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16 Church Row, Hampstead, London

Structural Assessment Report

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Ref: 230595/K Clark

Approved By: K Clark

Date: 01 Dec 2023

Status: For information

Version: 1.1

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1.0 INTRODUCTION

1.1 We have been instructed by our client, Mr & Mrs Nathanson, to provide Conservation Structural Engineering advice in connection with the front elevation of 16 Church Row in Hampstead, an early 18th century six storey Grade II listed end of terrace townhouse in use as a single occupancy residence.

1.2 The property has undergone a number of alterations during its life including refacing of the original front elevation and the apparent addition of a storey during the late 19th century, plus enlargement of the basement during the 20th century.

1.3 A detailed description of the building and the structural concerns regarding the front elevation which have led to our appointment is contained in a number of reports and drawings produced by Stefan Barbu of Elite Designers Structural Engineers between April and July 2023. This information will not be detailed here but in summary limited investigations carried out by Elite Designers Structural Engineers established that the external face of the brickwork wall that forms the front elevation facing Church Row is bowing outwards, in some areas by as much as 120mm, and that movement is progressing.

1.4 Elite Designers Structural Engineers determined that remedial structural intervention should be undertaken to address the heavily loaded, cracked and distorted brickwork pier at Ground floor between the windows. Their proposals would see the installation of temporary props to relieve load from the pier in question, allowing it to be removed and completely rebuilt with new brickwork designed to withstand the applied loads.

1.5 After expressing concerns about their remedial proposals the Conservation Officer at the London Borough of Camden recommended that a Conservation Accredited Engineer should be appointed to review the structural engineering approach and proposals to enable more appropriate interventions to be developed in accordance with established conservation principles. Consequently we were appointed to undertake this task and this report details our investigations, observations and recommendations to address the defects in an appropriate manner and restore the front elevation's structural integrity.

2.0 EXISTING BUILDING: HISTORY, CONSTRUCTION & CONTEXT

2.1 No. 16 Church Row is an end of terrace six storey residential property in single occupancy. Built in the early 18th century it is located on a historically and architecturally significant central Hampstead street mostly comprising residential properties of a similar period and style (see Figures 2.1, 2.2 & 2.3).

Figure 2.1 Site location (map view)

Figure 2.2 Site location (aerial view)

Figure 2.3 Context view of front elevation

Figure 2.4 Close up view of front elevation

2.2 The property was Grade II listed in 1950 under List Entry Number 1067350 as follows:

Terraced house. c1720, much extended, raised and refronted in late C19. Yellow stock brick with red brick dressings. 4 storeys and two floors of basements. 3 windows. Round-arched doorway with stucco keystone and impost blocks; radial patterned fanlight and panelled door. Gauged red brick flat arches to recessed sashes; 1st floor with stucco sill band. Parapet. INTERIOR: retains many early C19 features. Basement retains big tiled opening for range, and cupboard with H-hinges. Closed string stair leads to sub basement, with wine cellar. Staircase has closed string with turned balusters, but a ramped dado. Staircase hall and ground floor front room panelled with ovolo moulding and cornice, C19 tiled floor to staircase hall. Ground floor rear room has canted bay, fluted cornice and dado. First floor with panelling and shutters, early C19 cornices and a late C18 fireplace. Rear room has canted bay, cornice, panelling and a fireplace of c1830. Second floor has panelling with simple cornices; early C18 fireplace with early C19 grate to front room and Edwardian fireplace to rear. Third floor with simple panelling and C19 fireplaces; stick baluster staircase rises to early C20 attic.

2.3 The front elevation is arranged traditionally in a geometrically regular pattern of window openings with flat arch brickwork lintels supported on brickwork piers and walls (see Figures 2.3 & 2.4). The Ground floor entrance doorway has a round headed brickwork arch in a style typical of the period which is similarly supported on the adjacent brickwork walls.

2.4 The property is generally of traditional construction typical of the period, with a timber cut roof and timber floors supported on loadbearing brickwork external walls supplemented with loadbearing timber stud internal walls. As is typical in buildings of this era the floor structure comprises primary timber beams spanning front to back and bearing on the brickwork piers of the front elevation, in this case via timber wall plates. Timber floor joists span side to side between the primary beams and bear on the party wall and flank wall.

2.5 The property has undergone many alterations over the years including refacing of the front elevation and seemingly the construction of an extra storey, both of which took place during the late 19th century. More alterations were made during the 20th century and within the last ten years including enlargement of the basement, however none are reported to have involved the front elevation.

