Brick	Concrete Column Visible

Will Rudd Davidson Consulting Engineers Ltd Location: Westfield Court , Front Elevation

Date	Location Ref	Borescope Video Ref	Insulstion Type	Inner	Outer mm	Cavity mm	Tie Type & Condition	Comments
07/05/2025	**B27**	028	None Present	Concrete	Pre Cast Concrete "Orlit" Panel	40	No Ties Visible Very Narrow Cavity At Column Position Which Limits the Depth of Field View from Borescope	No Ties Visible Mortar Debris In Cavity Obscuring View
07/05/2025	**B28**	029	None Present	Concrete	Pre Cast Concrete "Orlit" Panel	40	No Ties Visible Very Narrow Cavity At Column Position Which Limits the Depth of Field View from Borescope	
08/05/2025	**B29**	030	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 2 Ties Visible Evenly Spaced at Top of Orlit Panel Ties viewed are in good condition and appear central within cavity. Bottom Tie appears to be missing	Concrete Section Visible Spanning Cavity
08/05/2025	**B30**	031	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 3 Ties Visible evenly spaced at Top and Bottom of Orlit Panel Ties viewed are in good condition and appear central within cavity.	Concrete Section Visible Spanning Cavity
08/05/2025	**B31**	032	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 1 Tie Visible at Top of Orlit Panel Ties appear to be missing Tie viewed is in good condition and appear central within cavity.	Concrete Column Visible
08/05/2025	**B32**	033	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 6 Ties Visible evenly spaced at Top and Bottom of Orlit Panel Ties viewed are in good condition and appear central within cavity.	Concrete Column Visible

Will Rudd Davidson Consulting Engineers Ltd Location: Westfield Court , Front Elevation

Date	Location Ref	Borescope Video Ref	Insulstion Type	Inner	Outer mm	Cavity mm	Tie Type & Condition	Comments
08/05/2025	**B33**	034	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 3 Ties Visible evenly spaced at Top of Orlit Panel Tie appears to be missing at bottom of panel. Ties viewed are in good condition and appear central within cavity.	Mortar Bridging
08/05/2025	**B34**	035	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 4 Ties Visible evenly spaced at Top and Bottom of Orlit Panel Ties viewed are in good condition and appear central within cavity.	
08/05/2025	**B35**	036	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 4 Ties Visible evenly spaced at Top and Bottom of Orlit Panel Ties viewed are in good condition and appear central within cavity.	
08/05/2025	**B36**	037	None Present	Concrete	Pre Cast Concrete "Orlit" Panel	45	No Ties Visible	Concrete Column Visible

Will Rudd Davidson Consulting Engineers Ltd Location: Westfield Court , North Gable

Date	Location Ref	Borescope Video Ref	Insulstion Type	Inner	Outer mm	Cavity mm	Tie Type & Condition	Comments
08/05/2025	**B37**	038	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 2 Ties Visible Ties appear to be missing at top and bottom of panel.	
08/05/2025	**B38**	039	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 3 Ties Visible Ties appear to be missing at top and bottom of panel	
08/05/2025	**B39**	040	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 5 Ties Visible Evenly Spaced at Top and bottom of Orlit Panel Ties viewed are in good condition and appear central within cavity.	Mortar Bridging on Ties
08/05/2025	**B40**	041	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 3 Ties Visible, Ties appear to be missing at top and bottom of panel Ties viewed are in good condition and appear central within cavity. 4 x Remedial Helifix Type Ties Visible	
08/05/2025	**B41**	042	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 2 Ties Visible, Ties appear to be missing ,Ties apper to be missing at top and bottom of panel. Ties viewed are in good condition and appear central within cavity. 2 x Remedial Helifix Type Ties Visible	
08/05/2025	**B42**	043	None Present	Concrete	Pre Cast Concrete "Orlit" Panel	45	No Ties Visible	Concrete Column

Will Rudd Davidson Consulting Engineers Ltd Location: Westfield Court , North Gable

Date	Location Ref	Borescope Video Ref	Insulstion Type	Inner	Outer mm	Cavity mm	Tie Type & Condition	Comments
08/05/2025	**B43**	044	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 2 Ties Visible	Concrete Column Visible

Will Rudd Davidson Consulting Engineers Ltd Location: Westfield Court , South Gable

Date	Location Ref	Borescope Video Ref	Insulstion Type	Inner	Outer mm	Cavity mm	Tie Type & Condition	Comments
09/05/2025	**B44**	045	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 4 Ties Visible Ties Visible Evenly Spaced at Top and Bottom of Orlit Panel Ties viewed are in good condition and appear central within cavity.	
09/05/2025	**B45**	046	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 2 Ties Visible Ties appear to be missing where viewed at previous locations. Remedial Helifix Typ Tie Visible	
09/05/2025	**B46**	047	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 4 Ties Visible Ties appear to be missing where viewed at previous locations. Remedial Tie Visible	Mortar Bridging on Ties
09/05/2025	**B47**	048	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 1 Tie Visible. Ties appear to be missing at top and bottom of panel. Ties viewed are in good condition and appear central within cavity.	
09/05/2025	**B48**	049	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 2 Ties Visible, Ties appear to be missing ties appear to be missing at top and bottom of panel. Ties viewed are in good condition and appear central within cavity. 2 x Remedial Ties Visible	Mortar Bridging on Ties
09/05/2025	**B49**	050	None Present	Brick	Pre Cast Concrete "Orlit" Panel	45	Steel Galvanized Flat Tie 2 Ties Visible, Ties appear to be missing Ties viewed are in good condition and appear central within cavity. 2 x Remedial Ties Visible	Concrete Column visible, with what appears to be Tie Bent back Against concrete surface.

Will Rudd Davidson Consulting Engineers Ltd Location: Westfield Court , South Gable

Date	Location Ref	Borescope Video Ref	Insulstion Type	Inner	Outer mm	Cavity mm	Tie Type & Condition	Comments
09/05/2025	**B50**	051	None Present	Brick	Pre Cast Concrete "Orlit" Panel	75	Steel Galvanized Flat Tie 4 Ties Visible, Ties Visible are evenly Spaced at Top and Bottom of Orlit Panel Ties viewed are in good condition and appear central within cavity. 2-3 x Remedial Ties Visible	

Appendix C

Concrete Test Results Table

CONCRETE TEST RESULTS TABLE- WESTFIELD COURT, EDINBURGH

Test Area	Sample Ref	Location	Depth of Cover (mm)	Depth of Carbonation (mm)	Chloride Content ($\%Cl^-$ by mass of cement*)	Corrosion Risk	Photograph Reference
C1	D1	Rear Elevation- Stringer Course	35	0-2	0.28	Low	097
C2	D2	Rear Elevation- Stringer Course	37	8-10	0.08	Low	103 &104
C3	D3	Rear Elevation- Stringer Course	38	0-2	0.25	Low	105&106
C4	D4	Rear Elevation- Stringer Course	35	15-20	<0.01	Low	107&108
C5	D5	Rear Elevation- Stringer Course	27	2-4	0.27	Low	109-111
C6	D6	Front Elevation- Window Sill	9	10	0.62	High	112&113
C7	D7	Front Elevation- Stringer Course	16	2-4	0.20	Low	114
C8	D8	Front Elevation- Stringer Course	42	0-2	<0.01	Low	115
C9	D9	Front Elevation- Stringer Course	32	10-12	0.04	Low	116
C10	D10	Front Elevation- Stringer Course	42	15-20	0.06	Low	117
C11	D11	Front Elevation- Stringer Course	38	30	0.43	Moderate	118 &119
C12	D12	South Gable- Stringer Course	18	2-4	0.24	Low	121
C13	D13	South Gable- Stringer Course	23	0-2	0.06	Low	122

Notes: cement content assumed to be 14%. Corrosion Risk Determined from BRE Digest 444 Part 2: Corrosion of Steel in Concrete.

Appendix D

Concrete Test Results Certificate

Your Ref. :
Our Ref. : LMS/A18787
Date : 20th May 2025

Stanger

Capital Testing Services Ltd
Units 13 & 14 Laverock Road
Stirling Road Industrial Estate
Airdrie
ML6 7UD

CERTIFICATE OF ANALYSIS OF CONCRETE SAMPLES FOR DETERMINATION OF CHLORIDE CONTENTTO TPM 49 – (IN HOUSE METHOD – POTENTIOMETRIC METHOD)

Project	:	Westfield Court, Edinburgh
Sample Location	:	External Concrete
Date Sampled	:	06-09/05/2025
Sampled By	:	Client
Sample Description	:	Concrete Dust
Our Reference	:	7930L249
GRN	:	37099
Date of Receipt	:	13/05/2025
Method of Test	:	In-house Method – TPM 49 (Potentiometric Method)
Date of Test	:	19/05/2025

Sample Reference	Chloride [Cl⁻]	
	% by mass sample	% by mass cement
D1	0.04	0.28
D2	0.01	0.08
D3	0.04	0.25
D4	<0.01	<0.01
D5	0.04	0.27
D6	0.09	0.62
D7	0.03	0.20
D8	<0.01	<0.01
D9	0.01	0.04
D10	0.01	0.06
D11	0.06	0.43
D12	0.03	0.24
D13	0.01	0.06

Comments:

a. The chloride content expressed as a percentage by mass of cement was calculated using an assumed cement content of 14.0%.
b. The test result only relates to sample tested.
c. We confirm that in preparing this report we have exercised all reasonable skill and care.

[redacted]

Quality Manager **Manager/Engineer**

Stanger Testing Services Limited
Cambuslang Laboratory Bogleshole Road Cambuslang Glasgow G72 7DD
Dundee Telephone (01382) 535272
Telephone (0141) 641 3623 Fax (0141) 641 9279
Email: stangertesting@aol.com
Stanger Testing Services Limited Registered in Scotland No. SC219023
'Stanger' is a trademark VAT Registration No. 774 7634 86

UKAS TESTING 0251

Appendix D – Capital Testing Internal Investigation Report

Capital Testing Services Ltd
Structural Investigation

REPORT ON BUILDING INVESTIGATION OF FLAT 2/1 WESTFIELD COURT

Report Reference: 25/3045/3352

Site: Flat 2/1 Westfield Court
Alexander Drive,
Edinburgh

Prepared by [redacted]

Approved by [redacted]

Prepared for:

WILL RUDD DAVIDSON
43 York Place,
Edinburgh
EH1 3HP

Date: 12th May 2025

Capital Testing Services Ltd
Units 13/14 Laverock Road
Stirling Road Industrial Estate
Airdrie
ML6 7UD

CONTENTS

1. INTRODUCTION

1.1. Further to the instructions of Will Rudd Davidson, Capital Testing Services Ltd have carried out building inspection and testing works on flat 2/1 Westfield Court, Alexander Drive, Edinburgh. The purpose of the investigation was to provide details of the material properties and limited structural details in order to assess the suitability of the property for continued residential use.

1.2. The investigation was carried out in April 2025

2. EXTENT OF INVESTIGATION

2.1. A covermeter survey was conducted to assess the level of concrete cover protecting the embedded reinforcement in concrete elements.

2.2. Breaking out of concrete to confirm the concrete cover to reinforcement, size, condition and arrangement of reinforcement.

2.3. Concrete dust samples were taken for the purpose of chemical analysis.

2.4. Removal of concrete core samples to determine the compressive strength.

2.5. Borescope and Brick Romoval to Inspect Wall ties.

3. INSPECTION PROCEDURES

3.1. The Elcometer 331 covermeter used in the survey was calibrated on site by locating and exposing reinforcement in the concrete selement, and using actual measurement of depth to metal reinforcement for calibration purposes. The survey was conducted by using the known depth of reinforcement contained within the concrete element. The lowest readings were then marked within a small area in each direction to establish the arrangement and depth of reinforcement. This was then recorded for reporting purposes.

3.2. Breakouts were conducted by identifying the position of reinforcement using the Elcometer 331. The concrete cover to reinforcement was removed using a Hilti TAG-76 110v rotary percussion drill fitted with various drill bits. Measurements and photographs were then taken for reporting purposes.

3.3. Concrete dust samples were taken at various locations. The samples were removed using a Hilti TAG-76 110v rotary percussion drill fitted with a 16mm diameter drill bit. Holes were drilled on each sample to a depth of 50mm. At the same locations as the dust samples, the depth of carbonation was measured in accordance with BRE Information Sheet IP6/81, using a phenolphthalein indicator solution sprayed on a freshly broken concrete surface and measuring the depth of concrete to which no distinct colour change occurred. Samples were submitted to Stanger Testing Services for Chemical Analysis.

3.4. Sample cores of the concrete elements were taken using a 110v hand held water flush rotary percussion core rig fitted with a 100mm diameter diamond impregnated core barrel.Core Samples were submitted to MatTest Ltd for visual description and compressive strength testing.

3.5. A small area of the external wall cavity was surveyed by means of 90 degree borescope to confirm presence and position of wall ties before removing a single brick to confirm type embedment and condition.

4. LABORATORY TEST RESULTS

4.1. Chemical Test Results are presented in Appendix B.

4.2. Core Sample Test Results are presented in Appendix C

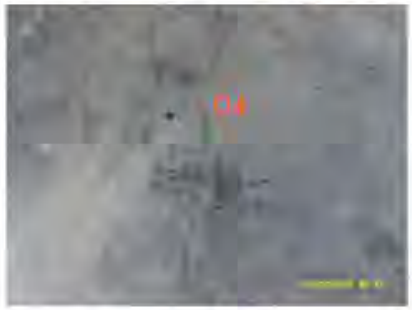
5. OBSERVATION RECORDS

5.1. Observation Records are presented in Appendix E.

APPENDIX A

INVESTIGATION LOCATIONS

INVESTIGATION LOCATIONS LIVING ROOM



NOTES:- Drawings not to scale. BO -Breakout D-Dust Drilling, DOC, Cover C -Core Sample WC1 -Wall Cavity

Capital Testing Services Ltd Units 13/14 Laverock Road Stirling Road Industrial Estate Airdrie	PROJECT: Flat 2/1 Westfield Court, Edinburgh	CLIENT: Will Rudd Davidson 43 York Place, Edinburgh	PREPARED BY: [redacted] DATE: May 2025 SHEET NO.: 2

Appendix A

INVESTIGATION LOCATIONS BEDROOM 1

NOTES:- Drawings not to scale. BO -Breakout D-Dust Drilling, DOC, Cover C -Core Sample WC2 -Wall Cavity

Capital Testing Services Ltd Units 13/14 Laverock Road Stirling Road Industrial Estate Airdrie	PROJECT: Flat 2/1 Westfield Court, Edinburgh	CLIENT: Will Rudd Davidson 43 York Place, Edinburgh	PREPARED BY: [redacted] DATE: May 2025 SHEET NO.: 2

Appendix A

APPENDIX B

CHEMICAL RESULTS TABLE
&
ANALYSIS CERTIFICATE

Flat 2/1 Westfield Court

Date	Location Ref	Cover To Reinforcement mm	Depth of Carbonation mm	Chloride Content by Mass Cement %
01/5/2054	**D1 Beam**	18	0-2	0.06
	D2 Column	18	0-2	0.06
	D3 Column	40	0-2	0.01
	D4 Floor Slab	87	0-2	0.03
	D5 Beam	33	2-4	0.15
	D6 Floor Slab	87	0-2	0.01

Your Ref. :
Our Ref. : LMS/A18787
Date : 5th May 2025

Stanger

Capital Testing Services Ltd
Units 13 & 14 Laverock Road
Stirling Road Industrial Estate
Airdrie
ML6 7UD

CERTIFICATE OF ANALYSIS OF CONCRETE SAMPLES FOR DETERMINATION OF CHLORIDE CONTENTTO TPM 49 – (IN HOUSE METHOD – POTENTIOMETRIC METHOD)

Project	:	Westfield Court, Edinburgh
Sample Location	:	Flat 2/1
Date Sampled	:	23/04/2025
Sampled By	:	Client
Sample Description	:	Concrete Dust
Our Reference	:	7930L143
GRN	:	37063
Date of Receipt	:	29/04/2025
Method of Test	:	In-house Method – TPM 49 (Potentiometric Method)
Date of Test	:	01/05/2025

Sample Reference	Chloride [Cl⁻]	
	% by mass sample	% by mass cement
D1	0.01	0.06
D2	0.01	0.06
D3	<0.01	0.01
D4	<0.01	0.03
D5	0.02	0.15
D6	<0.01	0.01

Comments:

a. The chloride content expressed as a percentage by mass of cement was calculated using an assumed cement content of 14.0%.
b. The test result only relates to sample tested.
c. We confirm that in preparing this report we have exercised all reasonable skill and care.

[redacted]
Quality Manager

[redacted]
Manager/Engineer

Stanger Testing Services Limited
Cambuslang Laboratory Bogleshole Road Cambuslang Glasgow G72 7DD
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Stanger Testing Services Limited Registered in Scotland No. SC219023
'Stanger' is a trademark VAT Registration No. 774 7634 86

UKAS TESTING 0253

APPENDIX C

TEST CORE RESULTS TABLE
&
TEST CERTIFICATES

Flat 2/1 Westfield Court

Date	Location Ref	As Received Densty Kg/m3	Compressive Strength N/mm2
16/5/2025	**C1B Beam**	2310	35.2
	C2 Clumn	2290	25.8
	C3 Column	2240	17.7

LABORATORY TEST CERTIFICATE

MATtest Limited
10 Queensile Point
Queensile Industrial Estate
120 Steppe Road
Glasgow
G33 3NQ

Tel: 0141 774 4032

email: info@mattest.org
Website: www.mattest.org

Certificate No 25/536 - 01-1

To : [redacted]

Client : Capital Testing Services Ltd.
Units 13 & 14, Laverock Road
Stirling Road Industrial Estate
Airdrie
ML6 7UD

TESTING CONCRETE IN STRUCTURES - CORED SPECIMENS
TAKING, EXAMINING AND TESTING IN COMPRESSION - BS EN 12504 - 1 : 2019

Introduction

We refer to a concrete core taken from Flat 2/1 Westfield Court, Edinburgh and delivered to our laboratory on 07 May 2025

Sampling Details			
Core Reference	:	C1B	
Date of coring	:	25/04/2025	
Orientation within element	:	Not Supplied	
Drilling operator	:	Client	
Required test age	:	>3	days
Date cast	:	Unknown	
Location	:	WFC Beam	
As Received Measurements			
Average diameter	:	93	mm
Maximum length	:	151	mm
Minimum length	:	135	mm
Reinforcement size	:	None	mm
Reinforcement distance from top	:	None	mm
Storage Conditions Prior to Test			
Stored in lab prior to test	:	9	days
Lab temperature	:	20+/-2	°C
Compression Test Conditions			
Date of test	:	16/05/2025	
Age at time of test	:	Unknown	days
Tested by	:	NC	
Failure load	:	240.7	kN

Examination			
Specimen condition	:	Good	
Est. Max. Size of Aggregate	:	19	mm
Concrete compaction	:	Good	
Material distribution	:	Even	
Excess Voidage	:	0.5	%
Cracks presence	:	None	
Abnormalities	:	Side of core ribbed	
After End Preparation Measurements			
Average diameter	:	93	mm
Average length	:	91	mm
Reinforcement size	:	None	mm
Reinforcement distance from top	:	None	mm
End preparation method	:	Grinding	
Test Conditions			
Length / Diameter ratio	:	1.0	
Surface moisture condition	:	Dry	
Density in accordance with BS EN 12390-7 : 2019			
Date of test	:	07/05/2025	
Specimen condition	:	As Received	
Determination of volume	:	Measurements	
Density	:	2310	kg/m³

Test Result

CORE COMPRESSIVE STRENGTH 35.2 N/mm²

Comments

The results contained in this test certificate relate to the sample(s) as received. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation. This test certificate should not be reproduced without the written approval of the laboratory. All remaining samples for this project will be disposed of 28 days after issue of this test certificate.

Remarks

Approved for Issue

[redacted] (Director)

Date 20/05/2025

UKAS TESTING 2643

Issue No:01

Page 1 of 1

MATtest Limited
materials testing & consultancy

LABORATORY TEST CERTIFICATE

Certificate No 25/536 - 01-2

To : [redacted]

Client : **Capital Testing Services Ltd.**
Units 13 & 14, Laverock Road
Stirling Road Industrial Estate
Airdrie
ML6 7UD

10 Queenslie Point
Queenslie Industrial Estate
120 Stepps Road
Glasgow
G33 3NQ

Tel: 0141 774 4032

email: info@mattest.org
Website: www.mattest.org

TESTING CONCRETE IN STRUCTURES - CORED SPECIMENS TAKING, EXAMINING AND TESTING IN COMPRESSION - BS EN 12504 - 1 : 2019

Introduction

We refer to a concrete core taken from Flat 2/1 Westfield Court, Edinburgh and delivered to our laboratory on 07 May 2025

Sampling Details				**Examination**			
Core Reference	:	C2		Specimen condition	:	Good	
Date of coring	:	25/04/2025		Est. Max. Size of Aggregate	:	24	mm
Orientation within element	:	Not Supplied		Concrete compaction	:	Good	
Drilling operator	:	Client		Material distribution	:	Even	
Required test age	:	>3	days	Excess Voidage	:	0.5	%
Date cast	:	Unknown		Cracks presence	:	None	
Location	:	WFC Column		Abnormalities	:	Side of core ribbed	
As Received Measurements				**After End Preparation Measurements**			
Average diameter	:	93	mm	Average diameter	:	93	mm
Maximum length	:	169	mm	Average length	:	92	mm
Minimum length	:	137	mm	Reinforcement size	:	None	mm
Reinforcement size	:	None	mm	Reinforcement distance from top	:	None	mm
Reinforcement distance from top	:	None	mm	End preparation method	:	Grinding	
Storage Conditions Prior to Test				**Test Conditions**			
Stored in lab prior to test	:	9	days	Length / Diameter ratio	:	1.0	
Lab temperature	:	20+/-2	°C	Surface moisture condition	:	Dry	
Compression Test Conditions				**Density in accordance with BS EN 12390-7 : 2019**			
Date of test	:	16/05/2025		Date of test	:	07/05/2025	
Age at time of test	:	Unknown	days	Specimen condition	:	As Received	
Tested by	:	NC		Determination of volume	:	Measurements	
Failure load	:	175.4	kN	Density	:	2290	kg/m^3

Test Result

CORE COMPRESSIVE STRENGTH **25.8** **N/mm^2**

Comments

The results contained in this test certificate relate to the sample(s) as received; Opinions and interpretations expressed herein are outside the scope of UKAS accreditation; This test certificate should not be reproduced without the written approval of the laboratory; All remaining samples for this project will be disposed of 28 days after issue of this test certificate

Remarks

Approved for Issue

[redacted] (Director)

Date 20/05/2025

UKAS TESTING 2643

Issue No:01

LABORATORY TEST CERTIFICATE

MATtest Limited
materials testing & consultancy

10 Queenslie Point
Queenslie Industrial Estate
120 Stepps Road
Glasgow
G33 3NQ

Tel: 0141 774 4032

email: info@mattest.org
Website: www.mattest.org

Certificate No 25/536 - 01-3

To : [redacted]

Client : **Capital Testing Services Ltd.**
Units 13 & 14, Laverock Road
Stirling Road Industrial Estate
Airdrie
ML6 7UD

TESTING CONCRETE IN STRUCTURES - CORED SPECIMENS
TAKING, EXAMINING AND TESTING IN COMPRESSION - BS EN 12504 - 1 : 2019

Introduction

We refer to a concrete core taken from Flat 2/1 Westfield Court, Edinburgh and delivered to our laboratory on 07 May 2025

Sampling Details			
Core Reference	C3		
Date of coring	25/04/2025		
Orientation within element	Not Supplied		
Drilling operator	Client		
Required test age	>3	days	
Date cast	Unknown		
Location	WFC Column		
As Received Measurements			
Average diameter	93	mm	
Maximum length	189	mm	
Minimum length	173	mm	
Reinforcement size	None	mm	
Reinforcement distance from top	None	mm	
Storage Conditions Prior to Test			
Stored in lab prior to test	9	days	
Lab temperature	20+/-2	°C	
Compression Test Conditions			
Date of test	16/05/2025		
Age at time of test	Unknown	days	
Tested by	NC		
Failure load	120.8	kN	

Examination			
Specimen condition	Good		
Est. Max. Size of Aggregate	24	mm	
Concrete compaction	Good		
Material distribution	Even		
Excess Voidage	0.5	%	
Cracks presence	None		
Abnormalities	Side of core ribbed		
After End Preparation Measurements			
Average diameter	93	mm	
Average length	92	mm	
Reinforcement size	None	mm	
Reinforcement distance from top	None	mm	
End preparation method	Grinding		
Test Conditions			
Length / Diameter ratio	1.0		
Surface moisture condition	Dry		
Density in accordance with BS EN 12390-7 : 2019			
Date of test	07/05/2025		
Specimen condition	As Received		
Determination of volume	Measurements		
Density	2240	kg/m^3	

Test Result

CORE COMPRESSIVE STRENGTH **17.7** **N/mm^2**

Comments

The results contained in this test certificate relate to the sample(s) as received; Opinions and interpretations expressed herein are outside the scope of UKAS accreditation; This test certificate should not be reproduced without the written approval of the laboratory; All remaining samples for this project will be disposed of 28 days after issue of this test certificate

Remarks

Approved for Issue

[redacted] (Director)

Date 20/05/2025

UKAS TESTING 2843

Issue No:01

Page 1 of 1

APPENDIX D

CORE SAMPLE PHOTOGRAPHS

TEST CORE OBSERVATIONS

Core C1A

Core C1A

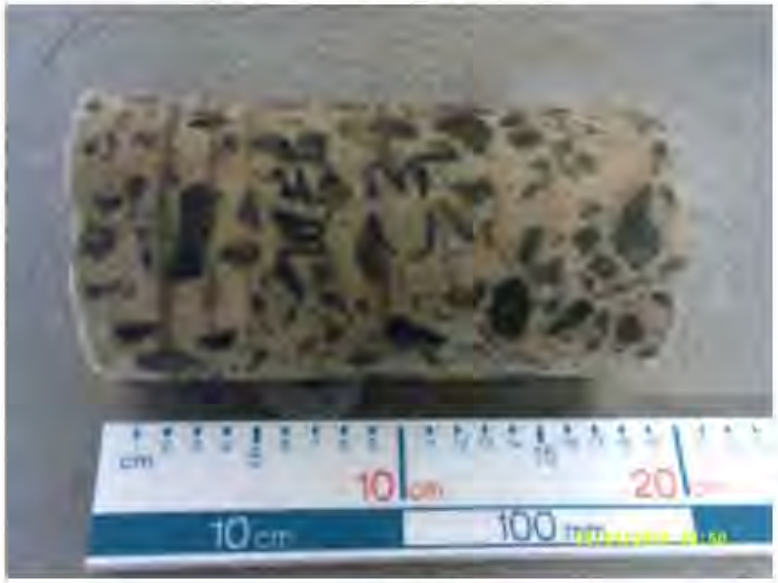
Core C1B

NOTES:- Drawings not to scale.

Capital Testing Services Ltd Units 13/14 Laverock Road Stirling Road Industrial Estate Airdrie	PROJECT: Flat 2/1 Westfield Court, Edinburgh	CLIENT: Will Rudd Davidson 43 York Place, Edinburgh	PREPARED BY: [redacted] DATE: May 2025 SHEET NO.: 2

TEST CORE OBSERVATIONS

Core C2



Core C3

NOTES:- Drawings not to scale.

Capital Testing Services Ltd Units 13/14 Laverock Road Stirling Road Industrial Estate Airdrie	PROJECT: Flat 2/1 Westfield Court, Edinburgh	CLIENT: Will Rudd Davidson 43 York Place, Edinburgh	PREPARED BY: [redacted] DATE: May 2025 SHEET NO.: 2

APPENDIX E

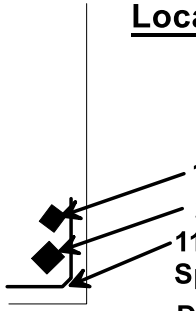
INVESTIGATION RESULTS

&

OBSERVATIONS

INVESTIGATION RESULTS

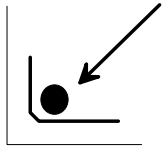
Location BO1 Beam (living room)



15mm Square Twist
20mm Square Twist
11mm Square Twist Link Bar
Spacing 200mm.
Depth of Cover 18mm to front face

Breakout at location BO1 shows 15 and 20 mm Square Twist Main Bar with 11mm Square Twist Link Bar at 200mm spacing. All bars are in good condition.
Both Longtitudnal main Bars Extend into Column

Location BO1 Colmn (living room)



25.4mm Round Bar
8mm Round Link Bar
Spacing 250mm
Depth of Cover 30mm

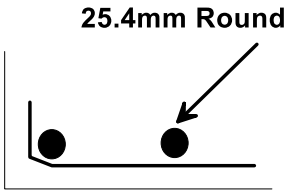
Breakout at location C4 shows 25.4mm Round Main Bars with 8mm Link Bars at 250mm spacing. All bars are in good condition.

NOTES:- Drawings not to scale. Reference Photographs 49-53

Capital Testing Services Ltd Units 13/14 Laverock Road Stirling Road Industrial Estate Airdrie	PROJECT: Flat 2/1 Westfield Court, Edinburgh	CLIENT: Will Rudd Davidson 43 York Place, Edinburgh	PREPARED BY: [redacted] DATE: April 2025 SHEET NO.: b5c4

INVESTIGATION RESULTS

Location BO2 Column Mid Hieght (living room)



Breakout at location BO2 Column shows 25.4mm Round Vertical Main Bar
Link Spacing 200mm 25mm Cover

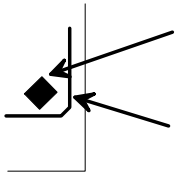
NOTES:- Drawings not to scale. Reference Photographs 54-55

Capital Testing Services Ltd Units 13/14 Laverock Road Stirling Road Industrial Estate Airdrie	PROJECT: Flat 2/1 Westfield Court, Edinburgh	CLIENT: Will Rudd Davidson 43 York Place, Edinburgh	PREPARED BY: DATE: April 2025 SHEET NO.: b5c4

INVESTIGATION RESULTS

Location BO3 Beam/Top of Column (Bedroom 1)

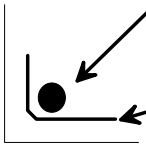
BEAM



20mm Square Twist

8mm Square Twist Link Bar
Spacing 200mm.
Depth of Cover 26mm to front face

COLUMN



25.4mm Round Bar

9mm Round Link Bar
Spacing 200mm
Depth of Cover 38mm

Breakout at location BO3 shows 20 mm Square Twist Main Bar with 8mm Square Twist Link Bar at 200mm spacing. All bars are in good condition.
Longtitudnal main Bar ExtendS into Column

Breakout at location BO3 Top of Column shows 25.4mm Round Vertical Main Bar With 9mm Round Link Bars

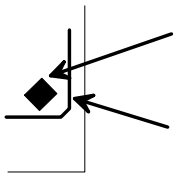
NOTES:- Drawings not to scale. Reference Photographs 61-63

Capital Testing Services Ltd Units 13/14 Laverock Road Stirling Road Industrial Estate Airdrie	PROJECT: Flat 2/1 Westfield Court, Edinburgh	CLIENT: Will Rudd Davidson 43 York Place, Edinburgh	PREPARED BY: [redacted] DATE: April 2025 SHEET NO.: b5c4

INVESTIGATION RESULTS

Location BO4 Beam/Top of Column (Bedroom 1)

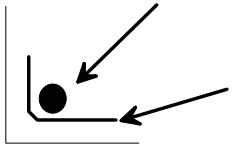
BEAM



15mm Square Twist

9mm Square Twist Link Bar
Spacing 200mm.
Depth of Cover 20mm to front face

COLUMN



25.4mm Round Bar

8mm Round Link Bar
Spacing 200mm
Depth of Cover 24mm

Breakout at location BO4 shows 15 mm Square Twist Main Bar with 9mm Square Twist Link Bar at 200mm spacing. All bars are in good condition.
Longtitudnal main Bar Extends into Column

Breakout at location BO4 Top of Column shows 25.4mm Round Vertical Main Bar With 8mm Round Link Bars

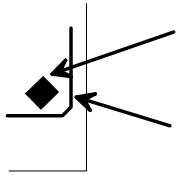
NOTES:- Drawings not to scale. Reference Photographs 64-67

Capital Testing Services Ltd Units 13/14 Laverock Road Stirling Road Industrial Estate Airdrie	PROJECT: Flat 2/1 Westfield Court, Edinburgh	CLIENT: Will Rudd Davidson 43 York Place, Edinburgh	PREPARED BY: [redacted] DATE: May 2025 SHEET NO.: b5c4

INVESTIGATION RESULTS

Location BO5 Transverse Beam/Top of Column (Bedroom 1)

TRANSVERSE BEAM



20mm Square Twist

10mm Square Twist Link Bar
Spacing 200mm.
Depth of Cover 35mm to front face

Breakout at location BO5 shows 20 mm Square Twist Main Bar with 10mm Square Twist Link Bar at 200mm spacing. All bars are in good condition.
Longtitudnal main Bar Extends into Column

NOTES:- Drawings not to scale. Reference Photographs 68-73

Capital Testing Services Ltd Units 13/14 Laverock Road Stirling Road Industrial Estate Airdrie	PROJECT: Flat 2/1 Westfield Court, Edinburgh	CLIENT: Will Rudd Davidson 43 York Place, Edinburgh	PREPARED BY: [redacted] DATE: May 2025 SHEET NO.: b5c4

INVESTIGATION RESULTS

Location WC1 Wall (living room)

Inner Leaf- Brick 105mm Tie Embedment 85mm
Cavity- 85mm
Outer- Orlit Panels
Tie Type - Steel Galanized Fish Tail Good Condition

Location WC2 Wall (Bedroom 1)

Inner Leaf- Brick 105mm Tie Embedment 85mm
Cavity- 85mm
Outer- Orlit Panels
Tie Type - Steel Galanized Fish Tail Good Condition

NOTES:- Drawings not to scale. WC1 - Reference Photographs 56-57 Borescope Video 405 WC2 - Reference Photographs 82-85 Borescope Video 406

Capital Testing Services Ltd Units 13/14 Laverock Road Stirling Road Industrial Estate Airdrie	PROJECT: Flat 2/1 Westfield Court, Edinburgh	CLIENT: Will Rudd Davidson 43 York Place, Edinburgh	PREPARED BY: [redacted] DATE: February 2021 SHEET NO.: b5c4

WINDOW FRAME CONNECTIONS

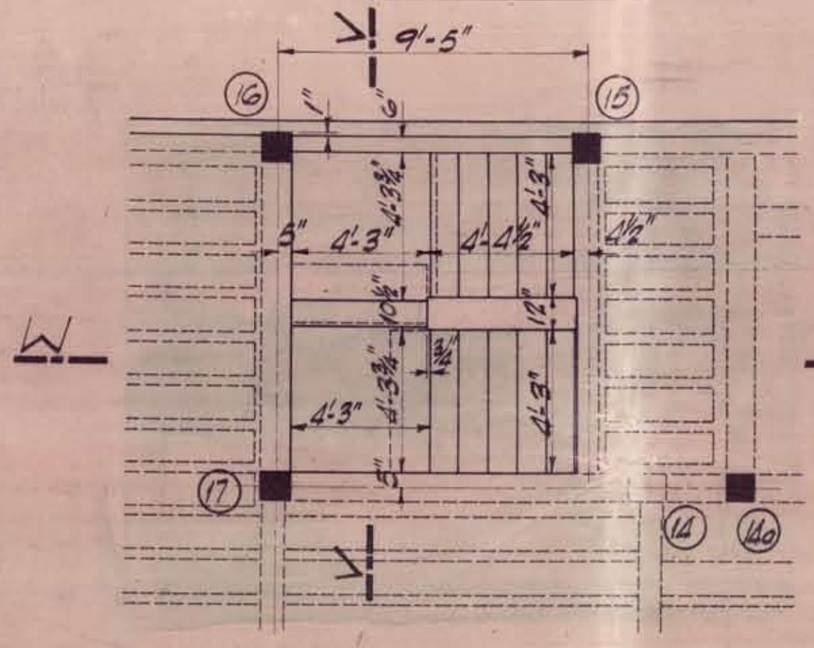
Typical Window Frame Connections

Typical Window Frame Connections

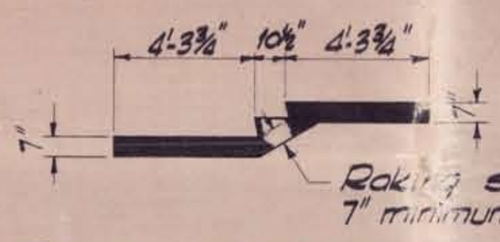
NOTES:- Drawings not to scale. Reference Photographs: Flat 2/1 58,59,77.78.79 Reference Photographs: Flat 1/4 124-130

Capital Testing Services Ltd Units 13/14 Laverock Road Stirling Road Industrial Estate Airdrie	PROJECT: Flat 2/1 Westfield Court, Edinburgh	CLIENT: Will Rudd Davidson 43 York Place, Edinburgh	PREPARED BY: [redacted] DATE: May 2021 SHEET NO.: 2

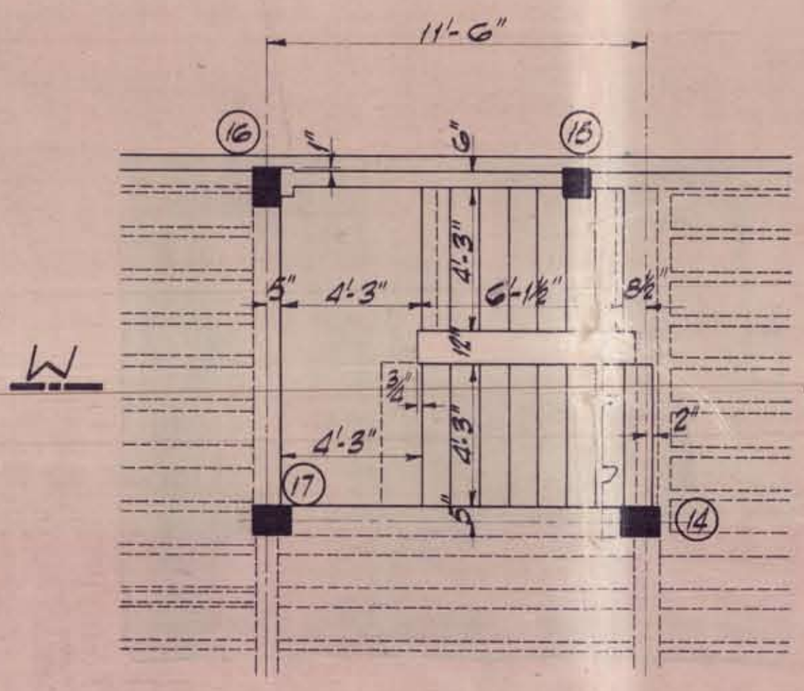
Appendix E – Archive Drawings



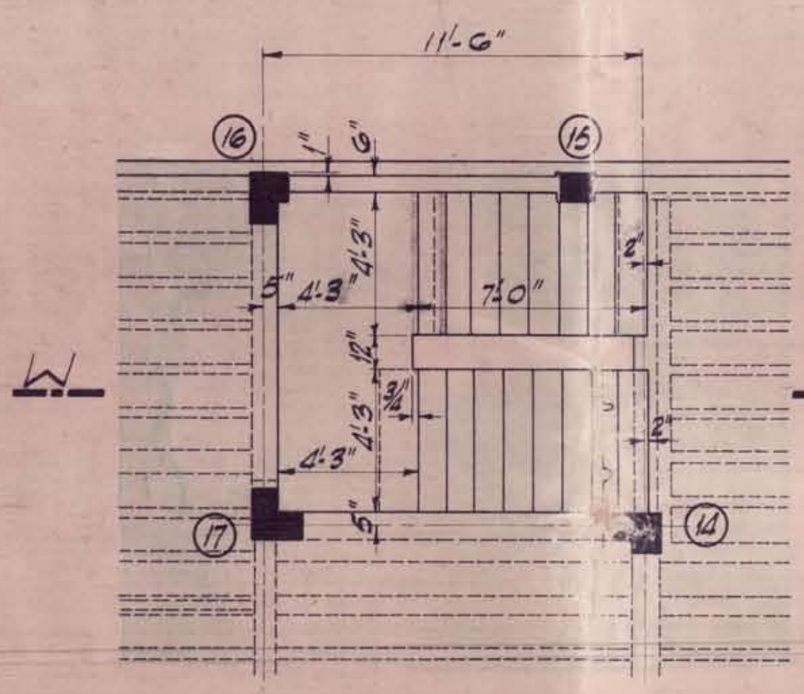
PLAN X-X
TOP FLIGHT ONLY.



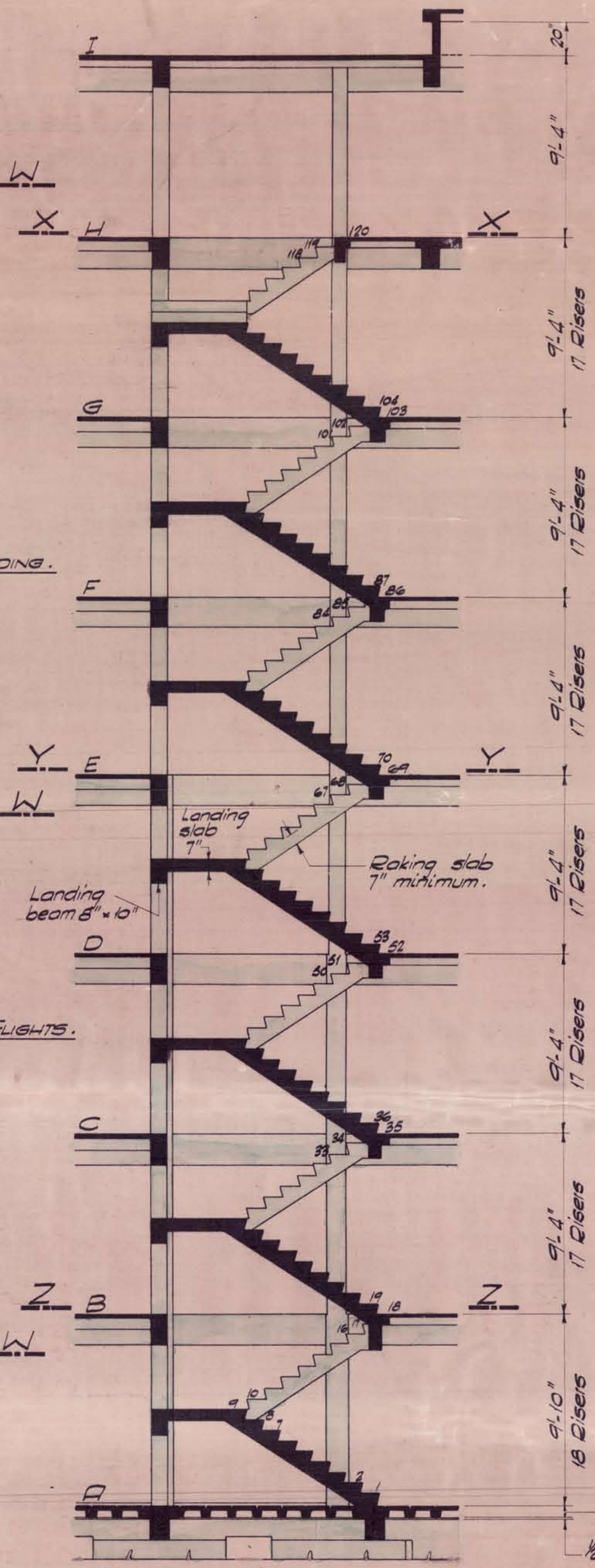
¼" SECTION V-V AT HALF LANDING.



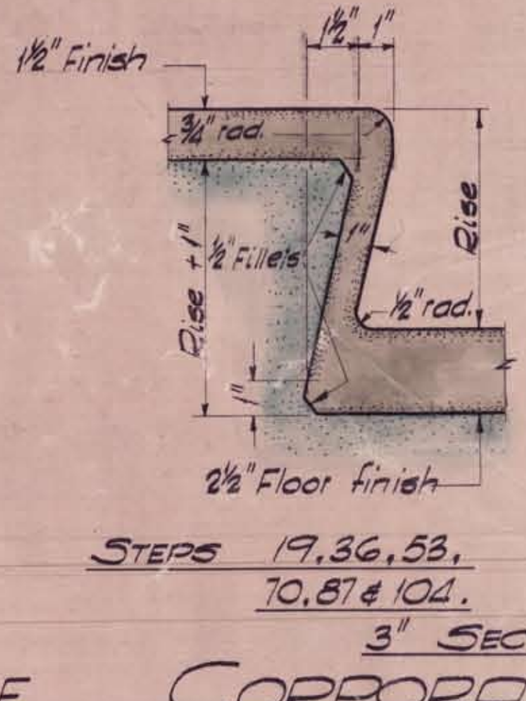
PLAN Y-Y.
TYPICAL OF INTERMEDIATE FLIGHTS.



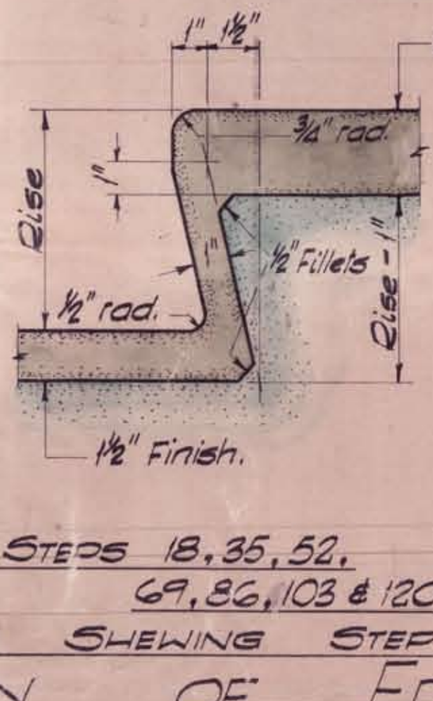
PLAN Z-Z
BOTTOM FLIGHT ONLY.



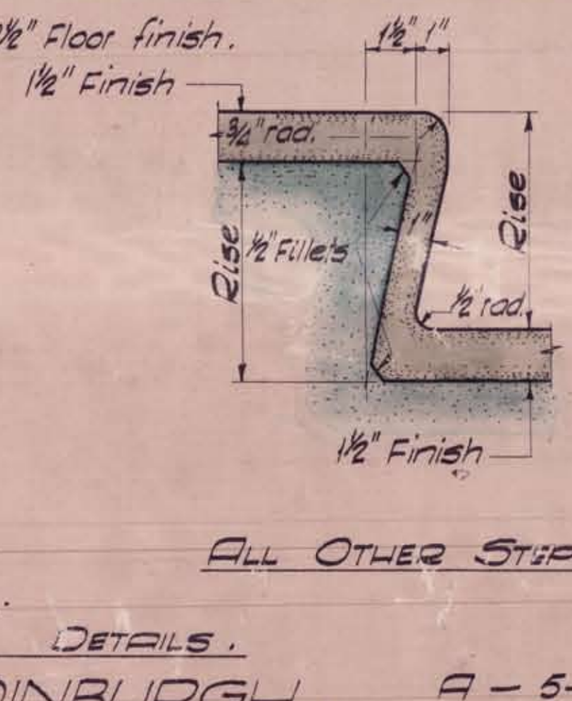
SECTIONAL ELEVATION ON LINE W-W.



STEPS 19, 36, 53, 70, 87 & 104.



STEPS 18, 35, 52, 69, 86, 103 & 120.



ALL OTHER STEPS.

3" SECTIONS SHEWING STEP DETAILS.

THE CORPORATION OF EDINBURGH.
WESTFIELD FLATS — GORGIE.
GENERAL ARRANGEMENT OF REINFORCED CONCRETE WORK.
BLOCK A — STAIRCASE.

SCALES : 3" AND ¼" = 1'-0".

A — 5-11-1948. Amended & redrawn. G/ N.V.A.

MESSRS. WILLIAMSON & HUBBARD F/A.R.I.B.A.,
CHARTERED ARCHITECTS, KIRKCALDY.

KINNEAR AND GORDON,
CHARTERED CIVIL ENGINEERS,
56, MELVILLE ST., EDINBURGH.

7-3-1948

195-16

DIAGRAM – 1

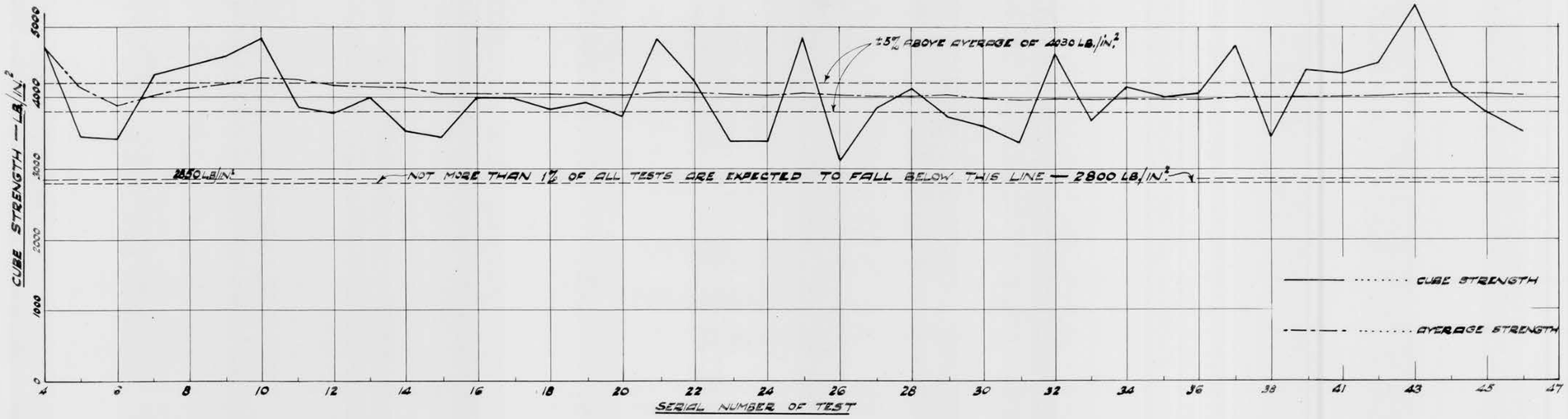


DIAGRAM – 2

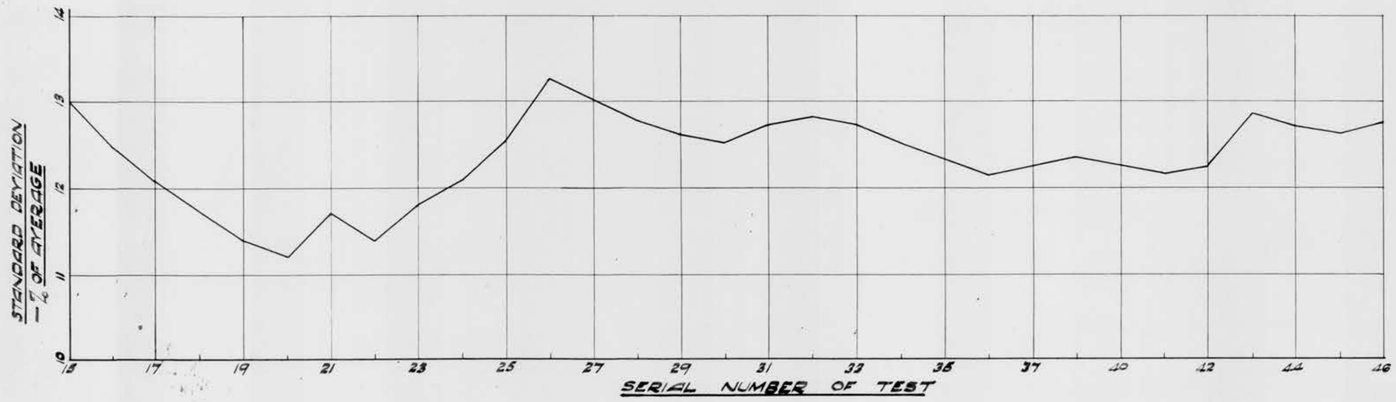


DIAGRAM – 3

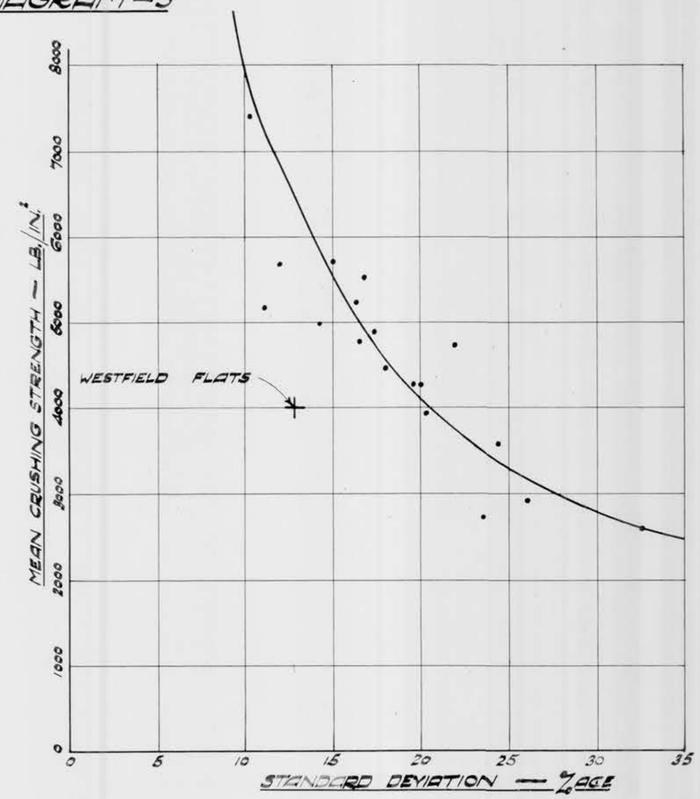


DIAGRAM – 5

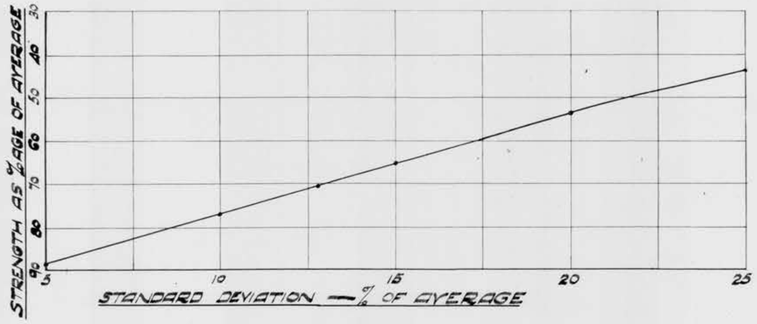
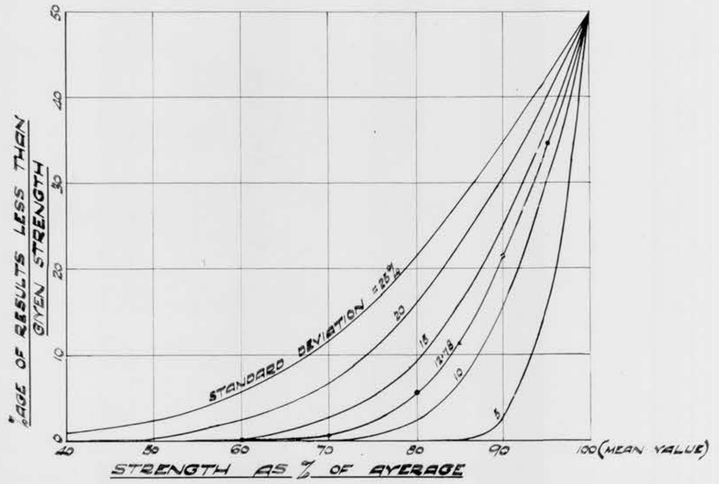


DIAGRAM – 4



WESTFIELD FLATS — GORGIE CONCRETE STRENGTHS

MESSERS WILLIAMSON & HUBBARD, F.I.A.R.I.B.A.
CHARTERED ARCHITECTS,
KIRKCALDY.

KINNEAR AND GORDON,
CHARTERED CIVIL ENGINEERS.
3, ST. ANDREW SQ., EDINBURGH.
1-5-1951. # 195-80.