3.0 INITIAL INSPECTION & PRELIMINARY STRUCTURAL ASSESSEMENT

3.1 Soon after our appointment we undertook an initial inspection of the property via all normally accessible areas before completing a preliminary structural assessment based on our site observations, our review of all relevant pre-existing information, and our discussions with Stefan Barbu of Elite Designers and Simon Fenwick of Sentinel Residential.

3.2 Our preliminary assessment was also informed by a deep and broad knowledge of the construction methods and techniques commonly applied to properties of this era, type, location and construction together with their structural behaviour and typical defects.

3.3 Before our appointment Elite Designers had recommended the removal of internal finishes to expose the brickwork pier between the windows at Ground floor for inspection, revealing severe cracking and distortion of the brickwork, attributed to overstress by the concentrated load applied to the pier by the primary timber floor beam at First floor. This area was re-sealed advance of our involvement and therefore unavailable for our inspection. Reluctance by the client to carry out further intrusive investigations prevented Elite Designers from establishing the construction and condition of other areas of the front elevation, thus limiting the completion of a holistic structural assessment at that stage.

3.4 Soon after our appointment a measured survey of the front elevation was commissioned on behalf of our client by Elite Designers to quantify the distortion of the front elevation (see Appendix A). This survey was undertaken by PointSCAN and measured the external surface of the 19th century brickwork façade that was applied to the original early 18th century brickwork.

3.5 During our initial inspection it was noted that the construction of the west elevation suggests that the Third storey is a later addition to the property, perhaps constructed during the 19th century contemporaneously with the façade refronting.

3.6 The refronting brickwork is laid in header bond suggestive, at least in part, of a considered attempt to enhance the aesthetic and social status of the property. In the absence of intrusive investigation data we postulated that the refronting brickwork wall would be thinner – perhaps around 4½ inches thick – than the original 18th century brickwork façade which would probably be around 9 inches thick for most of its height. We also thought it likely the refronting brickwork would in general be rather poorly connected to the original brickwork making copious use of snapped headers in a manner typical of the time and thereby increasing the risk of delamination and relative movement.

3.7 Brickwork construction during the early 18th and late 19th centuries commonly made use of regularly sized good quality bricks known as facing bricks to construct visible parts (e.g the façade) and irregularly sized lower quality bricks known as place bricks to construct parts hidden from view by internal or external finishes. This was common practice even in prestigious buildings of the era, however place bricks are weaker and less durable than facing bricks and their irregular size made it difficult to achieve a good inter-brick bond which often resulted in the delamination and distortion of the brickwork wall. We felt it would be necessary to investigate this further in this particular case.

3.8 Additionally the compression, shrinkage and/or decay of bonding timbers built into the thickness of brickwork walls – a common practice during the 18th century – could be a contributory factor to the observed distortion of the front elevation. Degradation of bonding timbers can enhance load eccentricity and overstress the adjacent brickwork leading to outward bowing and other types of distortion. Again it was felt necessary to investigate whether this might be a factor here.

3.9 Similarly the shrinkage, decay, creep and/or excessive deflection of timber lintels installed behind the external face of brickwork arches was postulated as a further possible contributory cause of the front elevation's distortion. Such timber lintels, which were in common usage during the 18th century, support the inner skin of brickwork above windows and doors but their degradation often leads to bowing and other distortion of the supported brickwork. Further investigation of this was felt to be worthwhile here too.

4.0 INTRUSIVE INSPECTION & DETAILED STRUCTURAL ASSESSMENT

4.1 On completion of our initial inspection and structural assessment, and after considering the remaining uncertainties, we recommended the completion of further targeted intrusive investigations in carefully selected areas.

4.2 We recommended these further investigations at both internal and external locations in order to fully understand the construction and condition of the front elevation together with the interfacing floors and roof that not only bear onto it but also help restrain it. We felt that completion of these investigations would be essential to correctly diagnose the cause(s) of the front elevation's distortion and develop an appropriate and effective remedial strategy in accordance with established conservation principles.