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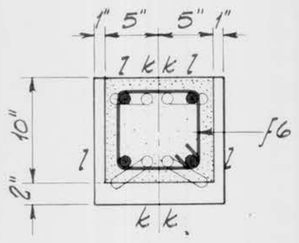
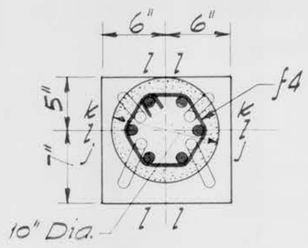
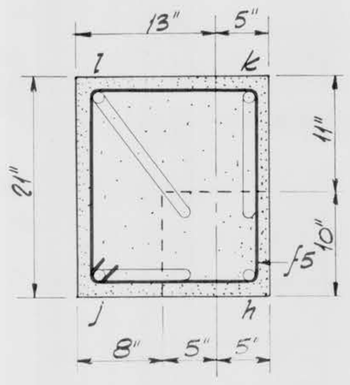
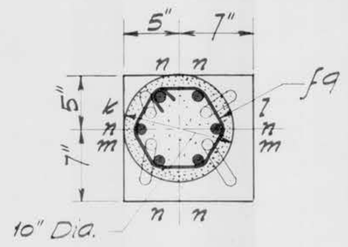
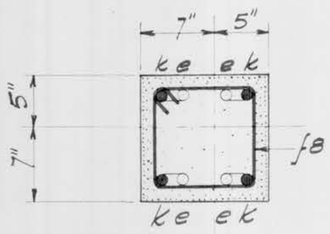
H

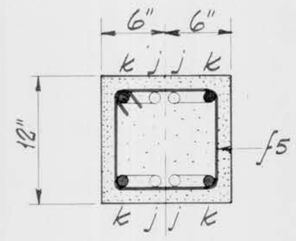


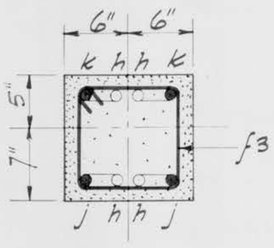


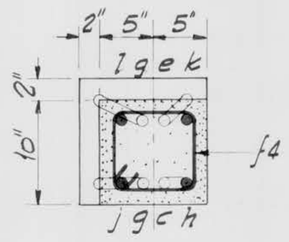


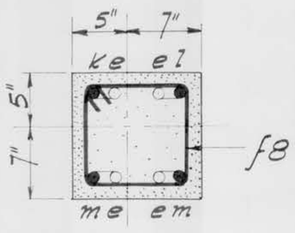












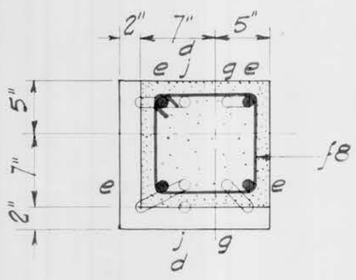
For Sections between Floors A and E see F (18) Dwg. No. 195-57.

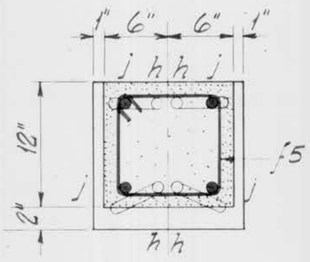
For Sections between Floors A and G see F (19) Dwg. No. 195-54.

Sections between Floors A and G are similar, but to opposite hand, to those of A (5)

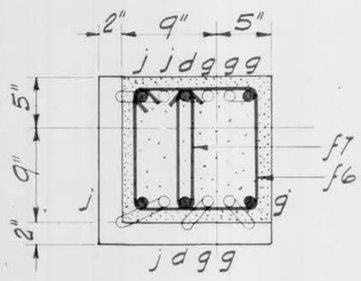
(18) (19) (21)

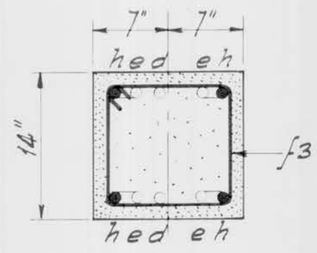
F



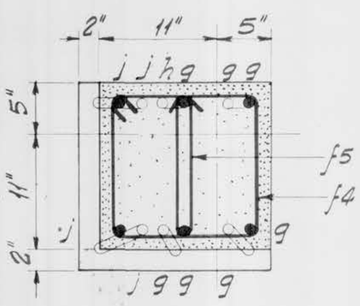


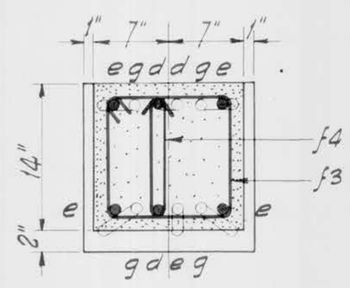
E



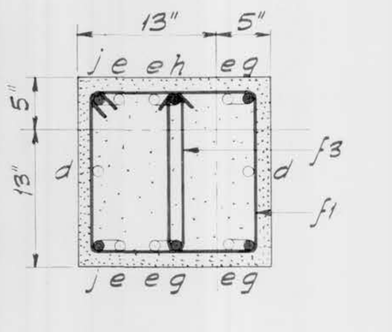


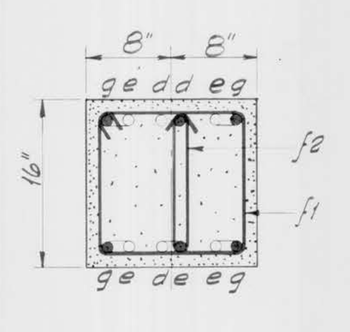
D



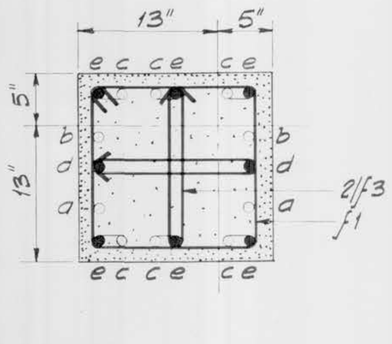


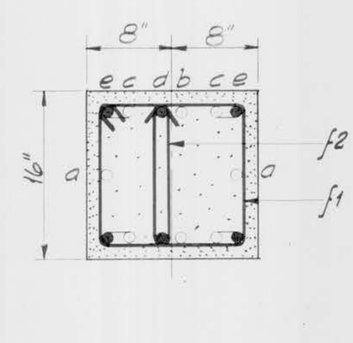
C



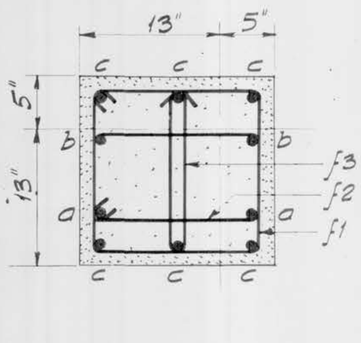


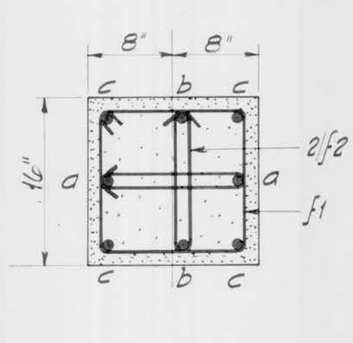
B





A





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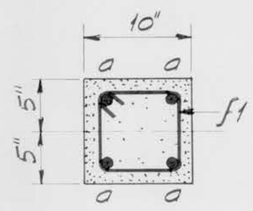
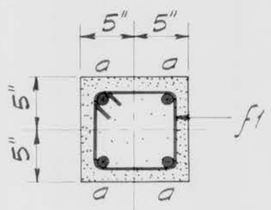
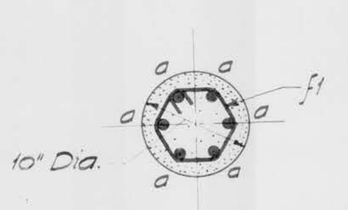






2a 14a 5a

12 SIMILAR.

THE CITY OF EDINBURGH.
WESTFIELD FLATS —— GORGIE.
BLOCK A.
COLUMNS.
SHEET 1 OF 10.
SCALE : 1/2" = 1'-0".

MESSRS. WILLIAMSON & HUBBARD, CHARTERED ARCHITECTS, KIRKCALDY.

KINNEAR AND GORDON. CHARTERED CIVIL ENGINEERS, 56, MELVILLE ST. EDINBURGH.

2-5-50 N.W.A. 195-100.

79'-11"

12'-9" | 14'-0" | 11'-6" | 5'-4" | 6'-3" | 5'-3" | 12'-1" | 12'-9" | 1" Block B

9'-5" | 2'-1" | 20" 11" | 3'-8" | 11"

20" | 20"

3'-2" | 4'-2" | 5'-3'-0"

C.I.S. slab 7½" thick

Lift 5'-5" × 6'-2"

Pipe Duct

C.I.S. slab 7½" thick

C.I.S.

6-P | 18" | 5" | 9-P | 5-P | 2-Q | 3-P | 3-P | 8-P | 8" | 5" | Pipe Duct | 18" | 6-P | 1"

8-P | 9-P | 7-P | 3-P | 3-P | 7-P | 8-P

8 units 5 = 10'-8" | 9 units 5 = 12'-0" | 7 units T = 9'-4" | 3 units T = 4'-0" | 7 units T = 9'-4" | 7 units 5 = 9'-4" | 8 units 5 = 10'-8"

16" | 9" | 13" | 10" | 13" | 2-R | 5-T | 13" | 5" | 3-T | 11" | 13" | 5-T | 2-R | 13" | 9" | 2'-0" | 9" | 8" | 15"

8-5 | 9-5 | 8-5 | 8-5

(23) (20a) (20) (16) (15) (11) (7) (4) (4a) (1)

(24) (21) (18) (17) (14) (12b) (12a) (10) (8) (5) (2)

(25) (22) (19) (13b) (13a) (9) (6) (3)

NOTE:
Column numbers given thus — (1)

EDINBURGH 13 MAY 1948
REFERRED TO J. Adam
WARRANT OF THIS DATE.
J. Gibson Maitland
Lord Provost of Guild

EDINBURGH 10 NOV 1950
REFERRED TO
WARRANT OF THIS DATE.
Jno. J. Ford
Lord Provost of Guild

¼" PLAN

Inches 12 9 6 3 1 2 3 4 5 6 7 8 9 10 — 20 — 30 — 40 — 50 Feet

¼" = 1'-0"

9" × 3" hole in one end of unit.

Sectional Elevation of ends of 12 no. units supplied with ventilating holes.

7" | 4" | 3" | 2" | 5" | 4"

85 units, 8'-6" long — P
2 units, 7'-6" long — Q
4 units, 6'-10" long — R
65 units, 5'-10" long — S
30 units, 4'-10" long — T

½" | ¼" | 3" | 2" | 1½" total finish (See Architect's drawings for details.) | 5" | 4" | 7" | ½" cement mortar bedding. | ⅛" | 11" | ½" | 2" | 2" | 12" | 2" | 16" | 16" | Top of longitudinal internal and outside beams.

Inches 12 9 6 3 0 — 1 — 2 — 3 — 4 — 5 Feet

1" = 1'-0"

1" DETAILS OF UNITS

THE CITY OF EDINBURGH — WESTFIELD FLATS — GORGIE.
GENERAL ARRANGEMENT OF REINFORCED CONCRETE WORK.
BLOCK A — FLOOR A (PRECAST WORK.).

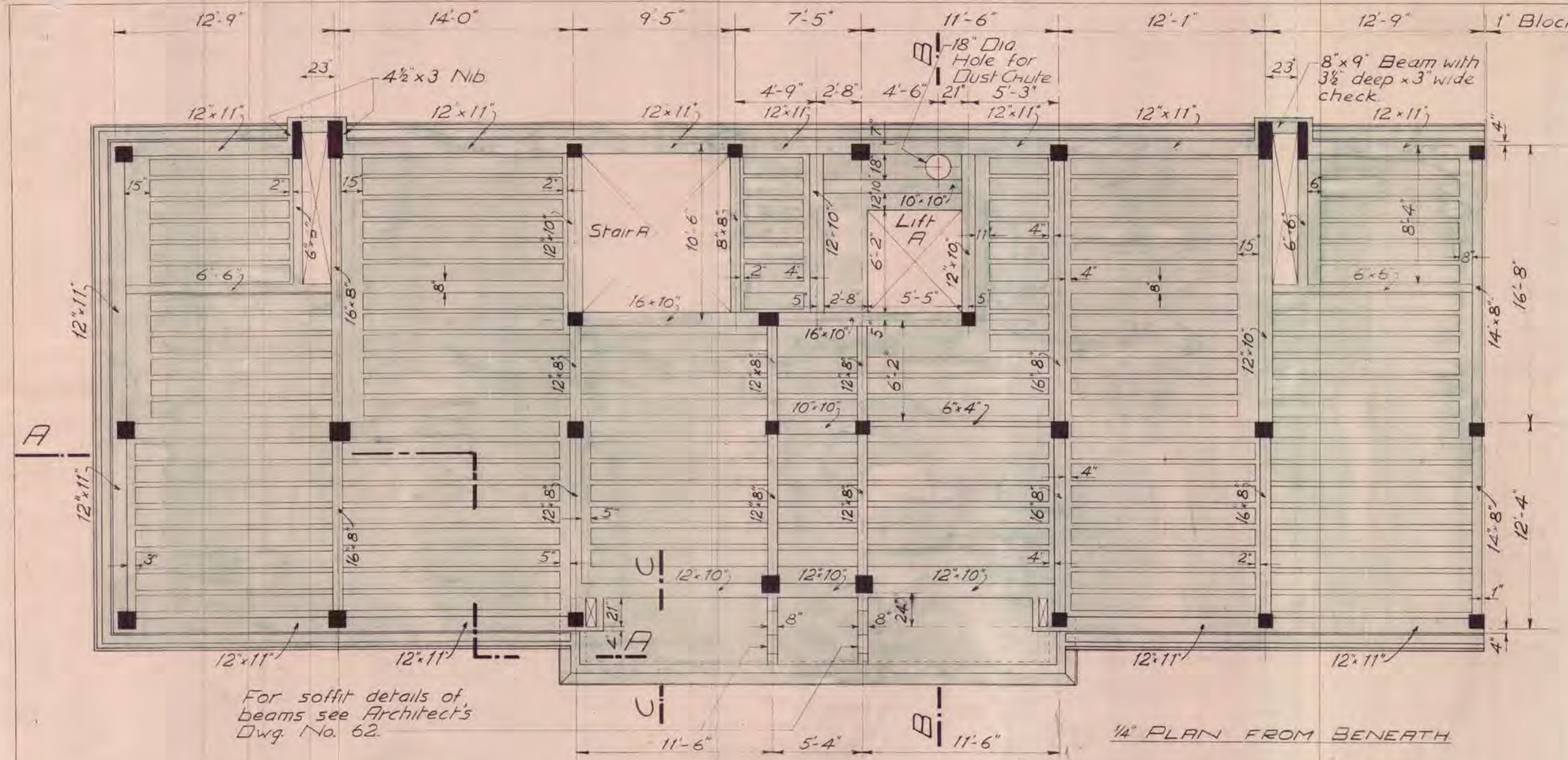
SCALES : 1" & ¼" = 1'-0"

B - 28-10-1948 Amended. N.V.A. & Ch.
A - 4-8-1948 Amended. N.V.A.

WM. WILLIAMSON & HUBBARD F/A.R.I.B.A.,
CHARTERED ARCHITECTS, KIRKCALDY.

KINNEAR AND GORDON,
CHARTERED CIVIL ENGINEERS,
56, MELVILLE ST., EDINBURGH.

8-3-1948 Ch. N.V.A. & 195-12

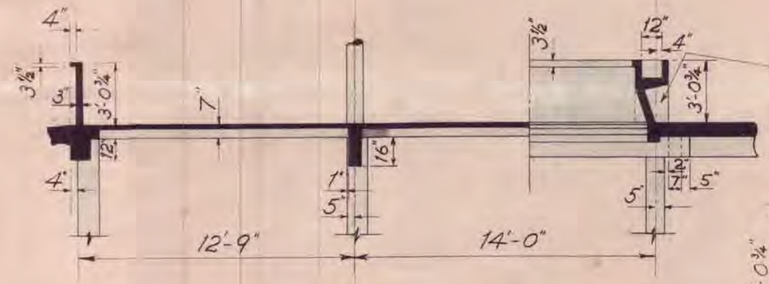


For soffit details of beams see Architect's Dwg. No. 62.

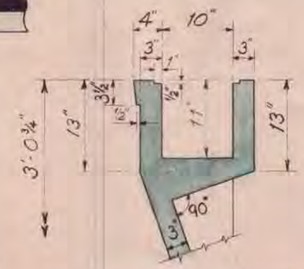
¼" PLAN FROM BENEATH

NOTES.

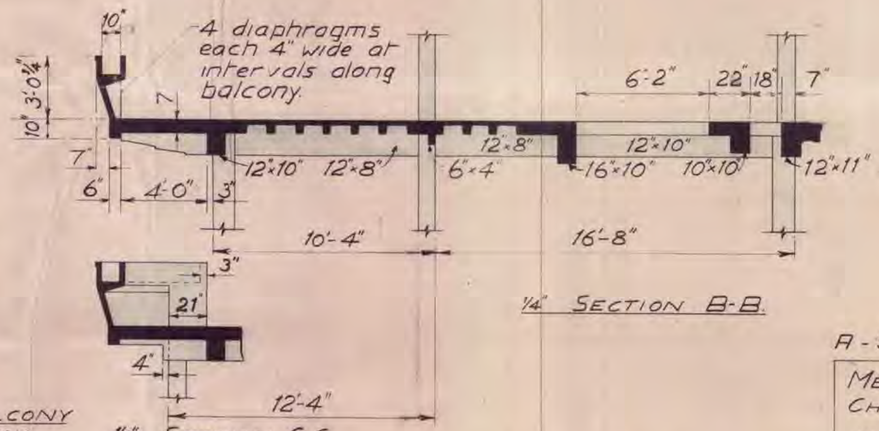
1. All beam sizes are given as depth × breadth clear
2. All slabs are 7" overall. For details of ribs see Dwg No. 195-13A
3. For details of Cornices to outside beams see Architect's Dwgs. Nos. 62 & 63
4. Concrete of balcony parapet to be made with ⅜" aggregate. Appearance to match precast blocks of external wall to Architect's satisfaction
5. All other concrete exposed on elevations is to be finished according to Architect's instructions.



¼" SECTION A-A



1" SECTION OF BALCONY FRONT FLOWER BOX



¼" SECTION B-B

¼" SECTION C-C

Inches 12 9 6 3 0 1 2 3 4 5 Feet

1" = 1'-0"

A-5-11-48 Amended & Redrawn R.N.V.R.

THE CORPORATION OF EDINBURGH — WESTFIELD FLATS — GORGIE.
GENERAL ARRANGEMENT OF REINFORCED CONCRETE WORK.
BLOCK A — FLOOR H.

Inches 1 2 3 4 5 6 7 8 9 10 20 30 40 50 Feet

SCALES: ¼" & 1" = 1'-0"

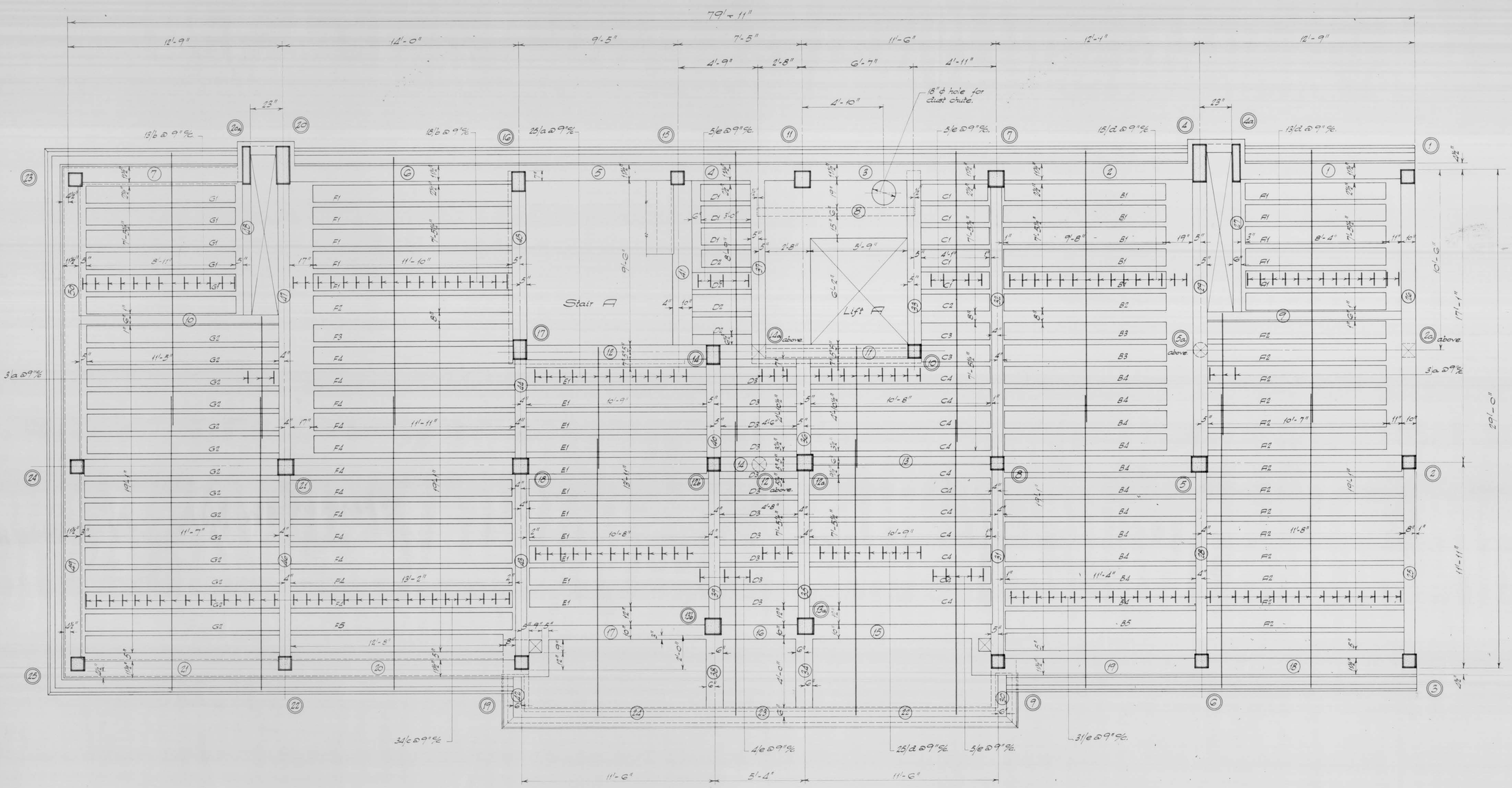
¼" = 1'-0"

MESSRS. WILLIAMSON & HUBBARD F/ARIBA
CHARTERED ARCHITECTS. KIRKCALDY

KINNEAR & GORDON.
CHARTERED CIVIL ENGINEERS
56, MELVILLE STREET, EDINBURGH.

10-3-1948

195-14.



PLAN FROM BENEATH.

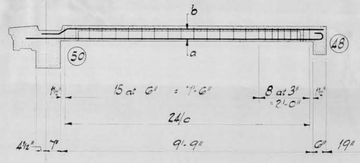
NOTE :
7" slab around Lift Well is similar to Block F, Roof, see Dwg. No. 195-551 for details.

THE CITY OF EDINBURGH —— WESTFIELD FLATS —— GORGIE.
BLOCK A —— FLOOR H —— SHEET 1 OF 15
GENERAL ARRANGEMENT.
SCALE : ½" = 1'-0".

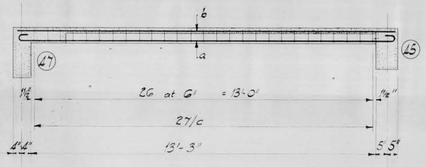
MESSRS. WILLIAMSON & HUBBARD, F/A.R.I.B.A., KIRKCALDY.

KINNEAR AND GORDON, CHARTERED CIVIL ENGINEERS, 5G, MELVILLE ST., EDINBURGH.

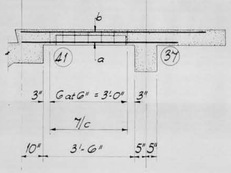
21-8-1950 N.V.R. & 195-140



5/G1.



5/F1.



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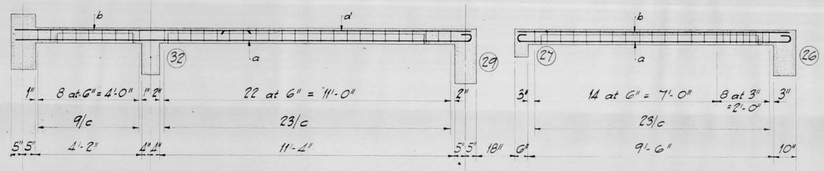
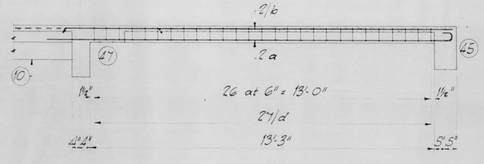


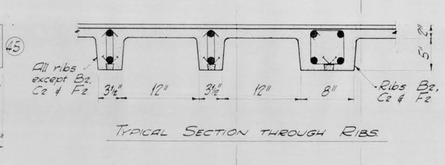
5/C1.

5/B1.

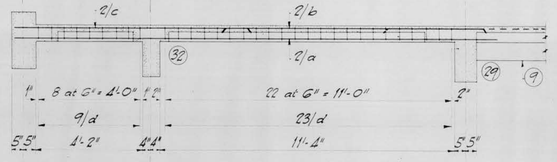
5/A1.



1/F2.

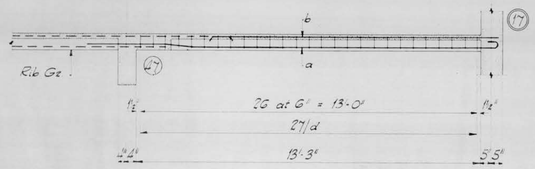


TYPICAL SECTION THROUGH RIBS



1/C2

1/B2



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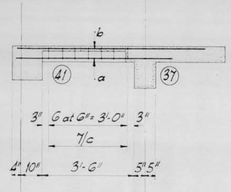
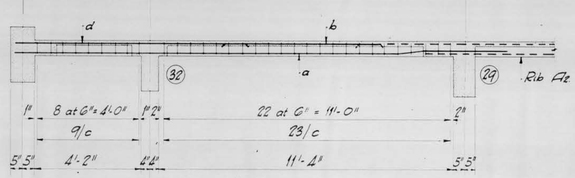
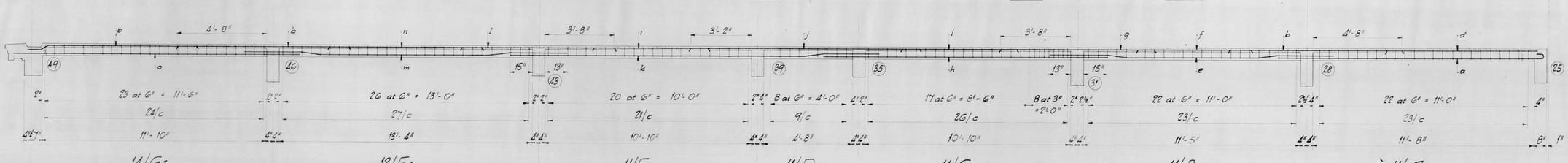


4/D2.



2/C3.

2/B3.



12/G2.

12/F4.

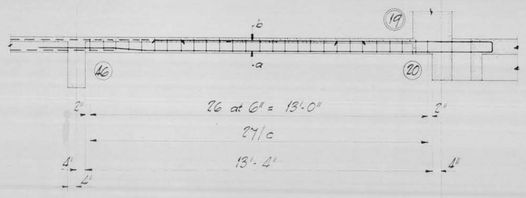
11/E1.

11/D3.

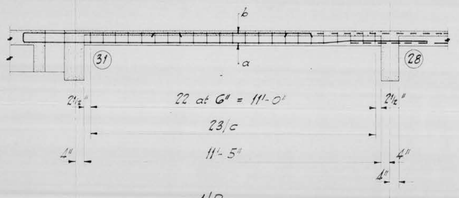
11/C4.

11/B4.

4/A2.



1/F5.



1/B5.

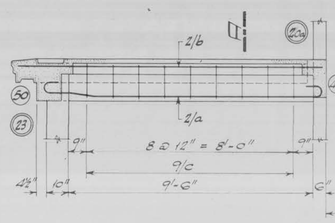
THE CITY OF EDINBURGH —— WESTFIELD FLATS —— GORGIE.
BLOCK A —— FLOOR H —— SHEET 2 OF 15. —— RIBS.
SCALES : —— ELEVATIONS : 1/2" = 1'-0". —— SECTIONS : 1 1/2" = 1'-0".

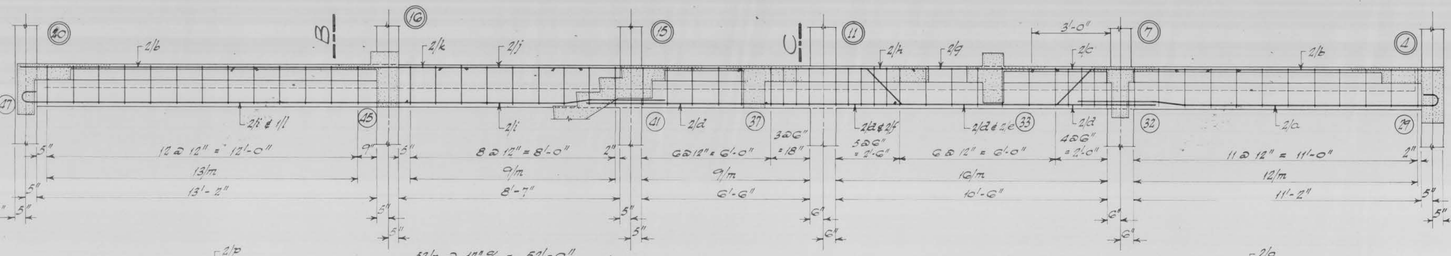
MESSRS WILLIAMSON AND HUBBARD
F.I.A.R.I.B.A.
KIRKCALDY

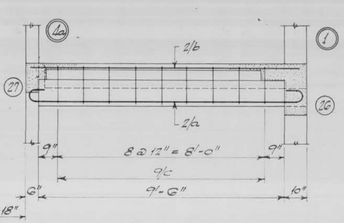
KINNEAR AND GORDON,
CHARTERED CIVIL ENGINEERS,
56 MELVILLE ST, EDINBURGH.

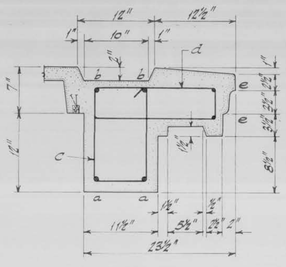
17-8-1950

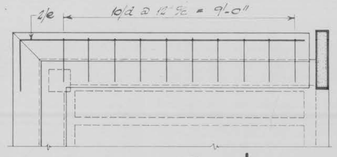
S.B. No. & 195-141.

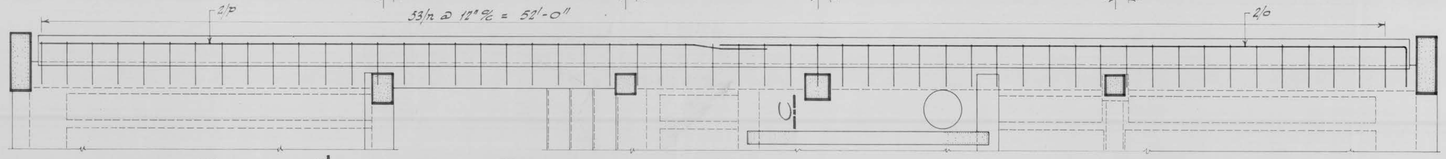


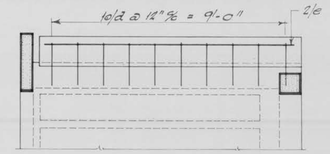


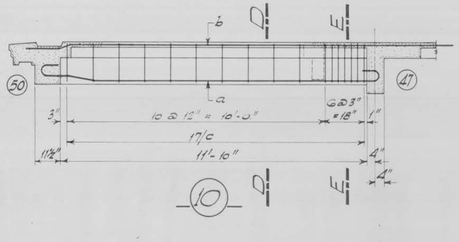


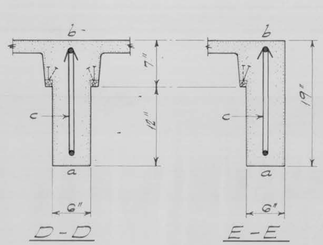


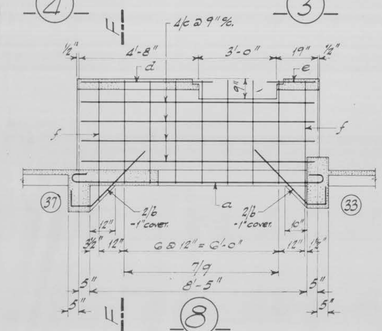


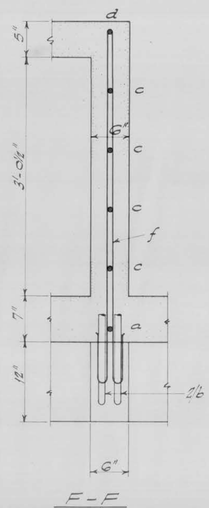


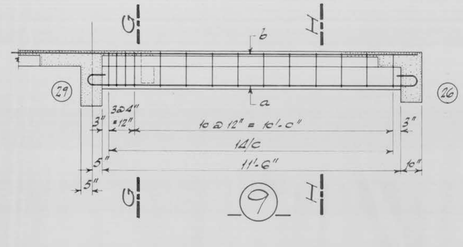


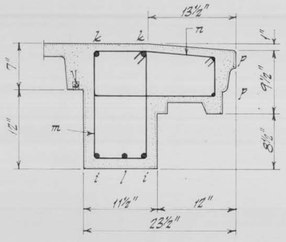


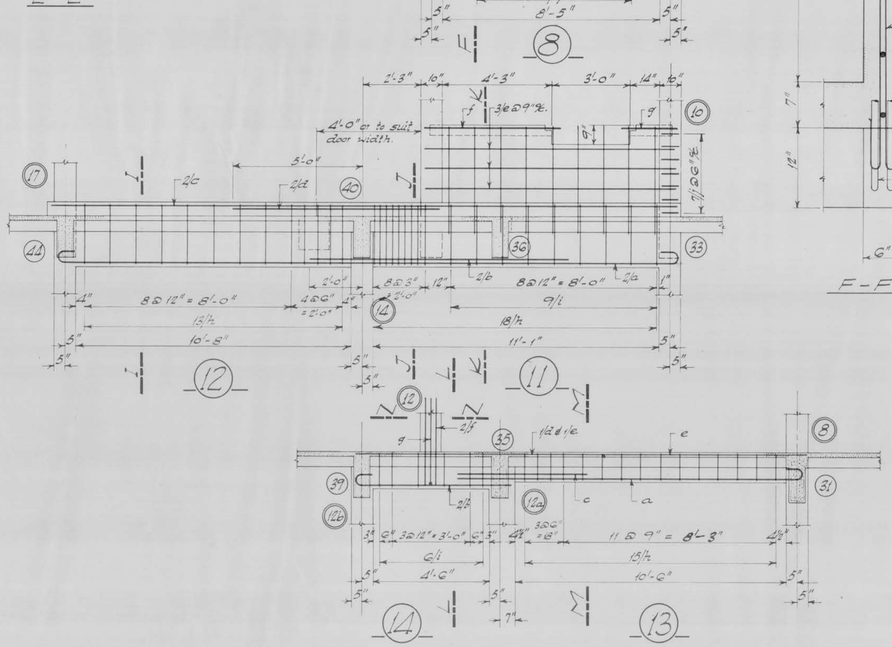


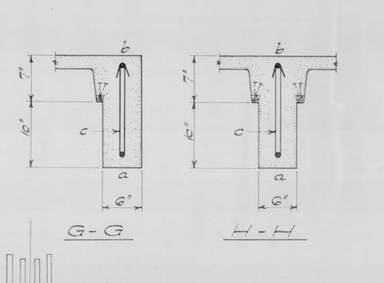


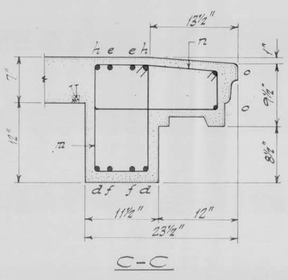


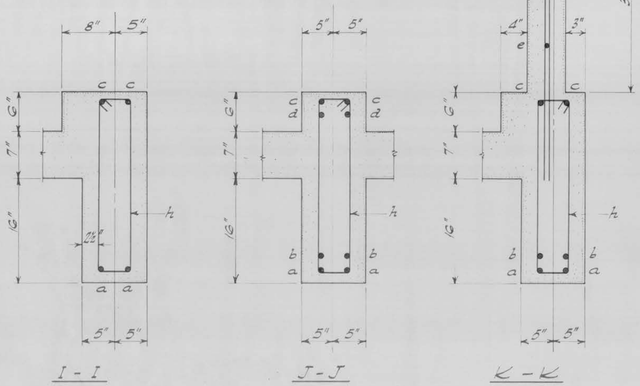


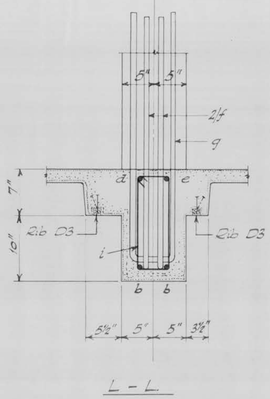


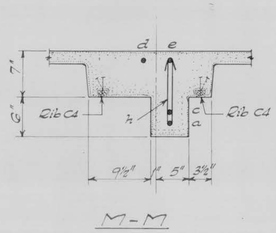


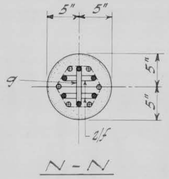








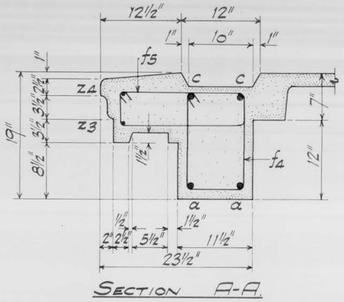




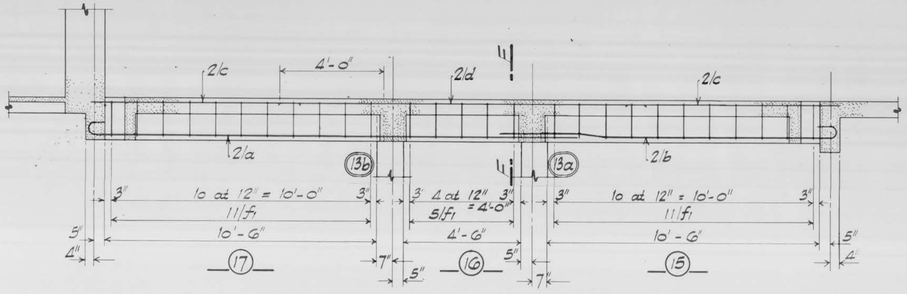
THE CITY OF EDINBURGH — WESTFIELD FLATS — GORGIE.
BLOCK A — FLOOR H — SHEET 3 OF 15 — BEAMS.
SCALES : PLANS & ELEVATIONS, ½" = 1'-0."
SECTIONS, 1½" = 1'-0."

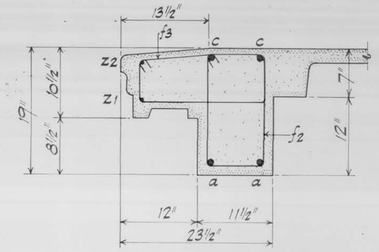
MESSRS. WILLIAMSON & HUBBARD, F/A.R.I.B.A., KIRKCALDY.

LINNEAR AND GORDON, CHARTERED CIV'L ENGINEERS, 36, MELVILLE ST., EDINBURGH.
30-8-1950 195-142



SECTION A-A.





SECTION B-B.
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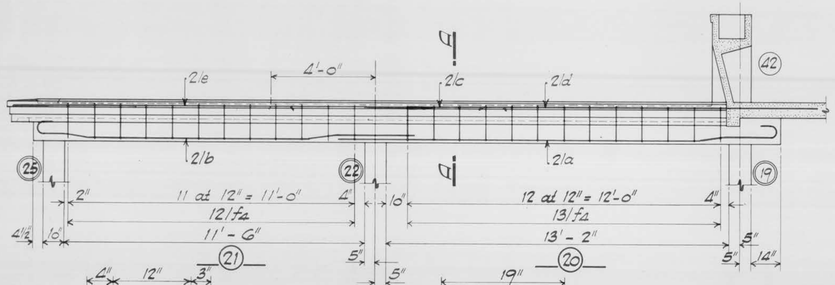
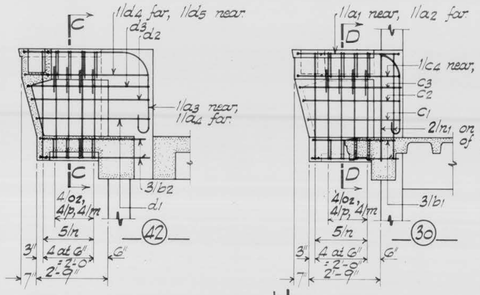
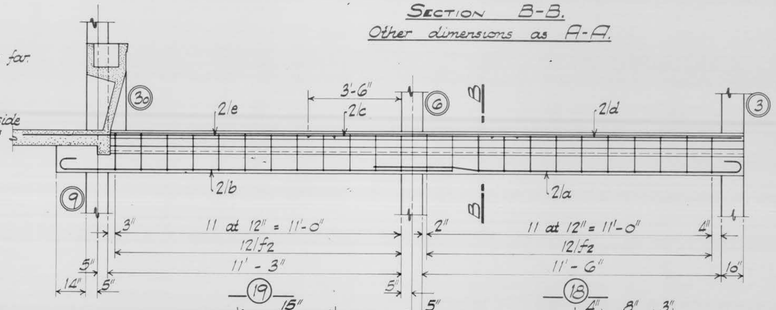
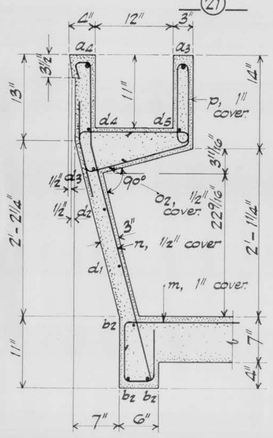
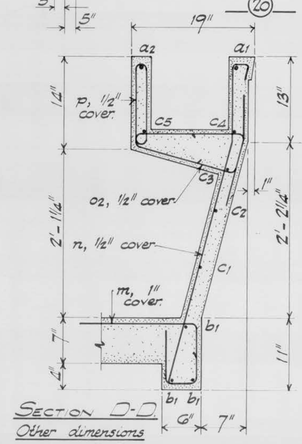








SECTION C-C.



Section D-D
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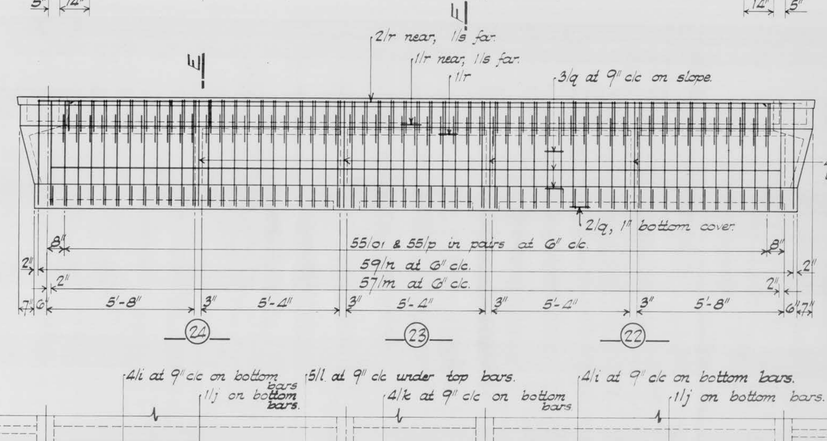

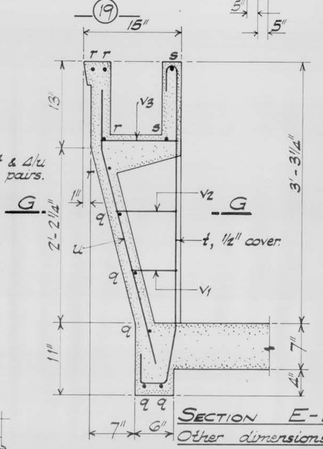

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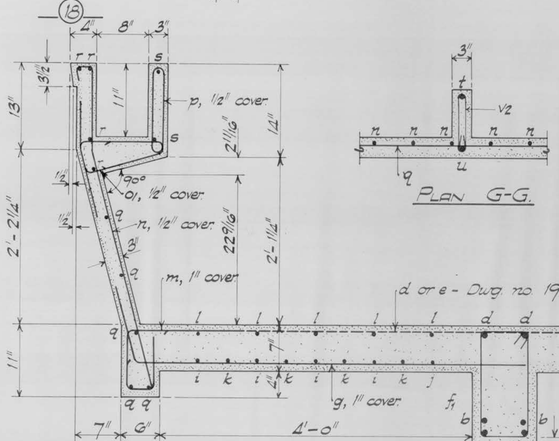
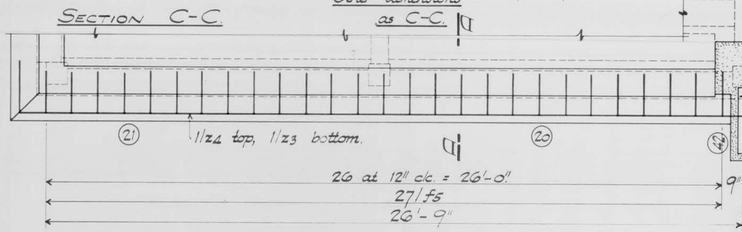
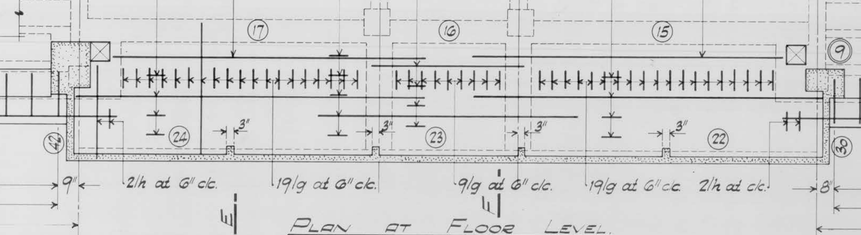


SECTION F-F.

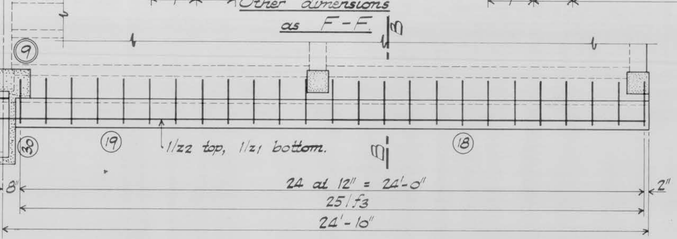
PLAN G-G.

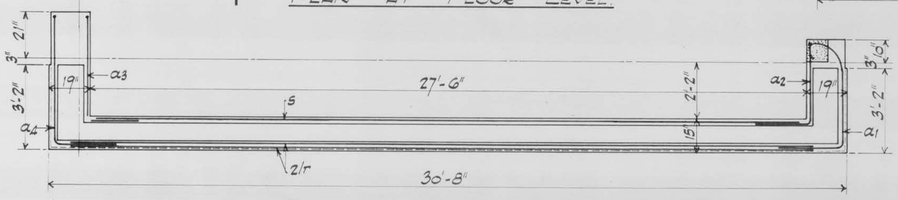
d or e - Dwg no 195-140.





PLAN AT FLOOR LEVEL.





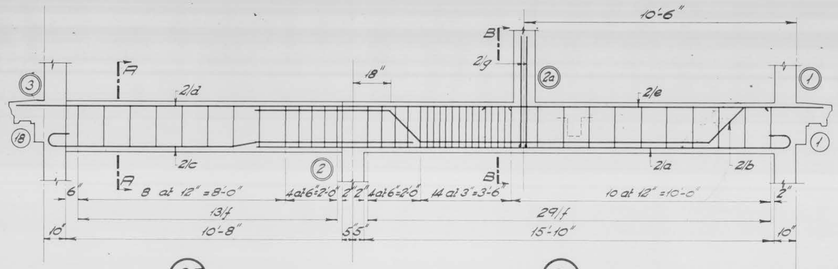
PLAN AT PARAPET LEVEL.

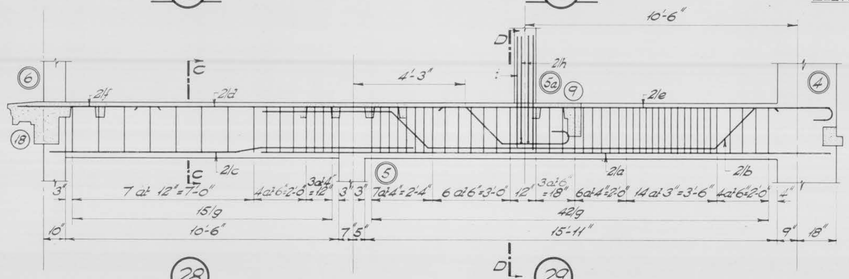
THE CITY OF EDINBURGH.
WESTFIELD FLATS, GORGIE.
BLOCK A —— FLOOR H.
SHEET 4 OF 15 —— BEAMS.
SCALES:- PLANS AND ELEVATIONS: 1/2" = 1'-0".
SECTIONS: 1½" = 1'-0".

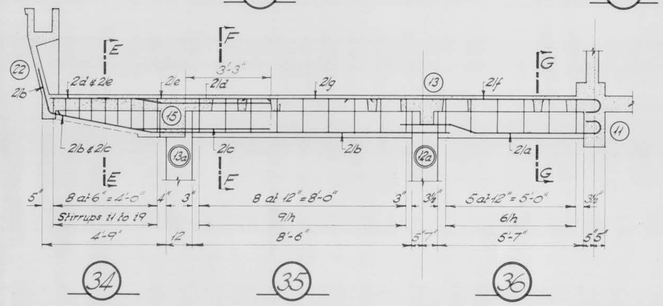
MESSRS. WILLIAMSON & HUBBARD,
F/A R.I.B.A.,
KIRKCALDY.

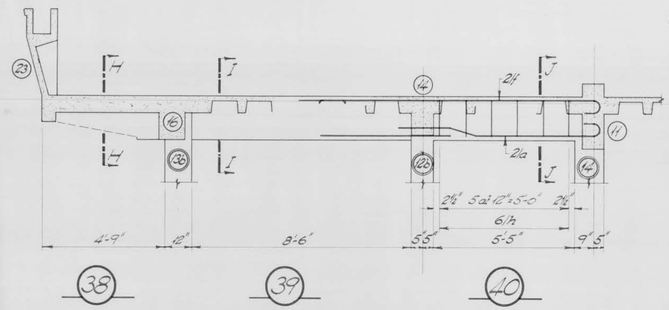
KINNEAR AND GORDON,
CHARTERED CIVIL ENGINEERS,
36, MELVILLE ST., EDINBURGH.

28-8-1950 DRAWING No. 195-143.

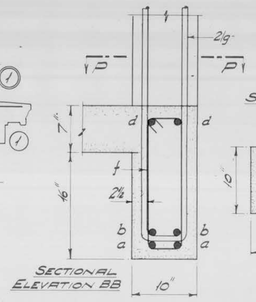


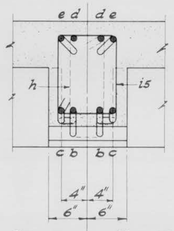




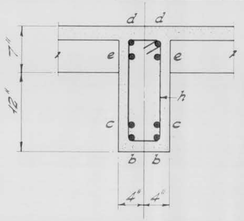


Reinforcement similar to (34) (35) & (36) except where noted.

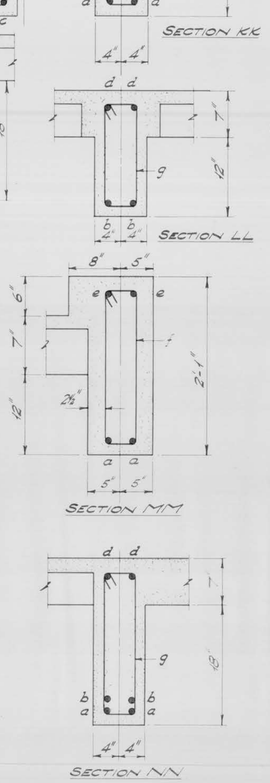


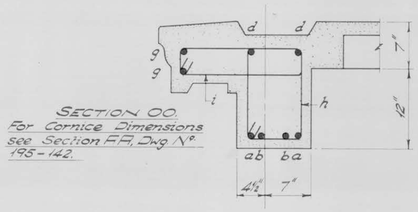


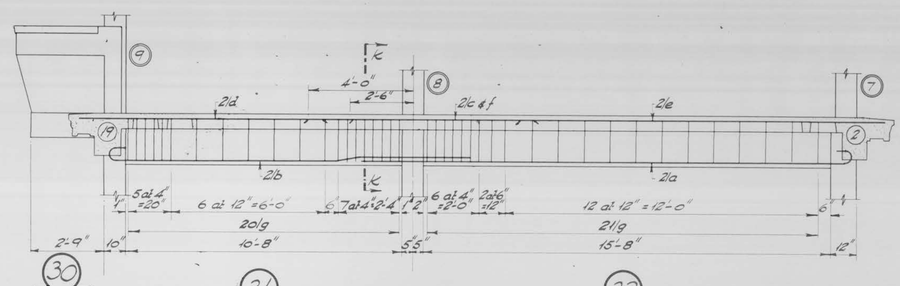
SECTIONAL ELEVNS. EE & HH OMITTING COLUMNS

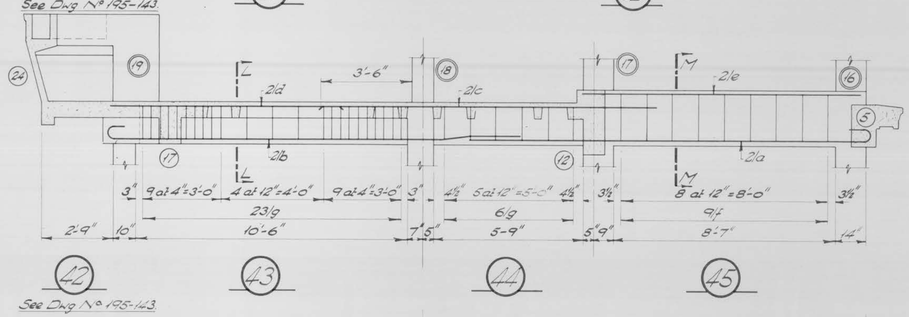


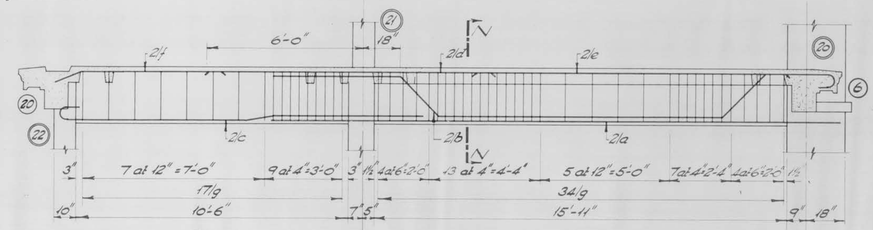
SECTIONS FF & II

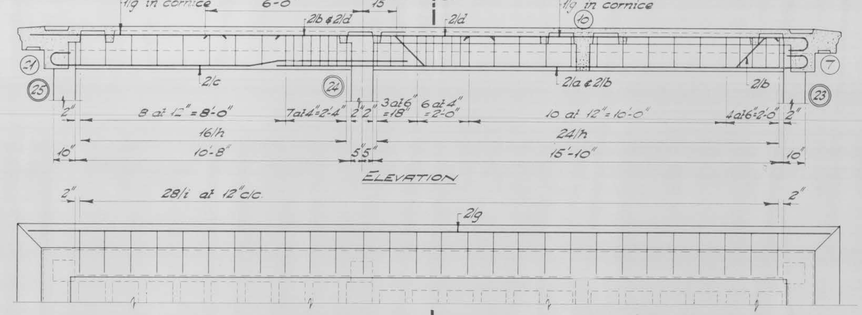










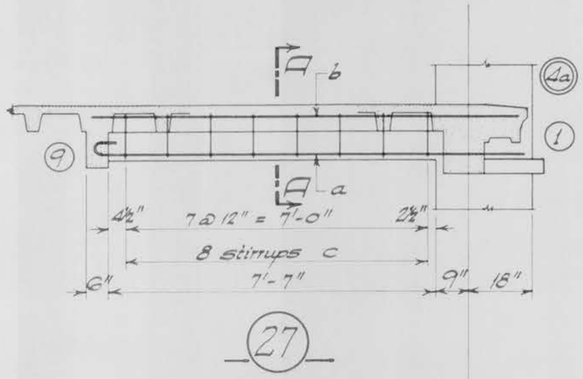


THE CITY OF EDINBURGH —— WESTFIELD FLATS —— GORGIE
BLOCK A —— FLOOR H —— SHEET 5 OF 15 —— BEAMS.
SCALES : —— PLAN & ELEVATIONS : ½" = 1'-0" —— SECTIONS : 1½" = 1'-0"