4.3 We developed a detailed schedule of opening up works (see Appendix B) which entailed:

- Removal of selected bricks from the external face of the front elevation at Ground floor, First floor, Second floor and Third floor to expose the original brickwork facade for inspection. All relevant bricks were appropriately tagged before removal by carefully cutting out the existing mortar using hand tools. After inspection all bricks were replaced using traditional lime/sand mortar (1 part NHL 2 to 3 parts sharp sand or similar approved) colour matched and texture matched to the wall's appearance to the Conservation Officer's approval.

- Removal of internal wall finishes from the face of the front elevation at Ground floor, First floor, Second floor and Third floor to expose the original brickwork wall for inspection. All relevant finishes were appropriately tagged before their careful removal. After inspection all finishes were replaced making use of traditional lime/sand plaster (1 part lime putty to 3 parts sharp sand or similar approved) in relevant areas in accordance with the Conservation Officer's approval.

4.4 All opening up works were minimised wherever possible so that as much as necessary but as little as possible was done to obtain the necessary information. The works began at Basement level and proceeded upwards through the building in a sequential manner to expose relevant areas of the structure at each floor. The minimally intrusive nature of the physical interventions were such that no temporary works were required to support the existing fabric during the course of the works, however the opening up works at the exterior of the front elevation were undertaken from a scaffold specially erected for the purpose.

4.5 We assessed the exposed structure at each floor before a decision was made on whether to proceed to the next level. In the event we were able to omit the opening up of internal wall finishes at Second floor and above as no structural concerns were discovered at First floor.

4.6 The intrusive investigation findings at the front elevation may be summarised as follows:

- At Basement level the front elevation brickwork wall was found to be in good condition where investigated with no noteworthy separation between the refronting brickwork and the original brickwork (see Figure 4.1). No cracking or other defects were revealed on locally removing the internal wall finishes (see Figure 4.2).
- At Ground floor level the refronting brickwork was found to have separated from the original brickwork by approximately 80mm where investigated (see Figure 4.3). Severe cracking and distortion of the brickwork pier between the windows at Ground floor was revealed on locally removing the internal finishes (see Figure 4.4). No cracking or other defects were revealed on locally removing the internal wall finishes at the pier between the door and window.
- At First floor level the refronting brickwork was found to have separated from the original brickwork by approximately 90mm (see Figure 4.5). No cracking or other defects were revealed on locally removing the internal wall finishes at the piers between windows, however remedial measures in the form of timber posts connected to each brickwork pier at mid height and spanning vertically between the timber wall plates were found to have been installed at some stage to enhance their lateral restraint (see Figure 4.6).

Figure 4.1 Intrusive investigation of front elevation exterior at Basement

Figure 4.2 Intrusive investigation of front elevation interior at Basement

Figure 4.3 Intrusive investigation of front elevation exterior at Ground floor

Figure 4.4 Intrusive investigation of front elevation interior at Ground floor

Figure 4.5 Intrusive investigation of front elevation exterior at First floor

Figure 4.6 Intrusive investigation of front elevation interior at First floor

Figure 4.7 Intrusive investigation of front elevation exterior at Second floor

Figure 4.8 Intrusive investigation of front elevation exterior at Third floor

Figure 4.9 Intrusive investigation of floor structure at Ground floor

Figure 4.10 Intrusive investigation of floor structure at First floor

- At Second and Third floor levels the front elevation brickwork wall was found to be in good condition where investigated with no noteworthy separation between the refronting brickwork and the original brickwork (see Figures 4.7 & 4.8).
- Opening up of localised areas of the ceilings at Basement, Ground and First floor confirmed that the floors are of traditional timber construction, comprising primary timber beams spanning front to back and bearing on the brickwork piers of the front elevation via timber wall plates, supplemented with timber floor joists spanning side to side between the primary beams (see Figures 4.9 & 4.10). The floor structure was found to be in good condition where investigated.

4.7 The information yielded by the intrusive investigations enabled us to establish that structurally concerning defects are limited to significant separation between the refronting brickwork and original brickwork wall between Ground and Second floor level and with severe cracking and distortion of the brickwork pier between the Ground floor windows.

4.8 The cause of this structural distress is very likely a combination of several different factors but the available evidence indicates it is primarily rooted in overstress of the relatively weak, low quality historic brickwork from which the pier is built coupled with its limited lateral restraint enhanced by the use of snapped headers within the body of the wall, thereby increasing the risk of delamination, load concentration and buckling-related movement.

4.9 A further, more general, contributary factor is the poor interconnectivity between the suspended floors and front elevation which reduces its lateral restraint and increases its tendency to buckle out of plane.