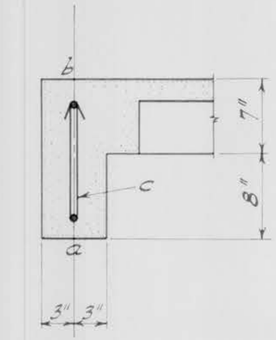
JESSIES WILLIAMSON & HUBBARD.
F.R.I.B.A.
KIRKCALDY

KINNEAR AND GORDON.
CHARTERED CIVIL ENGINEERS.
56 MELVILLE ST. EDINBURGH

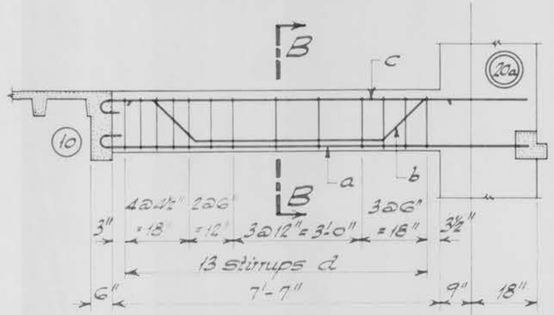
28-8-1950 R. & N/A. 195-144



27



SECTION A-A



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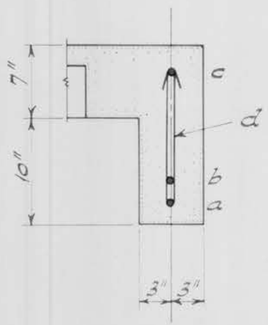
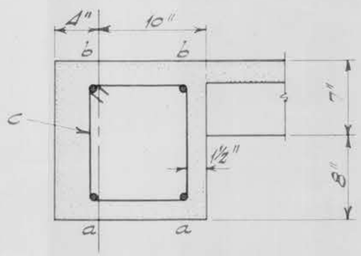
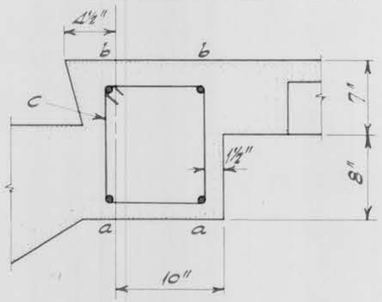


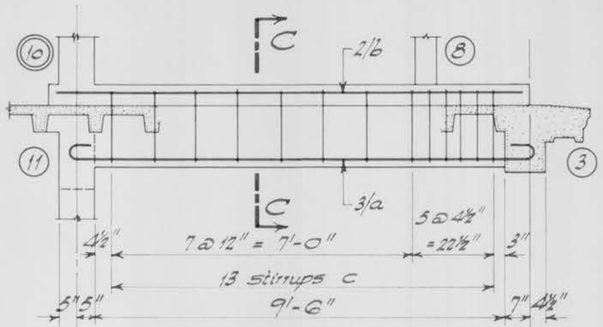
SECTION B-B



SECTION F-F



SECTION G-G



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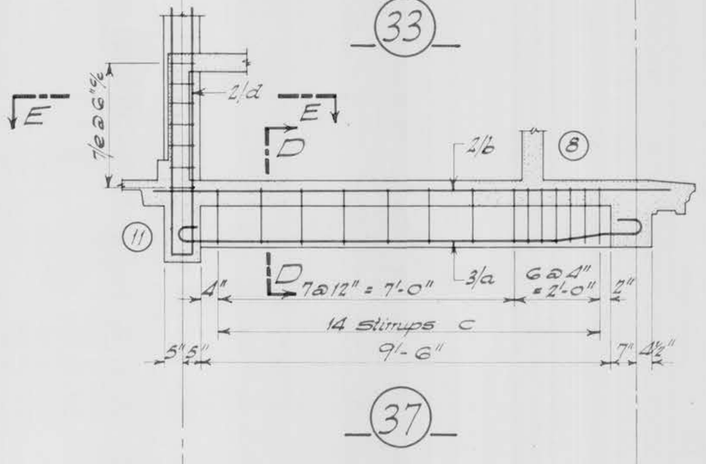

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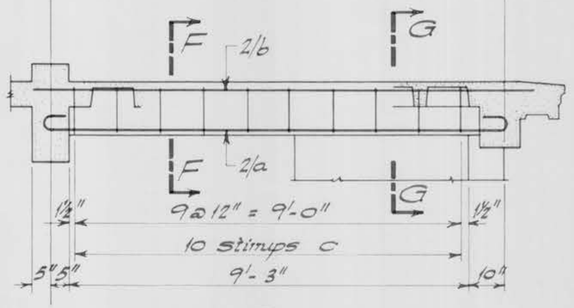

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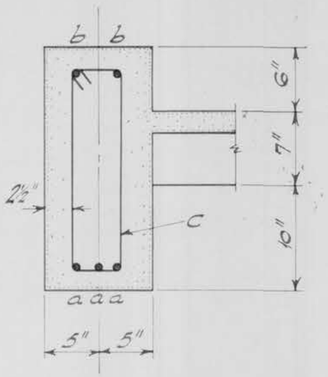
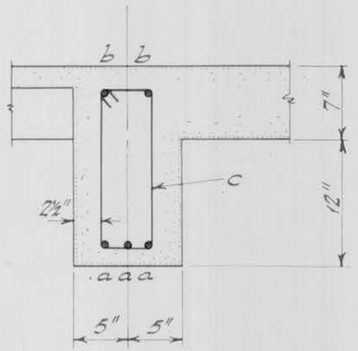
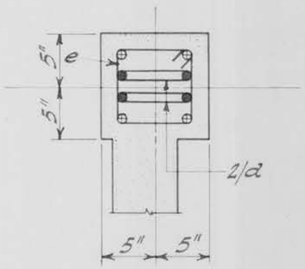


SECTION C-C



SECTION D-D



SECTION E-E

THE CITY OF EDINBURGH — WESTFIELD FLATS — GORGIE.

BLOCK A — FLOOR H — SHEET 6 OF — BEAMS.

SCALES : ELEVATIONS , ½" = 1'-0."
SECTIONS , 1½" = 1'-0."

MESSRS WILLIAMSON & HUBBARD,
F/A.R.I.B.A.,
KIRKCALDY.

KINNEAR AND GORDON,
CHARTERED CIVIL ENGINEERS,
56, MELVILLE ST., EDINBURGH.

23-8-1950 N.V.A. & E. 195-145

79'-11"

12'-9" | 14'-0" | 11'-6" | 5'-4" | 6'-3" | 5'-3" | 12'-1" | 12'-9" | 1" Block B

4½" × 3" nib

23"

4½" × 5" nib, ½" × 1" wide weather on top.

9'-5"

2'-1"

Beam between cols. (11) & (11a) 8" × 8" at Floor B only.

Col. (11a) beneath Floor B only

18" dia. hole in slab for dust chute pipe.

23"

8" × 9" with 3½" deep × 3" wide check.

6" 3" 8" 4½" 3½" 9"

1" SECTION C-C

12" × 6" | 10" × 6" | 19" × 6" wall | 12" × 6" | 12" × 6" | 10" × 6" | 12" × 6"

5" | 6" × 6" | 12" × 8" | 16" × 8" | 9" wall | 12" × 10" | 16" × 8" | 6" × 6" | 14" × 8"

Stair D | 15" × 8" - Floor B, 8" × 8" others. | 10'-6" | 8" × 10" | 16" × 10" | Lift D | 6'-2" | 10" × 10½" | 5'-5" | 4'-6" | 9" wall | 8'-4"

6" × 4" | 3'-9" | 6'-2" | 6" × 10" | 3" | 13" | 17'-1"

12" × 8" | 16" × 8" | 14" × 8" | 29'-0"

12" × 6" | 12" × 6" | 12" × 10" | 12" × 10" | 12" × 6" | 12" × 6"

4" slab

4½" × 5" nib, ½" × 1" wide weather on top.

4½" × 5" nib, ½" × 1" wide weather on top.

12" × 19", Floor B only, one trough omitted. 12" × 10" all other floors.

8" wide beams. For dimensions of soffit see Architect's Dwg. No. 62.

¼" PLAN OF FLOOR C FROM BENEATH
FLOORS D TO G SIMILAR - FLOOR B SIMILAR & AS NOTED.

12'-9" | 14'-0"

5" | 7" | 3" | 3½" | 31-0¾" | 6" | 4" | 3"

1" | 5" | 7" | 14" | 16" | 19" | 4½" | 10½"

¼" SECTION A-A.

2" × 1" Hardwood fillets with galvanised nails 2½" long @ 6" % staggered.

2" | 7" | 9" | ½" | 11" | ½" | 3½" | 12" | 3½"

1" to 1¼" Tapered hardwood fillets with galvanised nails 2½" long @ 6" % staggered.

2" | 5" | 7" | 6" | ⅞" | ½" | 11" | ½" | 3½" | 12" | 3½" | 12" | 1" | 4" | 1"

1" SECTION SHEWING 9" DEEP RIBBED SLAB.

1" SECTION SHEWING 7" DEEP RIBBED SLAB & 6" × 4" BEAMS.

7" | ½" | 3" | 3'-0¾" | 2" | 3" | 10½" | 6" | 4'-0" | 3"

10'-4" | 16'-8" | 7" | 9" | 6" | 1" | 5" | 4½"

¼" SECTION B-B.

Inches 12 9 6 3 0 | 1 | 2 | 3 | 4 | 5 Feet

1" = 1'-0"

Inches 12 6 0 1 2 3 4 5 6 7 8 9 10 | 20 | 30 Feet

¼" = 1'-0"

NOTES.

1. All slabs not otherwise marked are 7" thick overall.
2. All beam sizes are given depth × breadth in the clear.

EDINBURGH 13 MAY 1949
REFERRED TO IN WARRANT OF THIS DATE.
Lord Dean of Guild

EDINBURGH 10 NOV 1950
REFERRED TO IN WARRANT OF THIS DATE.
Lord Dean of Guild

A - 1-11-1948 Amended & redrawn.

THE CORPORATION OF EDINBURGH — WESTFIELD FLATS — GORGIE.
GENERAL ARRANGEMENT OF REINFORCED CONCRETE WORK.
BLOCK A — FLOORS B TO G.

SCALES : 1" AND ¼" = 1'-0".

MESSRS. WILLIAMSON & HUBBARD F/A.R.I.B.A., CHARTERED ARCHITECTS, KIRKCALDY.

KINNEAR AND GORDON, CHARTERED CIVIL ENGINEERS, 56, MELVILLE STREET, EDINBURGH.

10-8-1948

N.V.A.

195-13

SECTION AA

SECTION BB

SECTION CC

Finished Ground Floor Level

SECTION EE

SECTION FF

SECTION DD

SECTION GG

SECTION HH

ELEVATION

PLAN

THE CITY OF EDINBURGH — WESTFIELD FLATS — GORGIE

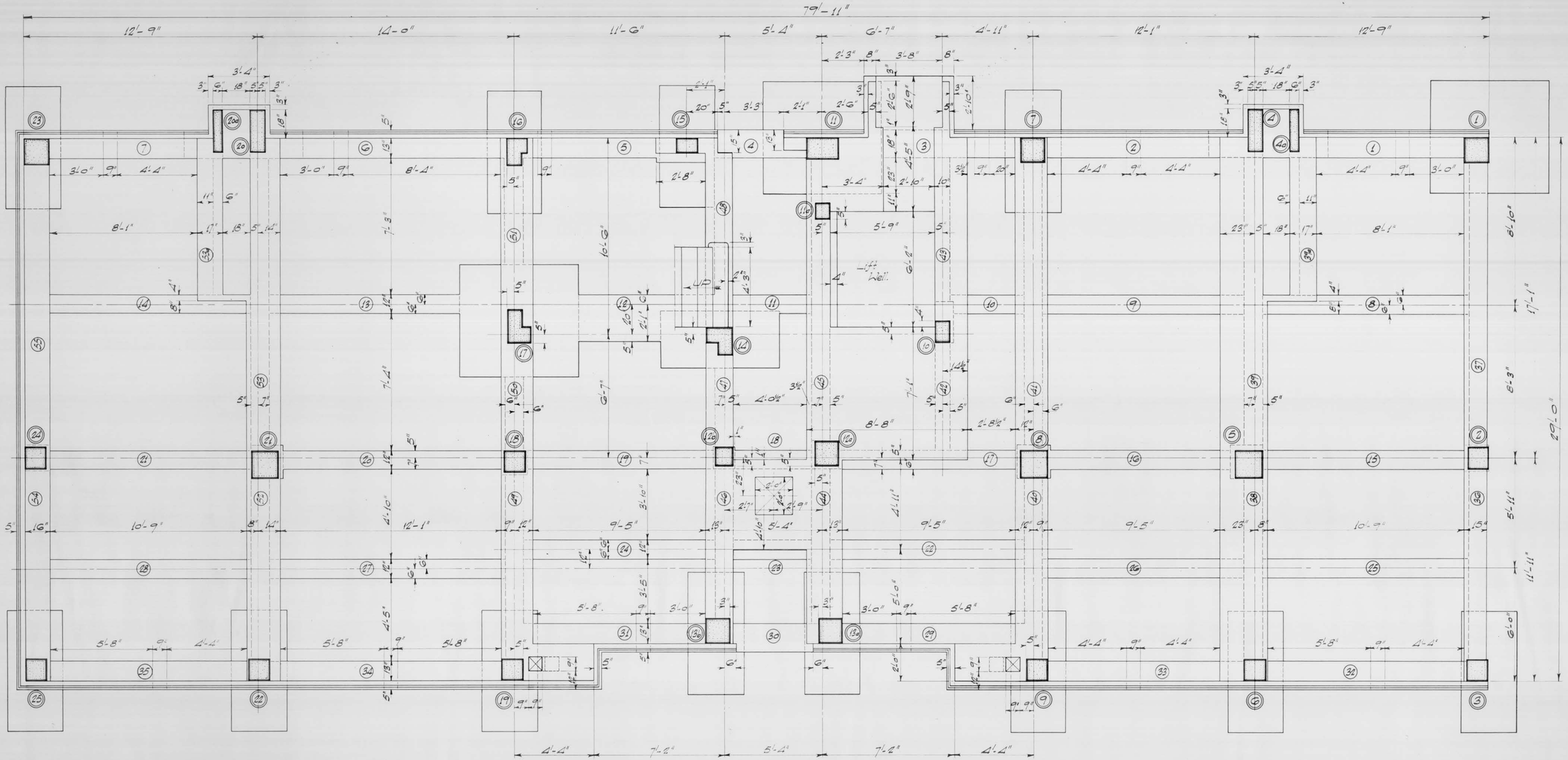
BLOCK A — GROUND FLOOR — CAST IN SITU PART — SHEET 2 OF 9 — BEAMS

SCALES :— PLAN & ELEVATIONS : ½" = 1'-0" — SECTIONS : 1½" = 1'-0"

MESSRS WILLIAMSON & HUBBARD
F/A/R/I/B/A
KIRKCALDY

KINNEAR AND GORDON
CHARTERED CIVIL ENGINEERS
56, MELVILLE ST EDINBURGH

23-3-50 N.V.A. 195-122



½" PLAN.

NOTE :

1. The c.i.s. slab details at the Lift Well, and Pipe Duct Manhole are similar to Block F, see Dwg. Nos 195-524 and 195-579.

THE CITY OF EDINBURGH — WESTFIELD FLATS — GORGIE.
BLOCK A — GROUND FLOOR A — CAST - IN - SITU PART.
SHEET 1 OF — GENERAL ARRANGEMENT.
SCALE : ½" = 1'-0"

MESSRS. WILLIAMSON & HUBBARD, F/A/R.I.B.A., KIRKCALDY.

KINNEAR AND GORDON, CHARTERED CIVIL ENGINEERS, 56, MELVILLE ST, EDINBURGH. 28-2-1950 NVA 195-121

79'-11"

12'-9" | 12'-0" | 11'-6" | 5'-4" | 6'-7" | 4'-11" | 12'-1" | 12'-9"

Concrete filling 2" approx.

Holes in ends of Units P1, Q1 and S1 are to be placed against holes in upstand

Lift Well.

UP

4" rest.

8" rest.

8'-1" | 8'-1"

8'-8" | 2'-8½"

5" | 10" | 10'-9" | 8" | 12" | 12'-1" | 4" | 10" | 9'-5" | 18" | 3" | 4'-4" | 7" | 13" | 9'-5" | 10" | 9" | 9'-5" | 23" | 8" | 10'-9" | 15" | 1"

4'-0½" | 3½"

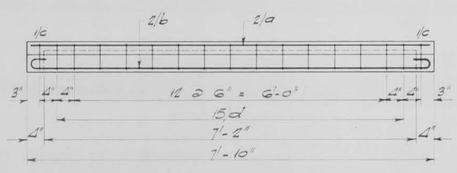
3'-10"

2'-0"

29'-0" | 17'-1" | 8'-10" | 8'-3" | 5'-11" | 11'-11" | 6'-0"

4'-4" | 7'-2" | 5'-4" | 7'-6" | 4'-4"

Concrete filling 2" approx.



UNITS T - 3 No.

UNIT.	No.
P	69
P1	6
P2	4
Q	2
R	60
R1	4
S	29
S1	2
T	3

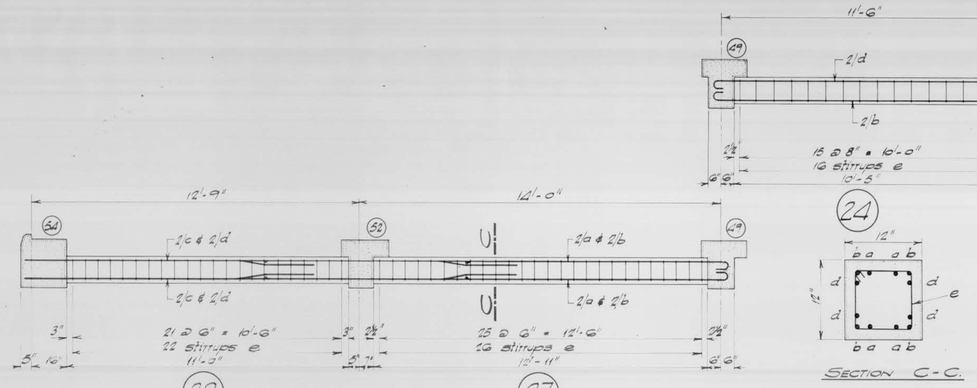
For Details of these units see Dwg. No. 195-581.

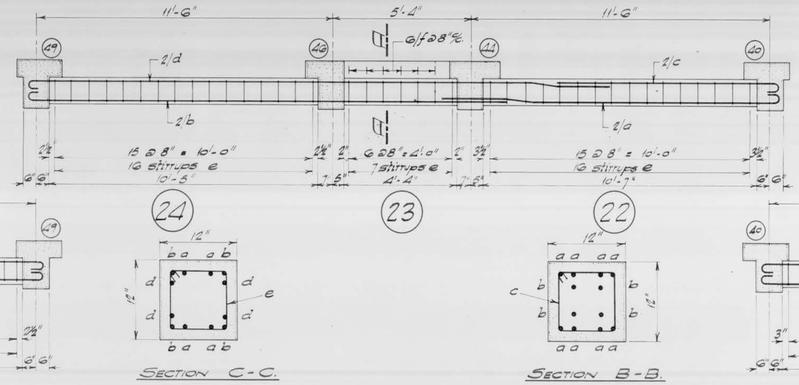
THE CITY OF EDINBURGH — WESTFIELD FLATS — GORGIE.
BLOCK A — GROUND FLOOR A — PRE-CAST PART.
SHEET 1 OF 2 — GENERAL ARRANGEMENT.
SCALE : ½" = 1'-0"

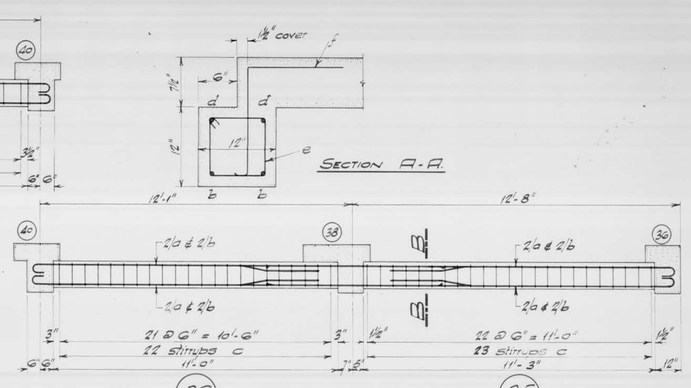
MESSRS. WILLIAMSON & HUBBARD, F.R.I.B.A., KIRKCALDY.

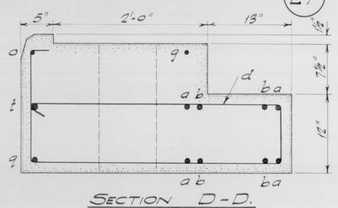
KINNEAR AND GORDON, CHARTERED CIVIL ENGINEERS, 56, MELVILLE ST., EDINBURGH.

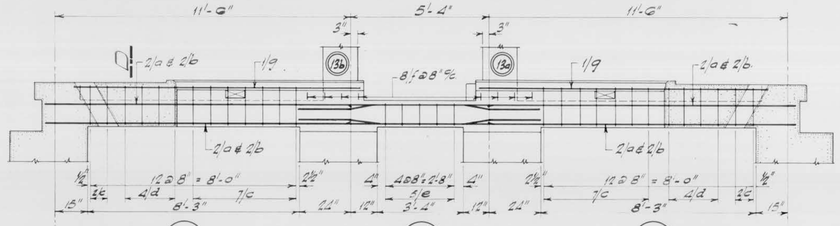
7-3-1950 NVR 195-180

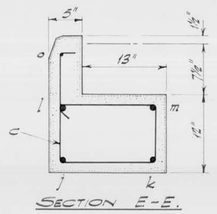


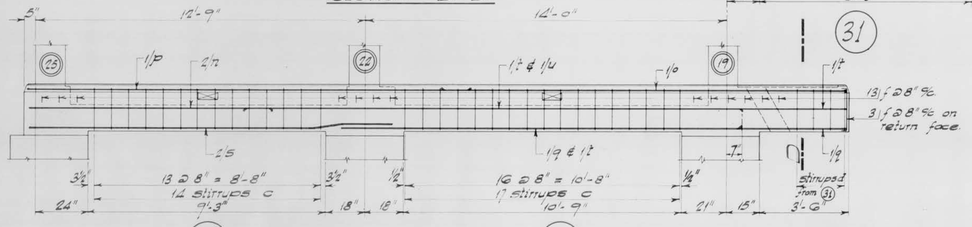


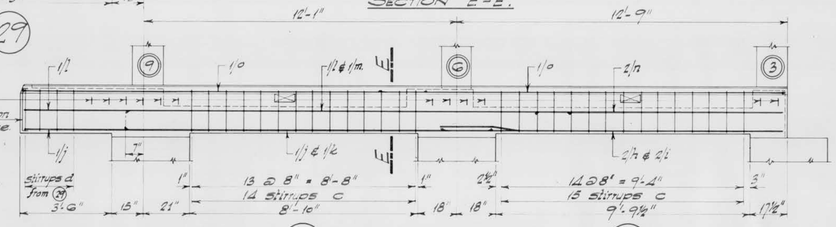


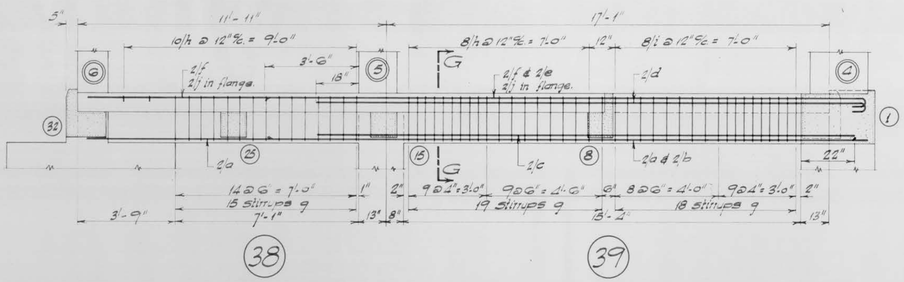


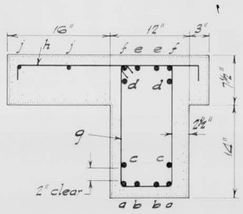


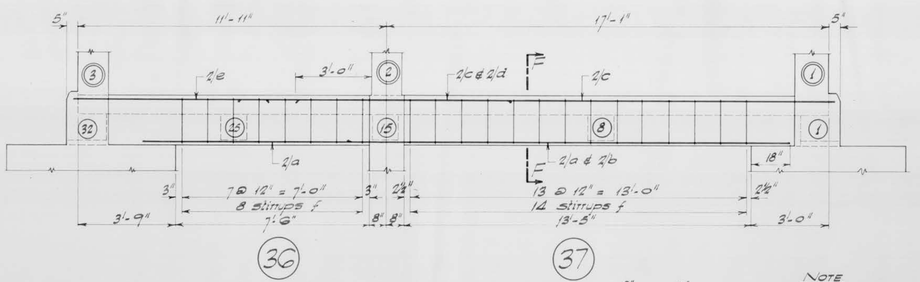


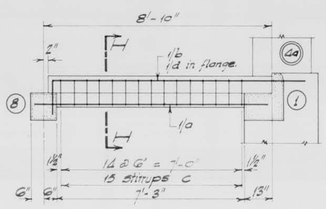




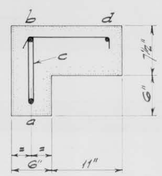


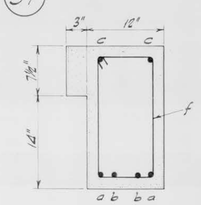






53a SIMILAR BUT TO OTHER HAND.





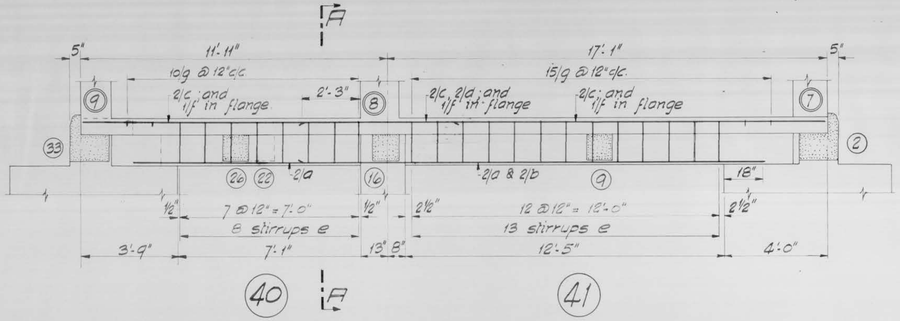
NOTE
All main bars have 1½" bottom and side cover, unless otherwise noted.

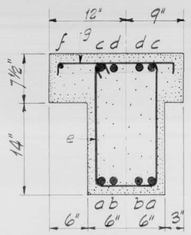
THE CITY OF EDINBURGH —
WESTFIELD FLATS — GORGIE.
BLOCK A.
GROUND FLOOR — CAST IN SITU PART —
SHEET 3 OF 9 — BEAMS.
SCALES : ELEVATIONS ½" = 1'-0"
SECTIONS 1½" = 1'-0"

MESSRS. WILLIAMSON & HUBBARD, F.R.I.B.A., KIRKCALDY.

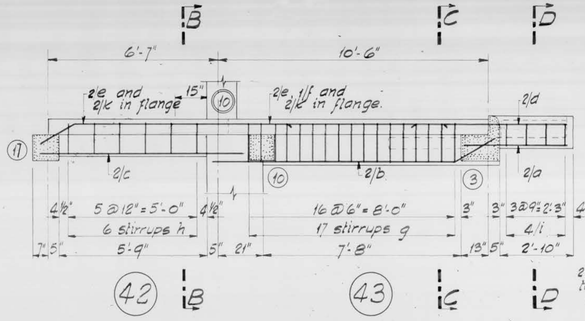
KINNEAR AND GORDON, CHARTERED CIVIL ENGINEERS, 56, MELVILLE ST., EDINBURGH.

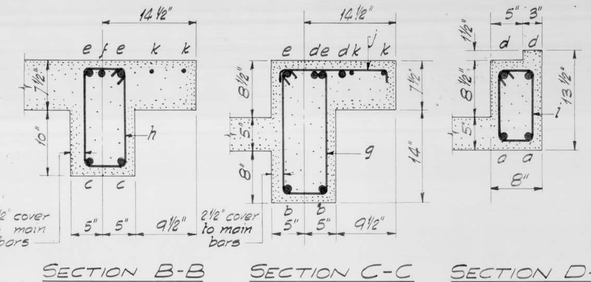
24-3-1950 N/A 195-123



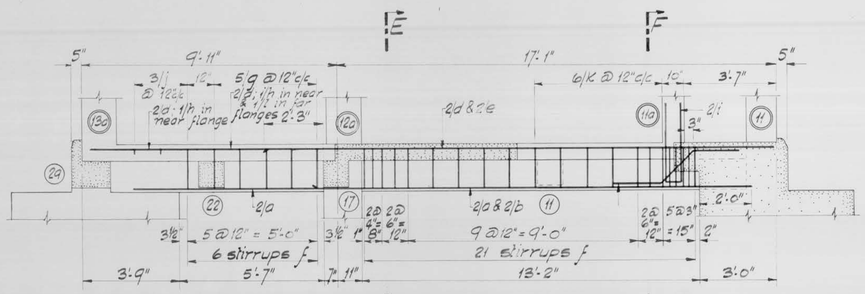


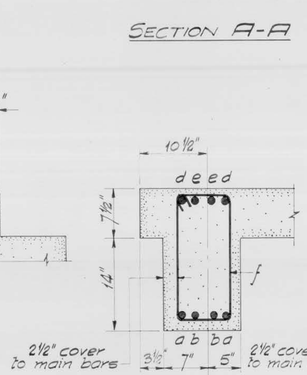
SECTION A-A





SECTION B-B SECTION C-C SECTION D-D





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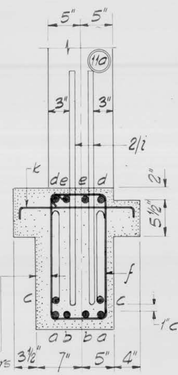

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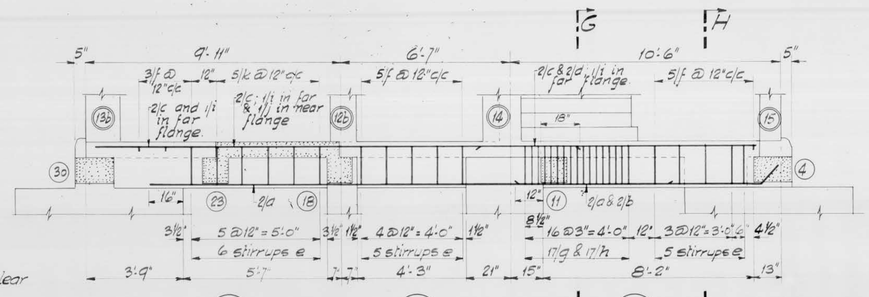

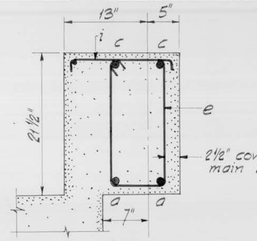

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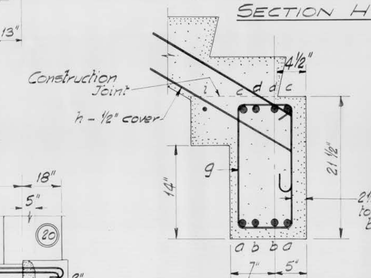

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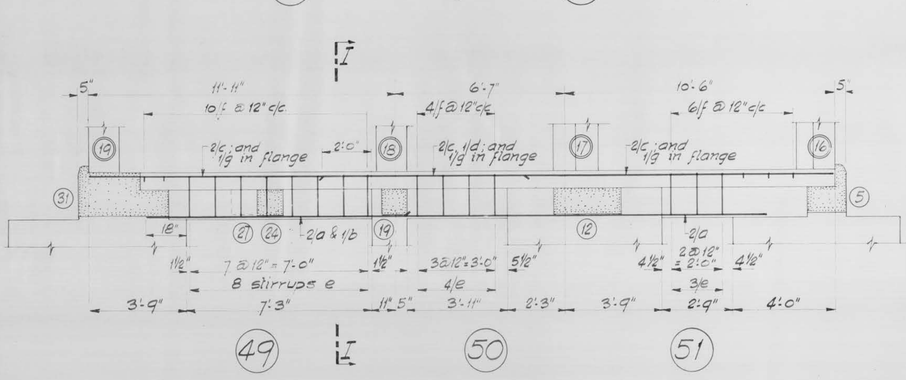
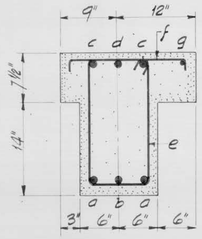
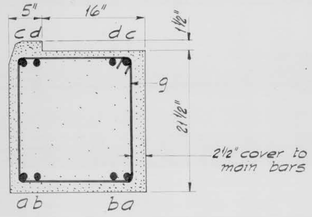


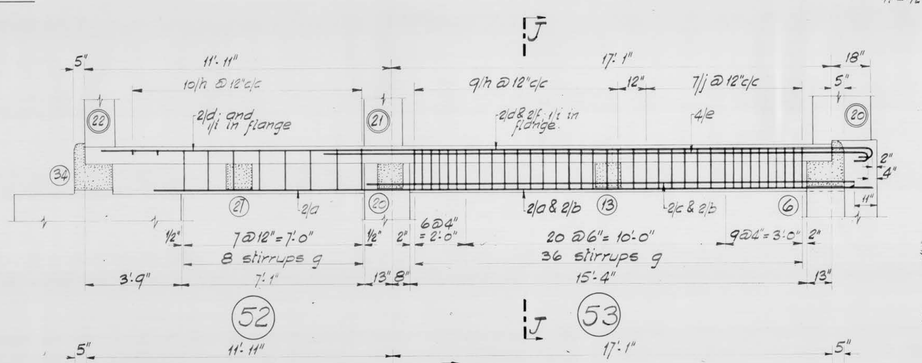


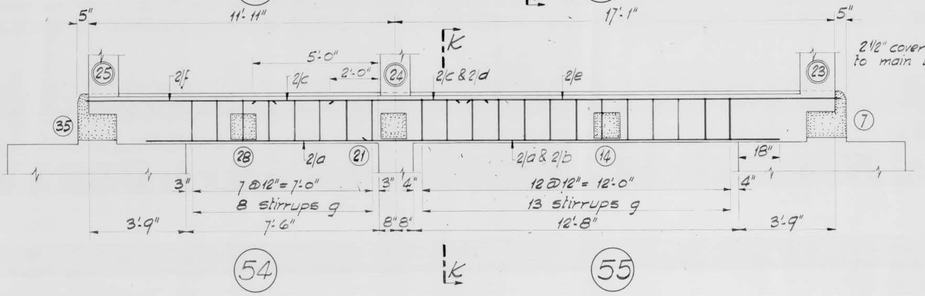
SECTION I-I

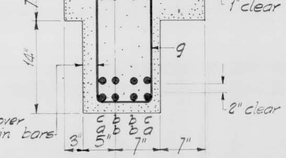


2½" cover to main bars

SECTION K-K







SECTION J-J

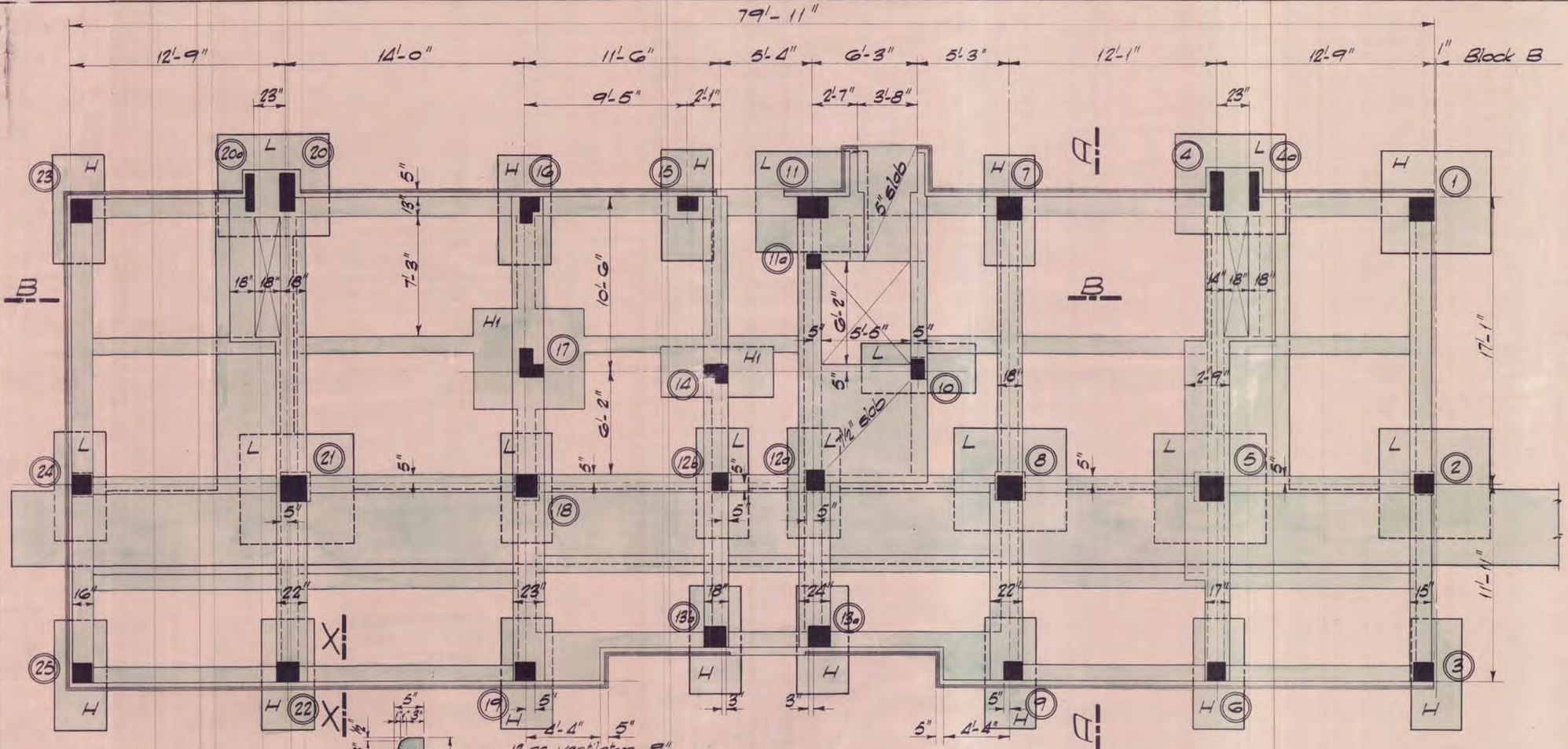
2½" cover to main bars

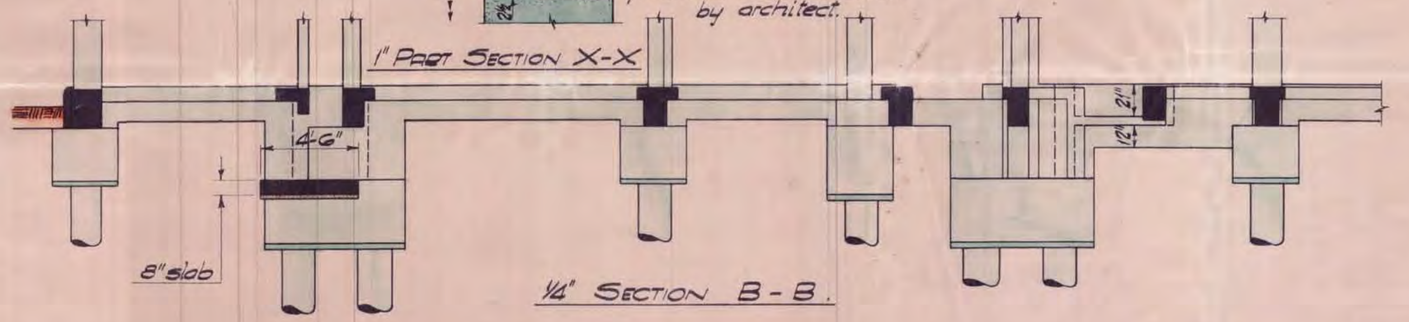
Note.
All main bars have 1½" side and bottom cover unless otherwise noted.

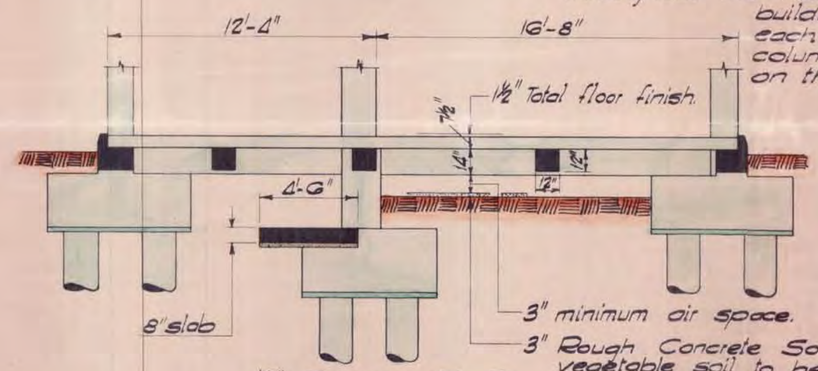
THE CITY OF EDINBURGH.
WESTFIELD FLATS. — GORGIE.
BLOCK A.
GROUND FLOOR. — CAST IN SITU PART.
SHEET 4 OF 9. — BEAMS.
SCALES:— ELEVATIONS. ½" = 1'-0"
SECTIONS. 1½" = 1'-0"

MESSRS. WILLIAMSON & HUBBARD, F.R.I.B.A., KIRKCALDY.

KINNEAR AND GORDON, CHARTERED CIVIL ENGINEERS. 56, MELVILLE ST. EDINBURGH. 25-3-1950 N.V.A. & No. 195-124.







Inches 12 0 1 2 3 4 5 6 7 8 9 10 20 30 40 50 Feet

½" = 1'-0."

Notes.

1. 3" rough concrete, 1:3:5 to be placed under pile coppings and all slabs and beams cast on ground.
2. Pile Coppings
   18 no. 6'-6" × 3'-0" × 3'-0".
   3 no. 6'-6" × 6'-6" × 3'-6".
   6 no. 6'-6" × 6'-0" × 3'-6".
3. The tops of pile coppings marked L are 4'-5" below finished ground floor level; the tops of those marked H are 23" below; the tops of those marked H1 are 9" below.
   These figures are based on a total thickness of 1½" of finishing materials on top of the cast-in-situ tee-beams.
4. Beams
   Outside longitudinal – 18" wide × 12" deep with 9" × 5" upstand. Internal longitudinal – 12" × 12". Internal cross-beams – 12" wide × 2½" deep overall with flanges 7½" deep.
5. The tops of all longitudinal beams are 9" below finished ground floor level; the tops of all cross-beams are 1½" below.
6. On coppings 4/4a and 20/20a the space between soffit of external beams and top of capping is filled with concrete outside the columns; between the columns an opening is left for pipe access.
7. Floors of pipe ducts between coppings are 8" R.C. solid.
8. Dimensioned faces of columns and all external faces of outside columns are plumb throughout the height of the building; elsewhere each lift of the column is centred on that below.

C	8-3-1949	Amended & redrawn.
B	28-10-1948	Amended & redrawn.
A	4-8-1948	Amended.

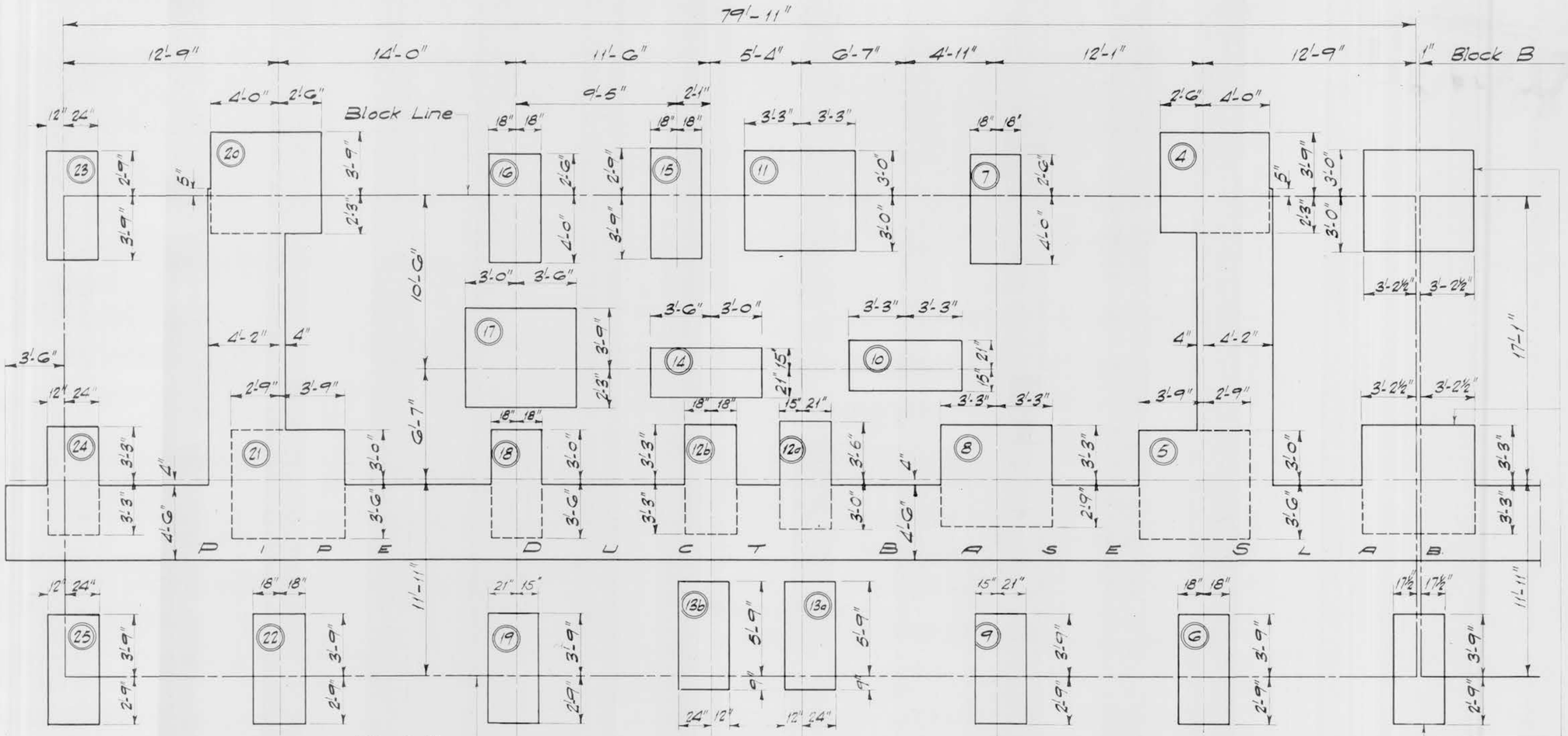
The City of Edinburgh — Westfield Flats — Gorgie.
General Arrangement of Reinforced Concrete Work.
Block A — Pile Coppings and Floor A (C.I.S. Work.)
Scales: 1" and ¼" = 1'-0."

Messrs. Williamson & Hubbard, F.R.I.B.A., Chartered Architects, Kirkcaldy.

Kinnear and Gordon, Chartered Civil Engineers, 56, Melville St., Edinburgh.

8-3-1948

195-11



¼" PLAN

Capping No	Type	Level of u/s capping
4	L	1:08
5	M	1:08
6	K	4:08
7	K	4:08
8	L	1:08
9	K	4:08
10	K	2:9½
11	L	3:58
12a	K	1:58
12b	K	1:58
13a	K	4:08
13b	K	4:08
14	K	5:25
15	K	4:08
16	K	4:08
17	L	4:75
18	K	1:58
19	K	4:08
20	L	1:08
21	M	1:08
22	K	4:08
23	K	4:08
24	K	1:58
25	K	4:08

NOTES.

1. Reduced levels given in Column 3 of the table are referred to the Arbitrary Datum given in Messrs. Williamson & Hubbard's Dwg. No. 36. Also with reference to this datum, the finished Ground Floor is 9:00 R.L..
2. Excavation to be taken down 3" below underside capping level given, this 3" to be made up with rough concrete.
3. The concrete in the exposed length of pile above u/s capping level to be cut out before capping is cast.
4. For details of capping types K, L & M see Dwg. No. 195-514.

THE CITY OF EDINBURGH — WESTFIELD FLATS — GORGIE.
BLOCK A — PILE CAPPINGS AND PIPE DUCT BASE SLAB LAYOUT.

SCALE : ¼" = 1'-0".

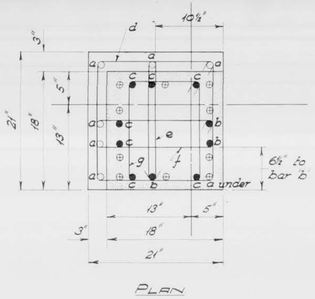
MESSRS. WILLIAMSON & HUBBARD F/AR/IBA.
CHARTERED ARCHITECTS, KIRKCALDY.

KINNEAR AND GORDON,
CHARTERED CIVIL ENGINEERS.
56, MELVILLE ST., EDINBURGH.

2-3-1949 N.V.A. & 195-113

Block A Capping No.	Similar Capping in Block F	See Dwg. No. 195-
* (1)	(23)	517
* (2)	(24)	
* (3)	(25)	
(4) / (4a)	(4) / (4a)	515
(6)	(6)	
(8)	(8)	
(9)	(9)	
(11)	(11)	516
(12a)	(12a)	
(12b)	(12b)	
(13a)	(13a)	
(13b)	(13b)	
(14)	(14)	
(15)	(15)	Note: Bars 'a' are now ⅝" dia.
(16)	(16)	
(17)	(17)	
(18)	(18)	517
(19)	(19)	515
(20) / (20a)	(20) / (20a)	
(22)	(22)	

* Cappings numbered as (24) (25) & (26) on dwg no. 195-213 for Block B are renumbered with Block A as nos (1) (2) & (3) respectively.

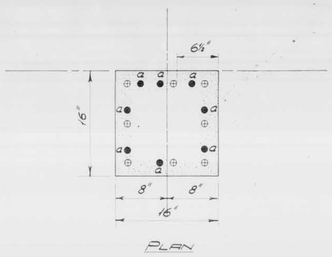


PLAN

Binders
4/d, 4/e & 4/f at 8" c/c commencing 4" above capping. Also 2/g in top two sets.
Ends of splice bars 'c' are to be 3'-1½" below finished floor level (900 RL)

5

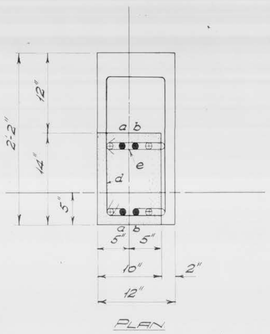
(21) SIMILAR, BUT TO OPPOSITE HAND



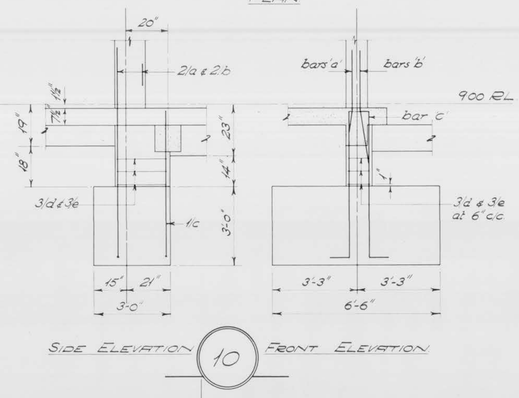
PLAN

Arrangement of hoop bars is similar to Capping (7) in Block F Dwg No 195-515

7

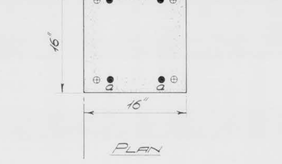


PLAN

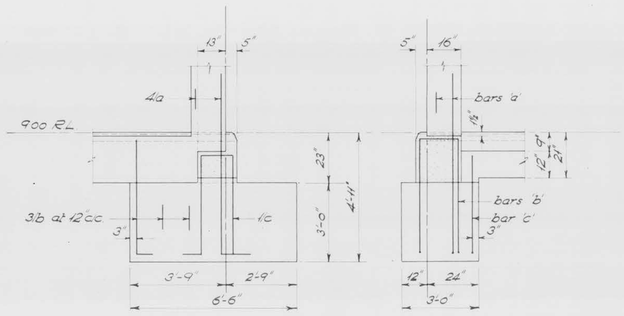


SIDE ELEVATION — FRONT ELEVATION

10

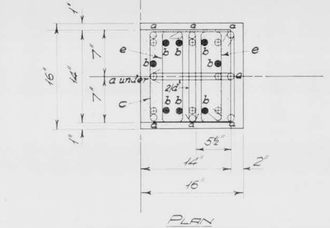


PLAN



SIDE ELEVATION — FRONT ELEVATION

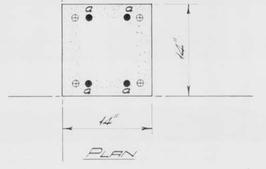
23



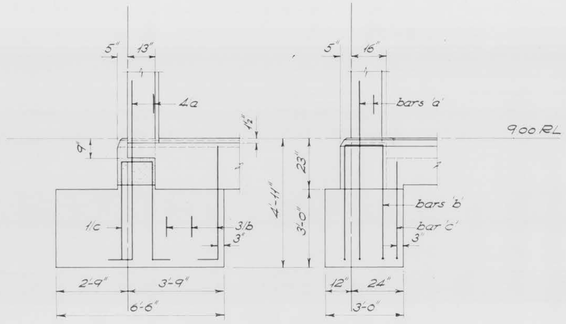
PLAN

Binders
5/c & 10/d at 6" c/c commencing 2" above capping. Also 4/e in top two sets.
Ends of splice bars 'c' are to be 3'-1½" below finished floor level (900 RL)

24



PLAN



NOTES
1 Notes 1-4 on dwg no 195-515 apply to this dwg also.
2 For splice bars to be left projecting for pipe duct base slab see dwg no. 195-115

SIDE ELEVATION — FRONT ELEVATION

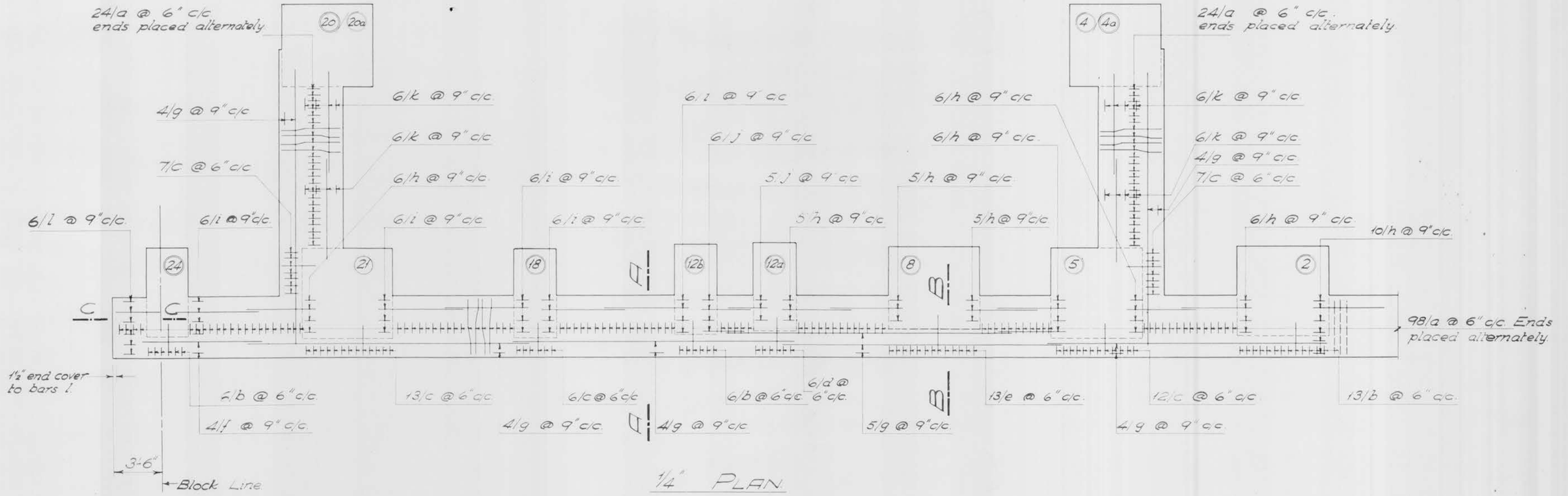
25

THE CITY OF EDINBURGH —— WESTFIELD FLATS —— GORGIE
BLOCK A —— PILE CAPPINGS AND PIPE DUCT BASE SLAB —— SHEET 2 OF 8 —— SPLICE BARS
SCALES :—— ELEVATIONS ½" = 1'-0" —— PLANS 1½" = 1'-0"

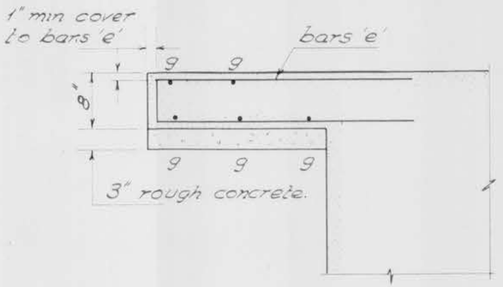
MESSRS WILLIAMSON & HUBBARD
F/A R/I B/A
KIRKCALDY

KINNEAR AND GORDON,
CHARTERED CIVIL ENGINEERS
56 MELVILLE ST EDINBURGH

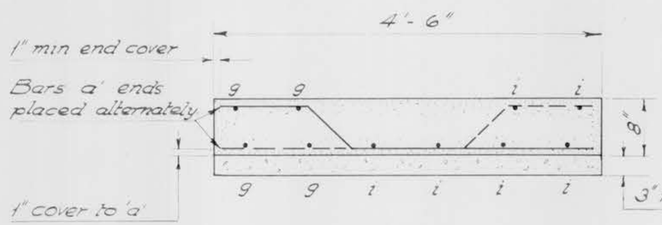
25-2-50 R. N/A R. 195-114



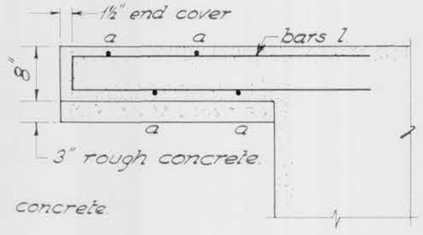
¼" PLAN.