4.10 The application of additional load to the pier resulting from the construction of an additional storey at Third floor coupled with potential reconfiguration of the original roof structure would have exacerbated these problems.

4.11 Bonding timbers built into the thickness of the front elevation were observed in several areas, however their condition was generally found to be good with no evidence of significant compression, shrinkage, decay or other degradation. Equally no evidence was found of significant degradation of timber lintels installed behind the external face of brickwork arches, however these elements were not investigated in detail.

5.0 RECOMMENDATIONS

5.1 To remedy the problems described above we recommend the reconstruction of irreparably defective parts of the brickwork pier between the Ground floor windows which, as far as it is possible to tell based on the information obtained from the intrusive investigations, largely comprises the original front elevation's late 18th century brickwork.

5.2 The new brickwork will comprise appropriately sized and sourced stock bricks with a minimum compressive strength of 10N/mm^2 laid in a suitable lime mortar with sufficient strength to withstand the proposed loads (i.e. 1 part NHL 5 to 3 parts sharp sand).

5.3 Ideally the later 19th century refronting brickwork will remain in situ whilst suitably propped for safety and protection before it is structurally tied into the brickwork pier progressively using stainless steel wall ties during the course of the construction works. This will result in the formation of a single consolidated pier with sufficient strength to safely withstand the loads applied by the wall and floors above, will maximise the retention of undamaged historic fabric and will minimise the aesthetic impact on the most visible street facing elements of the front elevation.

5.4 These works will still require the installation of temporary props to support the brickwork wall and floors above the Ground floor pier, however we are confident this can be achieved in a less intrusive manner than proposed previously by Elite Designers Structural Engineers and will not involve the formation of cast in situ concrete elements within the pier itself.

5.5 We also recommend the installation of Helifix ResiTie at 900mm horizontal centres and 900mm and 450mm vertical centres in a limited number of locations through the external face of the front elevation brickwork wall between Basement level and Second floor level (or alternatively through the internal face if penetration through the external face is deemed unacceptable by the Conservation Officer). This will reconnect the refronting brickwork with the original brickwork in areas where significant separation has occurred in order to reduce further movement and minimise the risk of future defects.

5.6 We further recommend enhancing interconnectivity between the front elevation brickwork and the suspended floors at Ground floor, First floor, Second floor and Third floor in order to improve the lateral restraint of the wall and enhance its resistance to buckling. This can be most easily achieved by the installation of Helifix BowTie HD through the external face of the brickwork wall at 1000mm horizontal centres at each relevant floor into the body of the floor joists spanning parallel to it.

5.7 Although the wall-to-floor structure restraint ties could possibly be installed without lifting floor finishes this would increase the risk of accidentally striking live services, therefore it would be prudent to locally lift relevant finishes by way of mitigation. In this case it may instead be preferable to locally remove selected areas of ceiling finishes to keep disruption and damage to a minimum.

5.8 All of our recommended remedial proposals are illustrated indicatively in our drawings and supporting manufacturer's information provided in Appendix C. Our proposals are appropriate to the property's construction, its previous performance and its current condition, take due account of the property's historic significance and are in accordance with established conservation principles.

6.0 CONTROLS, RISKS & MITIGATIONS

6.1 All necessary permissions and approvals are to be obtained before commencing site works.

6.2 All relevant services are to be traced and their locations confirmed before starting works.

6.3 All site operations are to be undertaken by CSCS accredited, fully trained and qualified personnel. Appropriate PPE is to be worn for all works.

6.4 The structure is to be continuously monitored by the contractor during the works.

6.5 All works are to inspected by the structural engineer before receiving permission to proceed.

6.6 Demolition areas should be barriered and warning signs erected, with drop zones clearly demarcated. Areas below and adjacent to demolition works should be clearly signed warning of the works in place and barriered to prevent accidental access.

6.7 Care should be taken during demolition to ensure the stability of the structure. Where any doubt exists works are to stop and assistance sought from the structural engineer.

This report has been prepared on behalf of Conisbee by:

Kevin Clark BSc (Hons) PhD DIC CEng MICE FRSA Conservation Accredited Engineer (CARE)

Director & Head of Heritage Engineering

APPENDIX A FRONT ELEVATION MEASURED SURVEY

ELEVATION 1

Notes:

1. This drawing is to be read in conjunction with all relevant architects, engineers & specialist sub-contractors' drawings and the specification.
2. Any discrepancies between the site conditions and these drawings to be reported to Elite Designers. Dimensions must not be scaled and should be checked on site.
3. All dimensions are in millimetres, levels are in metres a.o.d. (above ordnance datum).
4. Foundations have been designed on a safe increase in bearing pressure of 150kN/m² bearing 200mm into sandy gravel strata.
5. All new steelwork to be grade S355 and be supplied to site blast cleaned to Swedish standard SA2½ painted with high build zinc phosphate alkyd primer to 80 microns after fabrication. Any mechanical damage to coating to be touched up on site in accordance with the specification.
6. All new steel beams to have a minimum of 100mm bearing either end.
7. Lengths of all members are to be verified on site by the Contractor.
8. Catnic type lintels to have a minimum bearing of 150mm either end.
9. All temporary works to ensure the structural stability of all elements in the temporary state during construction are to be the responsibility of the contractor.
10. Cover to reinforcement to be 25mm to all bars unless noted otherwise.
11. Checking the location of the existing services in relation to the elements of the new construction works is the responsibility of the principal contractor. Any discrepancy between the existing services and the new construction works should be reported to Elite Designers before the commencement of the works.
12. The principal contractor is to provide all necessary flexible sleeves or lintels where drainage pipes pass through walls or foundations.
13. The principal contractor is to ensure that at all times the excavations shall remain free from standing water.
14. Movement joints to be positioned @ 6m c/c in blockwork and @ 12m c/c in brickwork.
15. Movement joints to be 15mm hydrocell or similar joint filler with a 15x15mm two part polysulphate sealant.(colour and fire resistance of sealant to be advised by architect).
16. All load bearing blockwork below DPC to be 7N/mm² dense concrete block.
17. Provide Ancon ST1 wall ties in accordance with DD140 @ 450 c/c vertically and @ 900 c/c horizontally, staggered u.n.o.
18. All bolts to be Grade 8.8 M20 unless noted otherwise.
19. All insulation details have been produced to comply with relevant regulations where possible. However, the responsibility for checking the compliance and execution of insulation details lies with the main contractor.
20. Floor joists spanning in excess of 2.5m should be strutted by one or more rows of solid or herringbone strutting as follows:

Joists <2.5m - None required
Joists 2.5 - 4.5m - One row required
Joists >4.5m - Two rows required

21. All beam end reactions shown are unfactored unless noted otherwise.

FOR INFORMATION

Rev.	Date	Description	by	chkd	app
A	13/07/23	ISSUED FOR INFORMATION	SB	SB	JGF

Project
16 Church Row
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NW3 6UP