1" SECTION B - B (TYPICAL)
Showing Slab Reinforcement only



1" SECTION A-A (TYPICAL)



1" SECTION C-C.

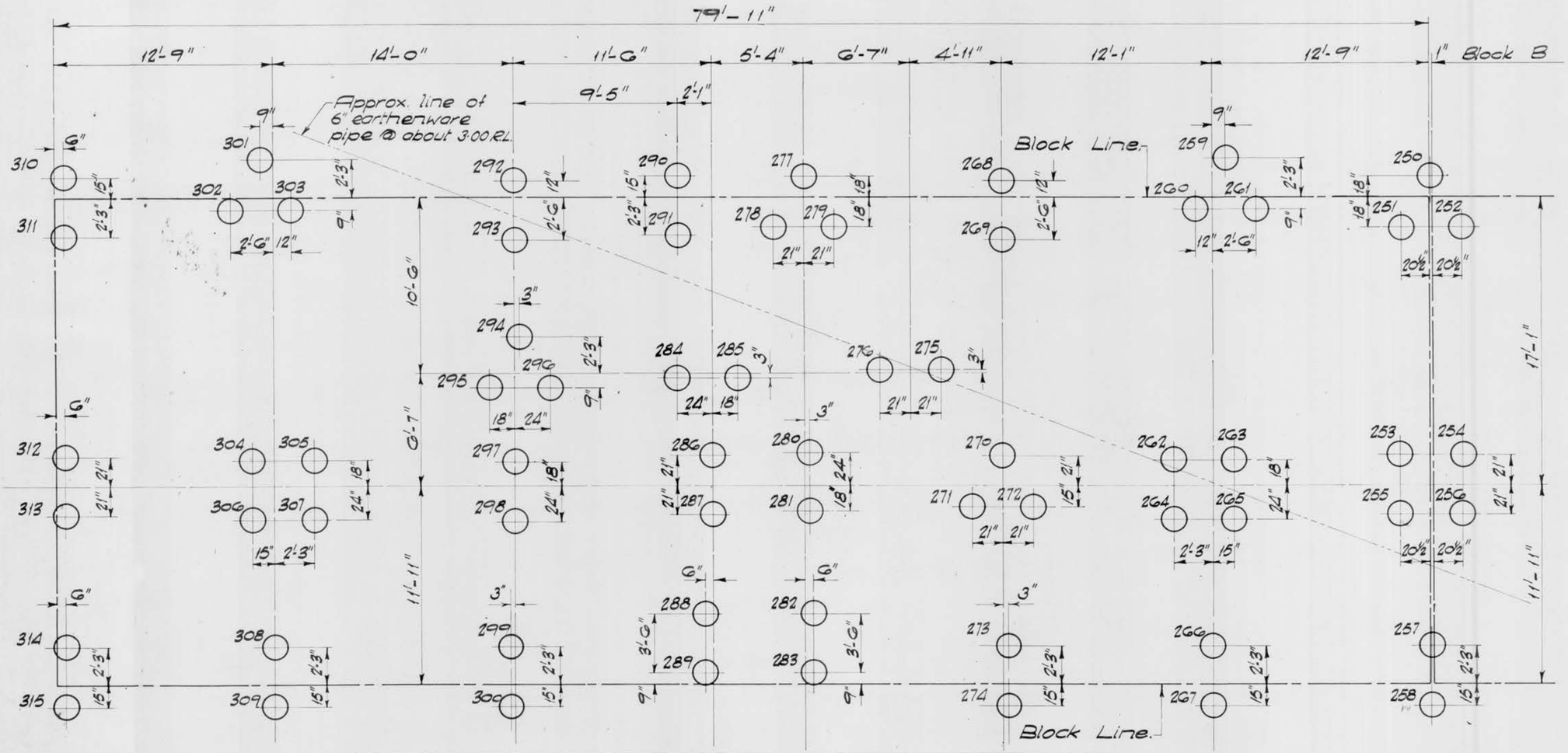
NOTES.
1. All splice bars are to be embeddcd 12" into Pile Cappings.
2. Minimum lap to be 12".

THE CITY OF EDINBURGH —— WESTFIELD FLATS —— GORGIE.
BLOCK A —— PILE CAPPINGS AND PIPE DUCT BASE SLAB. ——
SHEET 3 OF 8 —— PIPE DUCT BASE SLAB REINFORCEMENT

SCALES : ½" & 1" = 1'-0"

MESSRS WILLIAMSON & HUBBARD
F/A.R.I.B.A.
KIRKCALDY.

KINNEAR AND GORDON,
CHARTERED CIVIL ENGINEERS
56, MELVILLE ST. EDINBURGH.
21-2-50 & N.V.A. & 195-115.



5. Pile steel is to project at least 15" into the capping.

Pile No.	Level of t/s capping	Date driven	Length of pile.	Remarks
259	1·08			
260	"			
261	"			
262	"			
263	"			
264	"			
265	"			
266	4·08			
267	"			
268	"			
269	"			
270	1·08			
271	"			
272	"			
273	4·08			
274	"			
275	3·00			
276	"			
277	3·58			
278	"			
279	"			
280	1·58			
281	"			
282	4·08			
283	"			
284	5·25			
285	"			
286	1·58			
287	"			
288	4·08			
289	"			
290	"			
291	"			
292	"			
293	"			
294	4·75			
295	"			
296	"			
297	1·58			
298	"			
299	4·08			
300	"			
301	1·08			
302	"			
303	"			
304	"			
305	"			
306	"			
307	"			
308	4·08			
309	"			
310	"			
311	"			
312	1·58			
313	"			
314	4·08			
315	"			

NOTES.

1. The pile length to be entered in Column 4 of the table is the distance from the Original Prepared Surface to the bottom of the tube.
2. Reduced levels given in Column 2 are referred to the Arbitrary Datum given in Messrs. Williamson and Hubbard's Dwg. No. 36. Also, with reference to this datum, the Finished Ground Floor is 9·00 R.L..
3. For data about Piles 250 - 258 see Dwg. No. 195-212.
4. The total no. of piles listed on this dwg = 57. This total excludes nos 250-258.

THE CITY OF EDINBURGH — WESTFIELD FLATS — GORGIE.

BLOCK A — PILING LAYOUT.

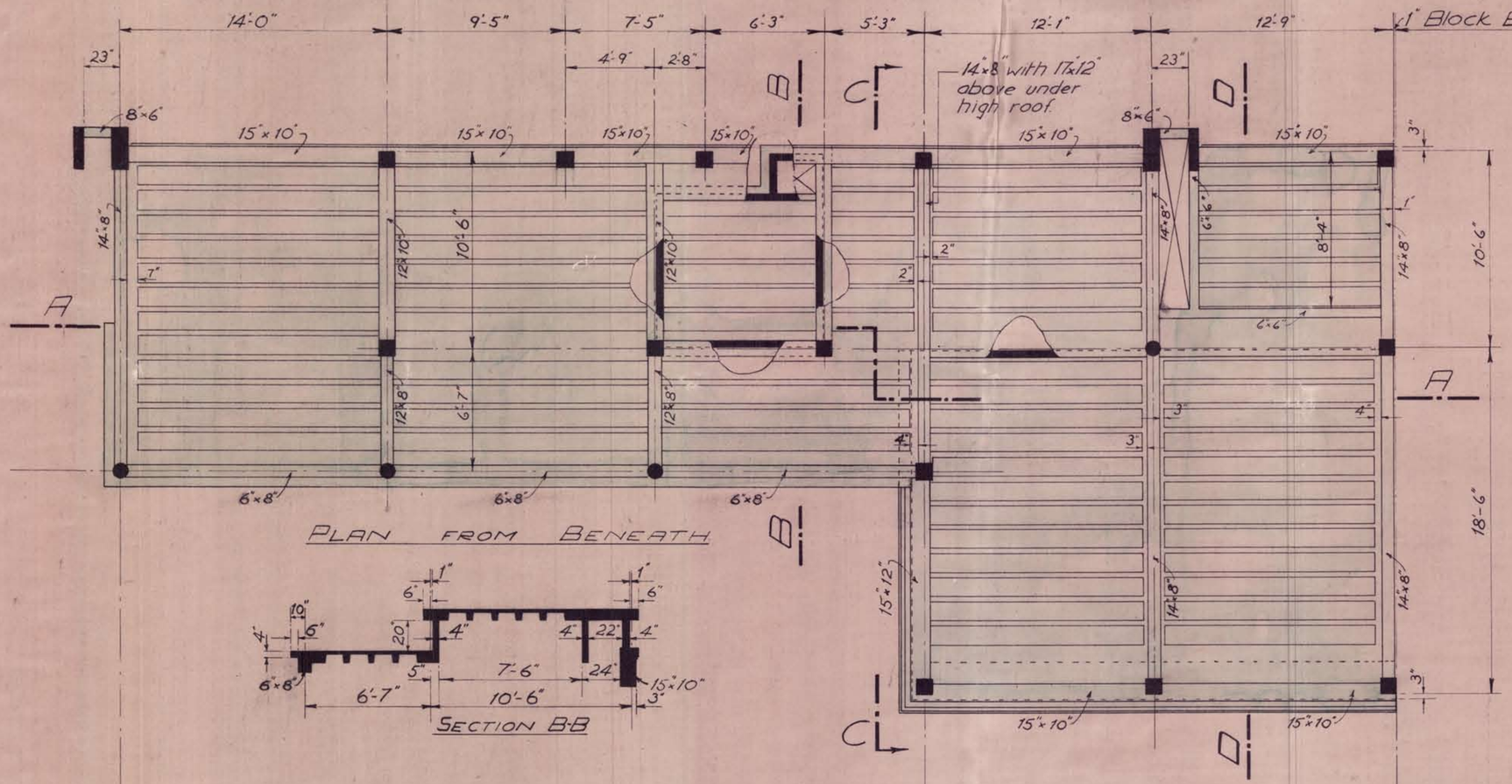
SCALE : ¼" = 1'-0".

MESSRS. WILLIAMSON & HUBBARD, F.R.I.B.A., CHARTERED ARCHITECTS, KIRKCALDY.

KINNEAR AND GORDON, CHARTERED CIVIL ENGINEERS, 56, MELVILLE ST., EDINBURGH.

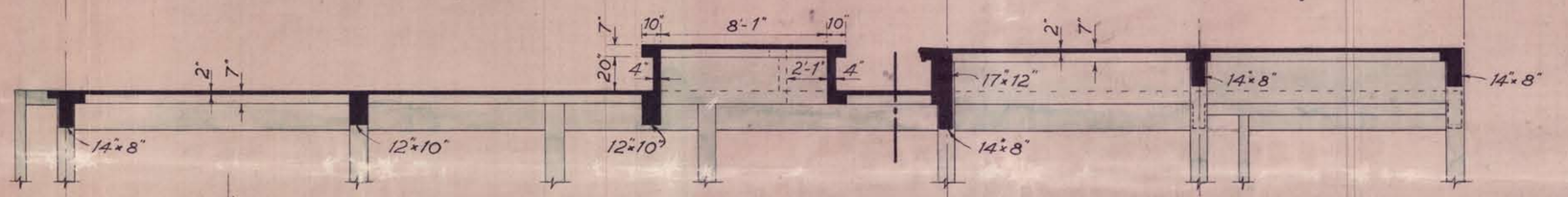
29-3-1949

195-112

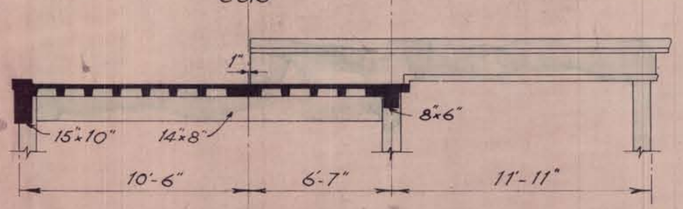


PLAN FROM BENEATH

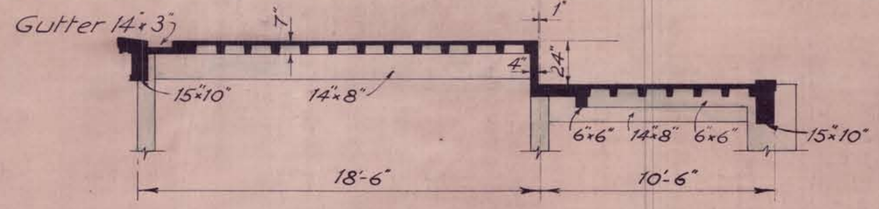
SECTION B-B



SECTIONAL ELEVATION ON LINE A-A.



SECTIONAL ELEVATION ON LINE C-C.



SECTIONAL ELEVATION ON LINE D-D.

NOTES

1. All beam sizes are given as depth × breadth clear.
2. Ribs are similar to those on floor 'C' - See Dwg. No. 195-13A.
3. For details of Cornices see Architect's Dwgs. Nos. 62 & 63.
4. This drawing cancels Drg. No. 195-15A.
5. All slabs are 7" overall.

COUNCIL 10 NOV 1950
REFERRED TO IN
WARRANT OF THE DATE.
Town Clerk of Edinburgh

B - 2-11-48 Amended & Redrawn. R. N.V.A.
A - 20-4-48 Amended & Redrawn.

MESSRS. WILLIAMSON & HUBBARD F/ARIBA.
CHARTERED ARCHITECTS. KIRKCALDY.

KINNEAR AND GORDON,
CHARTERED CIVIL ENGINEERS,
56, MELVILLE STREET, EDINBURGH.

10-3-48.

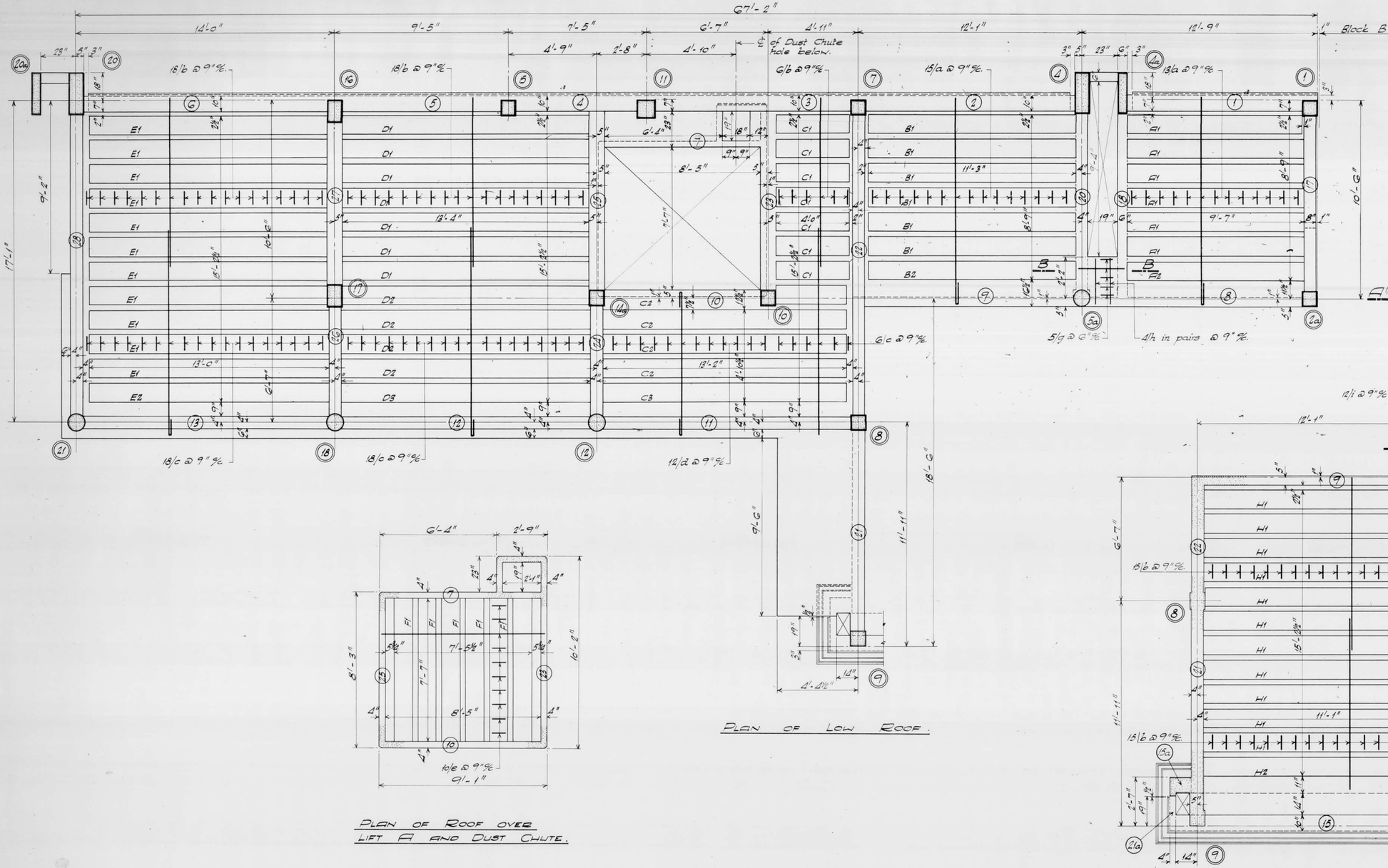
195-15.

THE CORPORATION OF EDINBURGH — WESTFIELD FLATS — GORGIE.
GENERAL ARRANGEMENT OF REINFORCED CONCRETE WORK.
BLOCK A — ROOF

SCALE : 1/4" = 1'-0"

Inches 1 2 3 4 5 6 7 8 9 10 20 30 40 50 Feet

1/4" = 1'-0"



PLAN OF LOW ROOF.

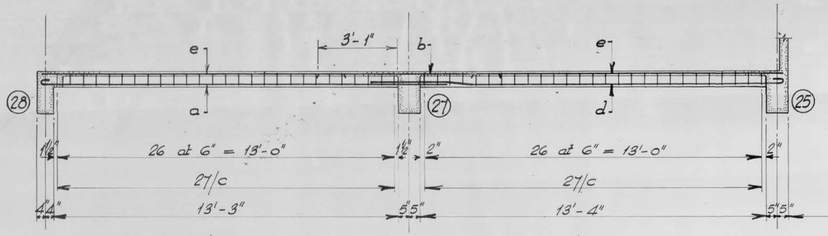
PLAN OF ROOF OVER LIFT A AND DUST CHUTE.

PLAN OF HIGH ROOF AND ROOF OVER PIPE DUCT.

THE CITY OF EDINBURGH — WESTFIELD FLATS — GORGIE.
BLOCK A — ROOF — SHEET 1 OF 8
GENERAL ARRANGEMENT.
SCALE : ½" = 1'-0".

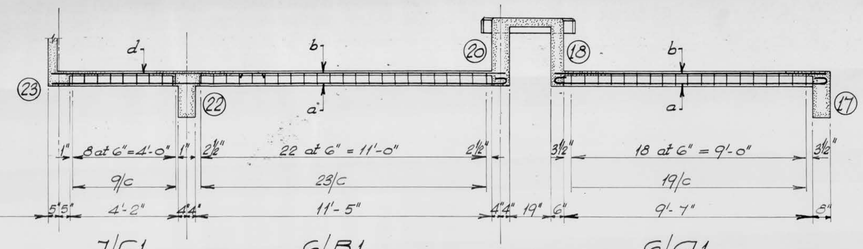
MESSRS. WILLIAMSON & HUBBARD, F/R.I.B.A., KIRKCALDY.

KINNEAR AND GORDON, CHARTERED CIVIL ENGINEERS, 5C, MELVILLE ST, EDINBURGH.
19-10-1950 & N.V.R. & N.V. 195-160



11/E1.
1/E2. SIMILAR.

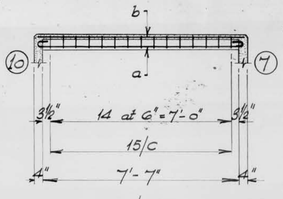
7/D1.



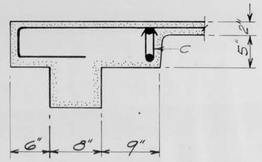
7/C1.

6/B1.
1/B2, SIMILAR.

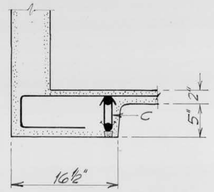
6/A1.
1/A2, SIMILAR.



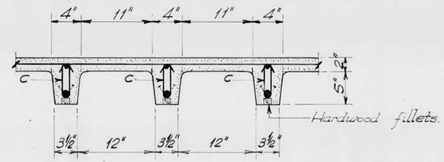
5/F1.



TYPICAL SECTION.
RIBS C3, D3, AND E2.

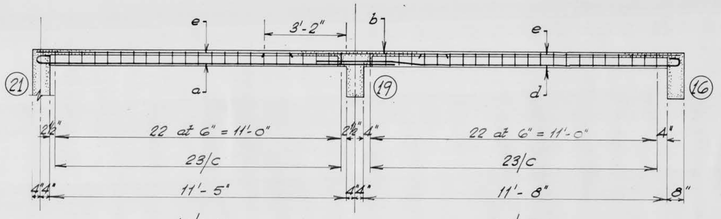


TYPICAL SECTION.
RIBS A2 & B2.



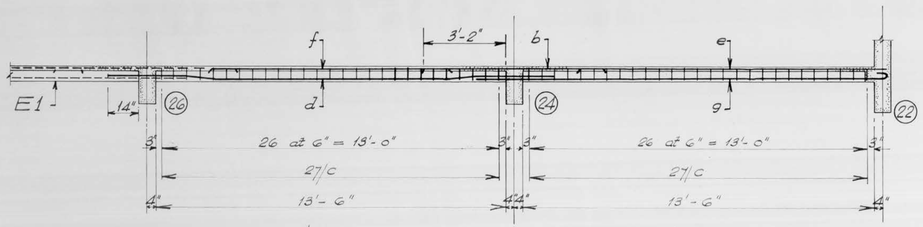
TYPICAL SECTION.
RIBS A1, B1, C1, C2, D1, D2, E1, H1 AND G1.

NOTE: Ribs D1, D2, E2, and portions of E1 outside School Entry, have no hardwood fillets.



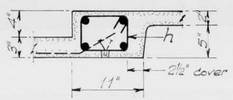
11/H1.

11/G1.

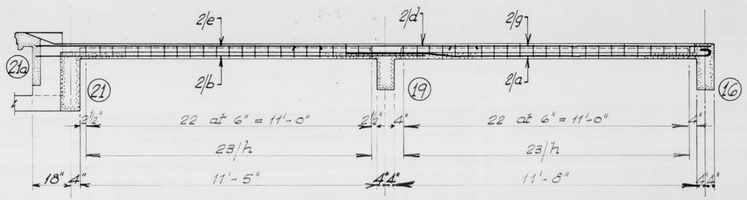


4/D2.
1/D3, SIMILAR.

4/C2.
1/C3, SIMILAR.



TYPICAL SECTION
RIBS G2 AND H2.



1/H2.

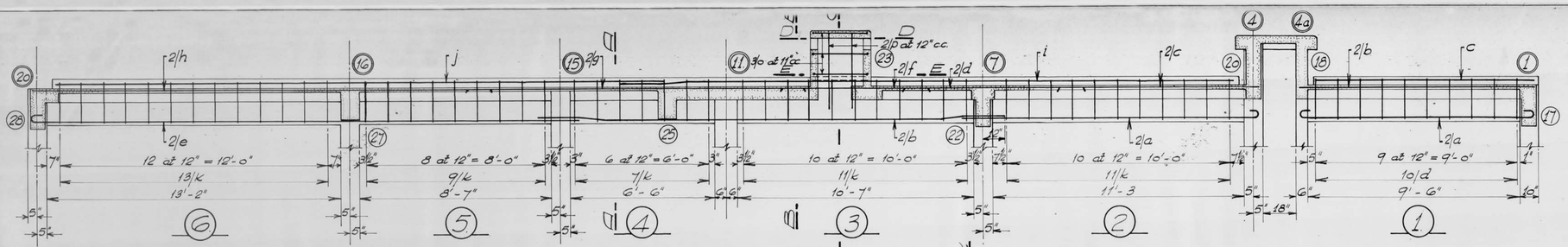
1/G2.

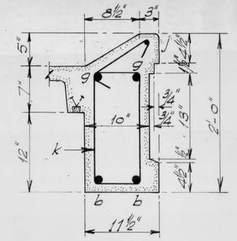
THE CITY OF EDINBURGH —— WESTFIELD FLATS —— GORGIE.
BLOCK A —— ROOF.
SHEET 2 OF 8. —— RIBS.
SCALES: —— ELEVATIONS, ½" = 1'-0": SECTIONS, 1½" = 1'-0":

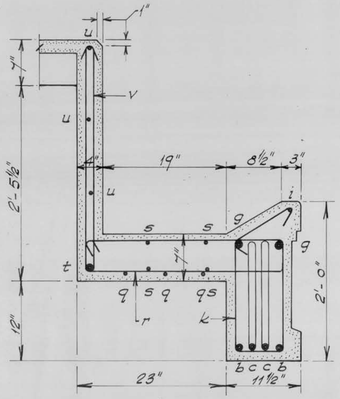
MESSRS. WILLIAMSON & HUBBARD.
F/A/R/I/B/A.
KIRKCALDY.

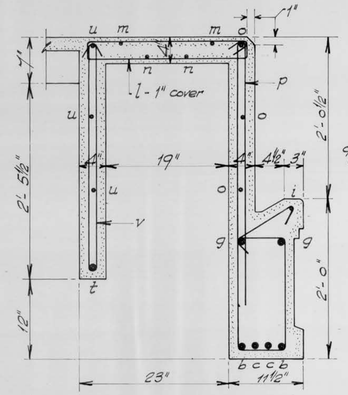
KINNEAR AND GORDON,
CHARTERED CIVIL ENGINEERS,
3, ST ANDREW SQ., EDINBURGH.

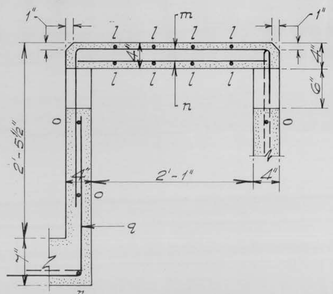
N.G.
25-10-1950. N.V.A. & N. 195-161.

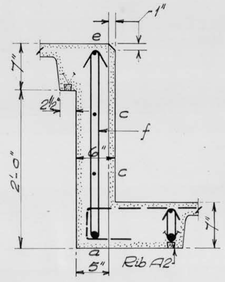


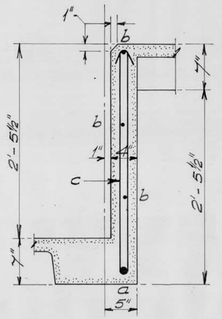


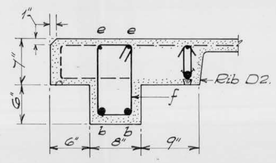


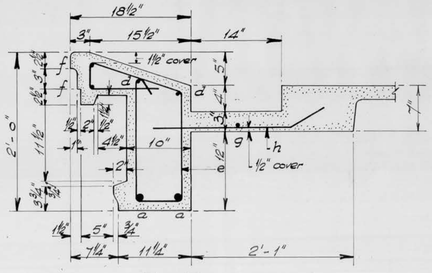


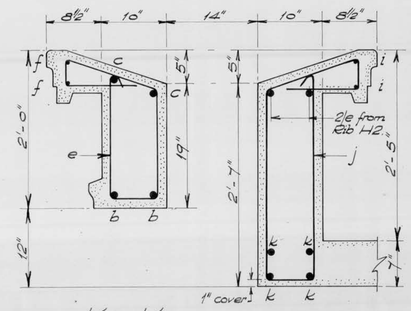












Other dimensions as J-J.

THE CITY OF EDINBURGH —— WESTFIELD FLATS —— GORGIE.

BLOCK A —— ROOF.

SHEET 3 OF 8 —— BEAMS.

SCALES:— PLANS AND ELEVATIONS, 1/2" = 1'-0"; SECTIONS, 1 1/2" = 1'-0".

MESSRS. WILLIAMSON AND HUBBARD, F/A.R.I.B.A. KIRKCALDY.

KINNEAR AND GORDON, CHARTERED CIVIL ENGINEERS, 3, ST ANDREW SQ., EDINBURGH.

30-10-1950 N.G. 195-162

THE CITY OF EDINBURGH — WESTFIELD FLATS — GORGIE

BLOCK A — ROOF — SHEET 4 OF 8 — BEAMS.

SCALES — PLANS & ELEVATIONS : 1/8" = 1'-0" — SECTIONS : 1/4" = 1'-0"

Messrs WILLIAMSON & HUBBARD
F/A/R/I/B/A
KIRKCALDY

KINNEAR AND GORDON
CHARTERED CIVIL ENGINEERS
3 ST ANDREW SQ EDINBURGH

30-10-50 N.G. & N.V.A.H. 195-163

Appendix F – Progressive Collapse Calculations

Will Rudd
Realise what's possible

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Tel: 0131 557 5255
edinburgh@ruddconsult.com

PROJECT TITLE	Job No.	
Westfield Court	E20511	
	Page	
	00	
SECTION	Prepared by	Date
Progressive Collapse Calculation Assessment		06/2025
	Checked by	Date

Reference		Output
BS8110-1 Cl 3.12.3	An assessment of existing tie provision will be undertaken within the following calculations. The analysis will take into the consideration the historic drawings that have been made available for Westfield Court. These include reinforcement layouts which provide some indication to how the structure would have been formed and tied together during construction. Intrusive concrete testing has been undertaken by Capital Testing. This will be used to verify the archive information and inform the type or size of reinforcement ties which are likely present between key concrete elements. The BS and EC evaluation of tie forces are virtually identical and therefore we will base the following assessment on BS, since the construction of this structure pre-dates the EC guidance. This should, however, follow the exact same principles. <u>Assessment of Tie Forces</u> Horizontal ties will be assessed for the following criteria: Each external column and (if the peripheral ties are not located within the wall), every meter length of external wall carrying vertical load should be anchored or tied horizontally into the structure at each floor and roof level with a tie capable of developing a force (in kN) equal to the greater of: a) 2.0 * Ft or (Ls/2.5)Ft (if less). Where Ls is the floor-to-ceiling height (in metres); or b) 3% of the total design ultimate vertical load carried by the column or wall at that level Where: Ft = the lesser of (20 + 4No) or 60, where No. is the number of storeys in the structure. Ft = (20 + 4*8) = 52kN Therefore adopt the lesser which is 52 kN <u>OR</u> 3% of the total design ultimate vertical load carried by the column at that level. The ultimate vertical load carried by the column at that level (i.e. at first floor where the void flat is located and therefore supports 7 floors and roof above). <u>Dead/Permanent Loading (Gk):</u> Slab self weight (ribbed with 130mm average depth) = 25 * 0.13 = 3.25 kN/m2 Ceiling and finishes allowance = 0.25 kN/m2 Services = 0.1 kN/m2 Total DL = 3.6 kN/m2 Partition loading for brickwork walls = 1.0 kN/m2 Allow a 20% self weight for concrete beams within the depth of the floor slab = 0.65 kN/m2 This gives a total DL at each floor level = 5.25 kN/m2 <u>Imposed/Live Loading (Qk):</u> Domestic Loading for a flat = 1.5 kN/m2 or Roof loading with M&E allowance = 1.5 kN/m2	

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PROJECT TITLE	Job No.	
Westfield Court	E20511	
	Page	
	01	
SECTION	Prepared by	Date
Progressive Collapse Calculation Assessment		06/2025
	Checked by	Date

Reference		Output

(CONT.)

Dead/Permanent Loading (Gk):
This gives a total DL at each floor level = 5.25 kN/m2

Imposed/Live Loading (Qk):
Domestic Loading for a flat = 1.5 kN/m2
or
Roof loading with M&E allowance = 1.5 kN/m2

Total ULS loading at each floor level =
(1.4 * 5.25) + (1.6 * 1.5) = 9.75 kN/m2

Consider 3% of the worst case applicable load at 1st floor which supports 7 floors above and roof.
Giving a total tie force = 9.75 kN/m2 * 8 * 0.03 = 2.34 kN/m2

Therefore providing a single column does not support a greater floor area than 27m2, a maximum tie force of 60kN is considered

Capital Testing Report

Location BO1 Beam (living room)

Breakout at location BO1 shows 15 and 20 mm Square Twist Main Bar with 11mm Square Twist Link Bar at 200mm spacing. All bars are in good condition.
Both Longtitudnal main Bars Extend into Column

Consider Horizontal Ties

The conservative approach is to ignore the tensile capacity of concrete provided this is an inherent weakness to concrete as a material and thus has limited tensile capacity. The tensile resistance will be resisted by any reinforcement which is notable acting as a tie between two elements (typically between beam and column).

Refer to the extract above from the Capital Testing records.

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PROJECT TITLE	Job No.
Westfield Court	E20511
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SECTION: Progressive Collapse Calculation Assessment	Prepared by / Date: 06/2025
	Checked by / Date

Reference		Output

Consider Horizontal Ties

Tie bars are noted in breakout locations undertaken by CT.
These are in the form of 15mm and 20mm square twist bars which extend from beam into the column. These are recorded to be in good condition which provides comfort that these have note been weakened by any corrosive actions.

fs = 250 N/mm2

Area of 15mm square twist bar = pi * 7.5^2 = 176mm2
Area of 20mm square twist bar = pi * 10^2 = 314 mm2

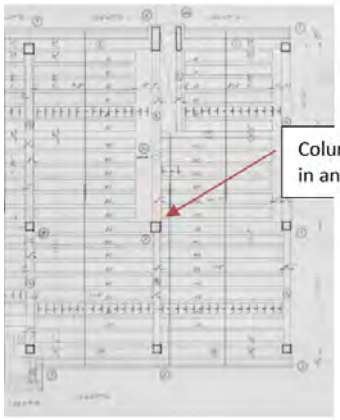
Total tensile capacity of the longitudinal bars which extend/lap into the column reinforcement = (176 x 250) + (314x 250) * 0.9 = 110 kN > 60 kN
Tensile capacity achieved assuming full tensile lap length.

If worst case, the 20mm square twist bar was the only bar to be sufficiently lapped, this would still provide 70kN which is greater than the 60kN tensile force required.

Consider Vertical Ties

Each column and each wall carrying vertical load should be tied continuously from the lowest to the highest level. The tie should be capable of resisting a tensile force equal to the maximum design ULS load supported by the column or wall from one storey.

Worst case loaded area which the column supports is taken as (3.75m x 4.4m) and is located central within the flat general arrangement.



Area of load = 3.75m x 4.4m = 16.5 m2
ULS per floor = 9.75 kN/m2
Tensile load applied = 16.5 x 9.75 = 161 kN

The column within living room space has 25mm DIA. reinforcement bars.
Number of bars has not been confirmed but 4No. minimum is suitable assumption.
A single bar will provide = pi * 12.5^2 * 250 * 0.9 * 0.001 = 110 kN
4No = 440kN > 161 kN
It is therefore deemed satisfactory that the vertical tie force is resisted by the column reinforcement. We would also note that the column will likely have greater than 4No. vertical bars provided it is at lower level of a 8 storey building. The nature of in-situ concrete means that the reinforcement should be suitably lapped between building levels for standard construction practices.

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PROJECT TITLE	Job No.
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	Checked by / Date

Reference		Output

Consider Horizontal Ties

Through assessment of the structure to determine the minimum requirements for tie force is met by standard detailing measures, key element analysis is not a requirements. However, the column will be checked to determine if it is capable of performing as a key element in an case.

Size of column = 400mm x 400mm (Based on historical information)
Main reinforcement = 4No. 25mm DIA bars (minimum)
Shear links = 8mm DIA. at 250mm CTR (worst case across testing at Flat 2/1)

Load applied to column per floor/roof level =
161 kN x 8 = 1300 kN (ULS)

Load case for accidental loading = 1.0Gk + 1.0Qk + Key element loading

Key elements to be subject to a 34 kN/m2 load in conjunction with any load which may reasonably be applied at the time of accidental loading.

Ultimate loading to be divided by partial safety factor to determine actual load applied.

Fs = 1300/1.45 = 900kN

Key element load applied = 34 kN/m2 * 0.4m = 13.6 kN/m
Floor to ceiling height = 2650mm

Moment applied from key element loading = WL^2/10 (continuous) =
13.6 * 2.65^2 /10 = 10 kNm (at top)

Shear force applied from key element loading = WL/2 = 13.6 * 2.65 / 2 = 20 kN

Refer to EC check of minimum column volumes with key item check.
This column is acceptable as a key element.

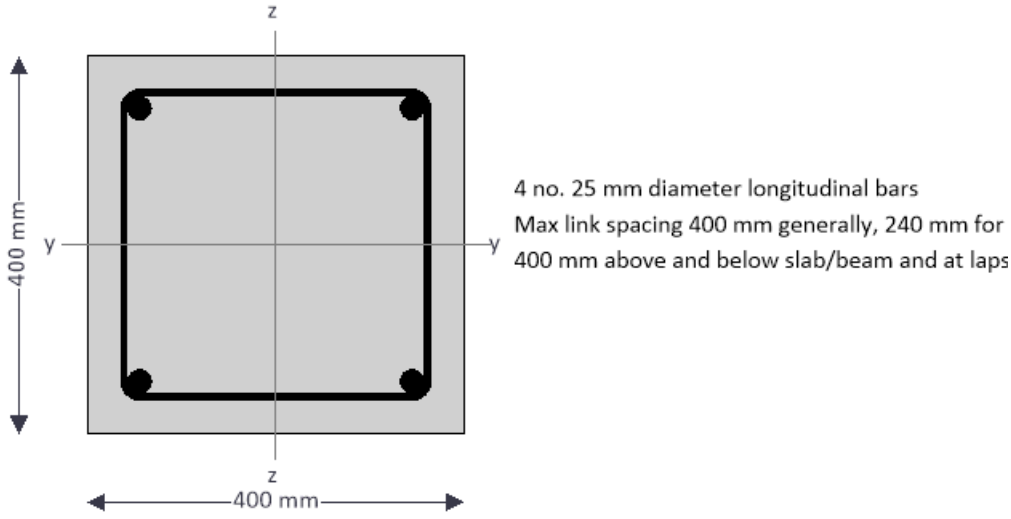
RC COLUMN DESIGN (EN 1992)

In accordance with EN1992-1-1:2004 incorporating Corrigendum January 2008 and the UK national annex

Tedds calculation version 1.4.08

Design summary

Description	Unit	Provided	Required	Utilisation	Result
Moment capacity (y)	kNm	170	26	0.15	PASS
Moment capacity (z)	kNm	170	26	0.15	PASS
Biaxial bending				0.17	PASS
Shear capacity (y)	kN	117	20	0.17	PASS
Shear capacity (z)	kN	117	20	0.17	PASS



Column input details

Column geometry

Overall depth (perpendicular to y axis)	h = **400** mm
Overall breadth (perpendicular to z axis)	b = **400** mm
Stability in the z direction	**Braced**
Stability in the y direction	**Braced**

Concrete details

Concrete strength class	C20/25	Note than minimum 20N/mm2 strength concrete assumed from the concrete core samples undertaken.
Partial safety factor for concrete (2.4.2.4(1))	γ_C = **1.50**	
Coefficient α_{cc} (3.1.6(1))	α_{cc} = **0.85**	
Maximum aggregate size	d_g = **20** mm	

Reinforcement details

Nominal cover to links	c_{nom} = **35** mm
Longitudinal bar diameter	ϕ = **25** mm
Link diameter	ϕ_v = **8** mm
Total number of longitudinal bars	N = **4**
No. of bars per face parallel to y axis	N_y = **2**
No. of bars per face parallel to z axis	N_z = **2**
Area of longitudinal reinforcement	$A_s = N \times \pi \times \phi^2 / 4$ = **1963** mm^2
Characteristic yield strength	f_{yk} = **500** N/mm^2
Partial safety factor for reinft (2.4.2.4(1))	γ_S = **1.15**

Modulus of elasticity of reinft (3.2.7(4)) E_s = **200** kN/mm²

Fire resistance details

Fire resistance period R = **120** min

Exposure to fire **Exposed on more than one side**

Ratio of fire design axial load to design resistance μ_{fi} = **0.70**

Axial load and bending moments from frame analysis

Design axial load N_{Ed} = **1300.0** kN

Moment about y axis at top M_{topy} = **10.0** kNm

Moment about y axis at bottom M_{btmy} = **0.0** kNm

Moment about z axis at top M_{topz} = **10.0** kNm

Moment about z axis at bottom M_{btmz} = **0.0** kNm

Column effective lengths

Effective length for buckling about y axis l_{0y} = **2650** mm

Effective length for buckling about z axis l_{0z} = **2650** mm

Calculated column properties

Concrete properties

Area of concrete $A_c = h \times b$ = **160000** mm²

Characteristic compression cylinder strength f_{ck} = **20** N/mm²

Design compressive strength (3.1.6(1)) $f_{cd} = \alpha_{cc} \times f_{ck} / \gamma_C$ = **11.3** N/mm²

Mean value of cylinder strength (Table 3.1) $f_{cm} = f_{ck}$ + 8 MPa = **28.0** N/mm²

Secant modulus of elasticity (Table 3.1) E_{cm} = 22000 MPa × $(f_{cm}$ / 10 MPa$)^{0.3}$ = **30.0** kN/mm²

Rectangular stress block factors

Depth factor (3.1.7(3)) λ_{sb} = 0.8

Stress factor (3.1.7(3)) η = 1.0

Strain limits

Compression strain limit (Table 3.1) ε_{cu3} = **0.00350**

Pure compression strain limit (Table 3.1) ε_{c3} = **0.00175**

Design yield strength of reinforcement

Design yield strength (3.2.7(2)) $f_{yd} = f_{yk} / \gamma_S$ = **434.8** N/mm²

Check nominal cover for fire and bond requirements

Min. cover reqd for bond (to links) (4.4.1.2(3)) $c_{min,b} = \max(\phi_v, \phi - \phi_v)$ = **17** mm

Min axis distance for fire (EN1992-1-2 T 5.2a) a_{fi} = **57** mm

Allowance for deviations from min cover (4.4.1.3) Δc_{dev} = **10** mm

Min allowable nominal cover $c_{nom\_min} = \max(a_{fi} - \phi / 2 - \phi_v, c_{min,b} + \Delta c_{dev})$ = **36.5** mm

FAIL - the nominal cover is less than the minimum required

Note that the cover to existing column is generally lower than acceptable at circa 30mm. Provided the age of the structure, this 'failure' to modern EC is acceptable in this instance. Concrete testing has generally confirmed that the depth of carbonation is minimal (<10mm) and risk of corrosion to the structure is small. Any assessment required in terms of fire resistance must be assessed by a fire engineer if deemed necessary.

Effective depths of bars for bending about y axis

Area per bar $A_{bar} = \pi \times \phi^2 / 4$ = **491** mm²

Spacing of bars in faces parallel to z axis (c/c) $s_z = (h - 2 \times (c_{nom} + \phi_v) - \phi) / (N_z - 1)$ = **289** mm

Layer 1 (in tension face) $d_{y1} = h - c_{nom} - \phi_v - \phi / 2$ = **344** mm

Layer 2 $d_{y2} = d_{y1} - s_z$ = **55** mm

Effective depth about y axis $d_y = d_{y1}$ = **344** mm

Effective depths of bars for bending about z axis

Area of per bar $A_{bar} = \pi \times \phi^2 / 4$ = **491** mm²

Spacing of bars in faces parallel to y axis (c/c)	$s_y = (b - 2 \times (c_{nom} + \phi_v) - \phi) / (N_y - 1) =$ **289** mm
Layer 1 (in tension face)	$d_{z1} = b - c_{nom} - \phi_v - \phi / 2 =$ **344** mm
Layer 2	$d_{z2} = d_{z1} - s_y =$ **56** mm
Effective depth about z axis	$d_z = d_{z1} =$ **344** mm

Column slenderness about y axis

Radius of gyration	$i_y = h / \sqrt{(12)} =$ **11.5** cm
Slenderness ratio (5.8.3.2(1))	$\lambda_y = l_{0y} / i_y =$ **22.9**

Column slenderness about z axis

Radius of gyration	$i_z = b / \sqrt{(12)} =$ **11.5** cm
Slenderness ratio (5.8.3.2(1))	$\lambda_z = l_{0z} / i_z =$ **22.9**

Design bending moments

Frame analysis moments about y axis combined with moments due to imperfections (cl. 5.2 & 6.1(4))

Ecc. due to geometric imperfections (y axis)	$e_{iy} = l_{0y} /400 =$ **6.6** mm
Min end moment about y axis	$M_{01y} = \min(\text{abs}(M_{topy}), \text{abs}(M_{btmy})) + e_{iy} \times N_{Ed} =$ **8.6** kNm
Max end moment about y axis	$M_{02y} = \max(\text{abs}(M_{topy}), \text{abs}(M_{btmy})) + e_{iy} \times N_{Ed} =$ **18.6** kNm

Slenderness limit for buckling about y axis (cl. 5.8.3.1)

Factor A	$A =$ **0.7**
Mechanical reinforcement ratio	$\omega = A_s \times f_{yd} / (A_c \times f_{cd}) =$ **0.471**
Factor B	$B = \sqrt{(1 + 2 \times \omega)} =$ **1.393**
Moment ratio	$r_{my} = M_{01y} / M_{02y} =$ **0.463**
Factor C	$C_y = 1.7 - r_{my} =$ **1.237**
Relative normal force	$n = N_{Ed} / (A_c \times f_{cd}) =$ **0.717**
Slenderness limit	$\lambda_{limy} = 20 \times A \times B \times C_y / \sqrt{(n)} =$ **28.5**

$\lambda_y < \lambda_{limy}$ *- Second order effects may be ignored*

Frame analysis moments about z axis combined with moments due to imperfections (cl. 5.2 & 6.1(4))

Ecc. due to geometric imperfections (z axis)	$e_{iz} = l_{0z} /400 =$ **6.6** mm
Min end moment about z axis	$M_{01z} = \min(\text{abs}(M_{topz}), \text{abs}(M_{btmz})) + e_{iz} \times N_{Ed} =$ **8.6** kNm
Max end moment about z axis	$M_{02z} = \max(\text{abs}(M_{topz}), \text{abs}(M_{btmz})) + e_{iz} \times N_{Ed} =$ **18.6** kNm

Slenderness limit for buckling about y axis (cl. 5.8.3.1)

Factor A	$A =$ **0.7**
Mechanical reinforcement ratio	$\omega = A_s \times f_{yd} / (A_c \times f_{cd}) =$ **0.471**
Factor B	$B = \sqrt{(1 + 2 \times \omega)} =$ **1.393**
Moment ratio	$r_{mz} = M_{01z} / M_{02z} =$ **0.463**
Factor C	$C_z = 1.7 - r_{mz} =$ **1.237**
Relative normal force	$n = N_{Ed} / (A_c \times f_{cd}) =$ **0.717**
Slenderness limit	$\lambda_{limz} = 20 \times A \times B \times C_z / \sqrt{(n)} =$ **28.5**

$\lambda_z < \lambda_{limz}$ *- Second order effects may be ignored*

Design bending moments (cl. 6.1(4))

Design moment about y axis	$M_{Edy} = \max(M_{02y}, N_{Ed} \times \max(h/30, 20 \text{ mm})) =$ **26.0** kNm
Design moment about z axis	$M_{Edz} = \max(M_{02z}, N_{Ed} \times \max(b/30, 20 \text{ mm})) =$ **26.0** kNm

Moment capacity about y axis with axial load (1300.0 kN)

Moment of resistance of concrete

By iteration:-

Position of neutral axis — y = **285.0** mm

Concrete compression force (3.1.7(3)) — $F_{yc} = \eta \times f_{cd} \times \min(\lambda_{sb} \times y , h) \times b$ = **1033.6** kN

Moment of resistance — $M_{Rdyc} = F_{yc} \times [h / 2 - (\min(\lambda_{sb} \times y , h)) / 2]$ = **88.9** kNm

Moment of resistance of reinforcement

Strain in layer 1 — $\varepsilon_{y1} = \varepsilon_{cu3} \times (1 - d_{y1} / y)$ = **-0.00073**

Stress in layer 1 — $\sigma_{y1} = \max(-1 \times f_{yd}, E_s \times \varepsilon_{y1})$ = **-146.1** N/mm^2

Force in layer 1 — $F_{y1} = N_y \times A_{bar} \times \sigma_{y1}$ = **-143.5** kN

Moment of resistance of layer 1 — $M_{Rdy1} = F_{y1} \times (h / 2 - d_{y1})$ = **20.7** kNm

Strain in layer 2 — $\varepsilon_{y2} = \varepsilon_{cu3} \times (1 - d_{y2} / y)$ = **0.00282**

Stress in layer 2 — $\sigma_{y2} = \min(f_{yd}, E_s \times \varepsilon_{y2}) - \eta \times f_{cd}$ = **423.4** N/mm^2

Force in layer 2 — $F_{y2} = N_y \times A_{bar} \times \sigma_{y2}$ = **415.7** kN

Moment of resistance of layer 2 — $M_{Rdy2} = F_{y2} \times (h / 2 - d_{y2})$ = **60.1** kNm

Resultant concrete/steel force — F_y = **1305.8** kN

PASS - This is within half of one percent of the applied axial load

Combined moment of resistance

Moment of resistance about y axis — M_{Rdy} = **169.7** kNm

PASS - The moment capacity about the y axis exceeds the design bending moment

Moment capacity about z axis with axial load (1300.0 kN)

Moment of resistance of concrete

By iteration:-

Position of neutral axis — z = **285.0** mm

Concrete compression force (3.1.7(3)) — $F_{zc} = \eta \times f_{cd} \times \min(\lambda_{sb} \times z , b) \times h$ = **1033.6** kN

Moment of resistance — $M_{Rdzc} = F_{zc} \times [b / 2 - (\min(\lambda_{sb} \times z , b)) / 2]$ = **88.9** kNm

Moment of resistance of reinforcement

Strain in layer 1 — $\varepsilon_{z1} = \varepsilon_{cu3} \times (1 - d_{z1} / z)$ = **-0.00073**

Stress in layer 1 — $\sigma_{z1} = \max(-1 \times f_{yd}, E_s \times \varepsilon_{z1})$ = **-146.1** N/mm^2

Force in layer 1 — $F_{z1} = N_z \times A_{bar} \times \sigma_{z1}$ = **-143.5** kN

Moment of resistance of layer 1 — $M_{Rdz1} = F_{z1} \times (b / 2 - d_{z1})$ = **20.7** kNm

Strain in layer 2 — $\varepsilon_{z2} = \varepsilon_{cu3} \times (1 - d_{z2} / z)$ = **0.00282**

Stress in layer 2 — $\sigma_{z2} = \min(f_{yd}, E_s \times \varepsilon_{z2}) - \eta \times f_{cd}$ = **423.4** N/mm^2

Force in layer 2 — $F_{z2} = N_z \times A_{bar} \times \sigma_{z2}$ = **415.7** kN

Moment of resistance of layer 2 — $M_{Rdz2} = F_{z2} \times (b / 2 - d_{z2})$ = **60.1** kNm

Resultant concrete/steel force — F_z = **1305.8** kN

PASS - This is within half of one percent of the applied axial load

Combined moment of resistance

Moment of resistance about z axis — M_{Rdz} = **169.7** kNm

PASS - The moment capacity about the z axis exceeds the design bending moment

Biaxial bending

Determine if a biaxial bending check is required (5.8.9(3))

Ratio of column slenderness ratios — $ratio_\lambda = \max(\lambda_y, \lambda_z) / \min(\lambda_y, \lambda_z)$ = **1.00**

Eccentricity in direction of y axis	$e_y = M_{Edz} / N_{Ed}$ = **20.0** mm
Eccentricity in direction of z axis	$e_z = M_{Edy} / N_{Ed}$ = **20.0** mm
Equivalent depth	$h_{eq} = i_y \times \sqrt{(12)}$ = **400** mm
Equivalent width	$b_{eq} = i_z \times \sqrt{(12)}$ = **400** mm
Relative eccentricity in direction of y axis	$e_{rel\_y} = e_y / b_{eq}$ = **0.050**
Relative eccentricity in direction of z axis	$e_{rel\_z} = e_z / h_{eq}$ = **0.050**
Ratio of relative eccentricities	$ratio_e = \min(e_{rel\_y}, e_{rel\_z}) / \max(e_{rel\_y}, e_{rel\_z})$ = **1.000**
	$ratio_e$ > 0.2 - Biaxial bending check is required

Biaxial bending (5.8.9(4))

Design axial resistance of section	$N_{Rd} = (A_c \times f_{cd}) + (A_s \times f_{yd})$ = **2667.0** kN
Ratio of applied to resistance axial loads	$ratio_N = N_{Ed} / N_{Rd}$ = **0.487**
Exponent a	a = **1.32**
Biaxial bending utilisation	$UF = (M_{Edy} / M_{Rdy})^a + (M_{Edz} / M_{Rdz})^a$ = **0.167**
	PASS - The biaxial bending capacity is adequate

Shear along y axis- Section 6.2)

Design shear force	$V_{Ed} = V_{Ed,y}$ = **20.0** kN
	$C_{Rd,c} = 0.18 / \gamma_C$ = **0.12**
Tension reinforcement	$A_{sl} = N_z \times \pi \times \phi^2 / 4$ = **982** mm^2
Depth of tension reinforcement	$d_v = d_{z1}$ = **344** mm
	$k_{shear} = \min(1 + (200 \text{ mm} / d_v)^{0.5}, 2)$ = **1.762**
Width of the cross section in tensile area	$b_w = h$ = **400** mm
Longitudinal reinforcement radio	$\rho_l = \min(A_{sl} / (b_w \times d_v), 0.02)$ = **0.00712**
Axial pressure in cross-section	$\sigma_{cp} = \min(N_{Ed} / A_c, 0.2 \times f_{cd})$ = **2.27** N/mm^2
	$v_{min} = 0.035 \text{ N}^{0.5}/\text{mm} \times k_{shear}^{3/2} \times f_{ck}^{1/2}$ = **0.37** N/mm^2
	$k_{1,shear}$ =**0.15**
Design shear resistance – exp. 6.2 a & b	$V_{Rd,c} = \max((C_{Rd,c} \times k_{shear} \times (100 \text{ N}^2/\text{mm}^4 \times \rho_l \times f_{ck})^{1/3}, v_{min}) \times b_w \times d_v +$ $k_{1,shear} \times \sigma_{cp} \times b_w \times d_v$ = **117.5** kN
	$V_{Ed} / V_{Rd,c}$ = **0.17**
	PASS - Design shear resistance exceeds design shear force

Shear along z axis- Section 6.2)

Design shear force	$V_{Ed} = V_{Ed,z}$ = **20.0** kN
	$C_{Rd,c} = 0.18 / \gamma_C$ = **0.12**
Tension reinforcement	$A_{sl} = N_y \times \pi \times \phi^2 / 4$ = **982** mm^2
Depth of tension reinforcement	$d_v = d_{y1}$ = **344** mm
	$k_{shear} = \min(1 + (200 \text{ mm} / d_v)^{0.5}, 2)$ = **1.762**
Width of the cross section in tensile area	$b_w = b$ = **400** mm
Longitudinal reinforcement radio	$\rho_l = \min(A_{sl} / (b_w \times d_v), 0.02)$ = **0.00712**
Axial pressure in cross-section	$\sigma_{cp} = \min(N_{Ed} / A_c, 0.2 \times f_{cd})$ = **2.27** N/mm^2
	$v_{min} = 0.035 \text{ N}^{0.5}/\text{mm} \times k_{shear}^{3/2} \times f_{ck}^{1/2}$ = **0.37** N/mm^2
	$k_{1,shear}$ =**0.15**
Design shear resistance – exp. 6.2 a & b	$V_{Rd,c} = \max((C_{Rd,c} \times k_{shear} \times (100 \text{ N}^2/\text{mm}^4 \times \rho_l \times f_{ck})^{1/3}, v_{min}) \times b_w \times d_v +$ $k_{1,shear} \times \sigma_{cp} \times b_w \times d_v$ = **117.5** kN
	$V_{Ed} / V_{Rd,c}$ = **0.17**
	PASS - Design shear resistance exceeds design shear force