Title
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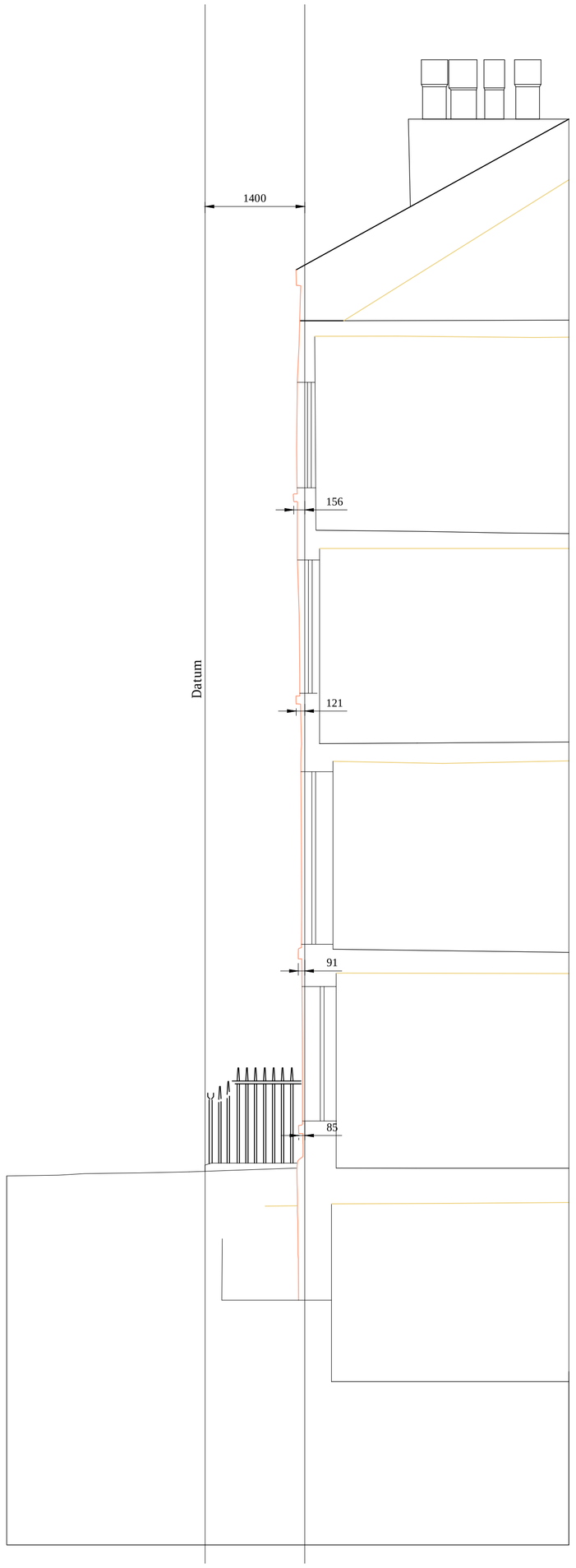
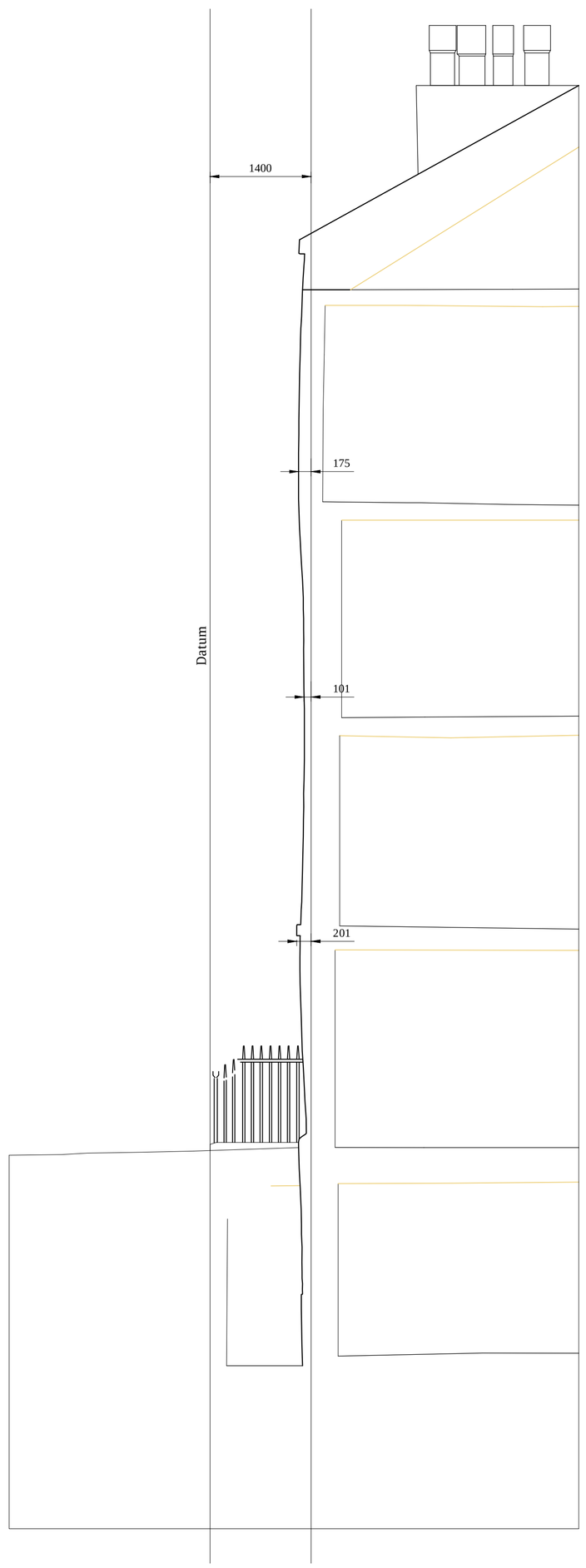
Scales (A1)	AS SHOWN	
Drawn	SB	25/04/23
Ch'd(Eng.)	SB	25/04/23
Approved	SJM	25/04/23

Drg. No. 2023-026- 06
Rev. A



SECTION 1



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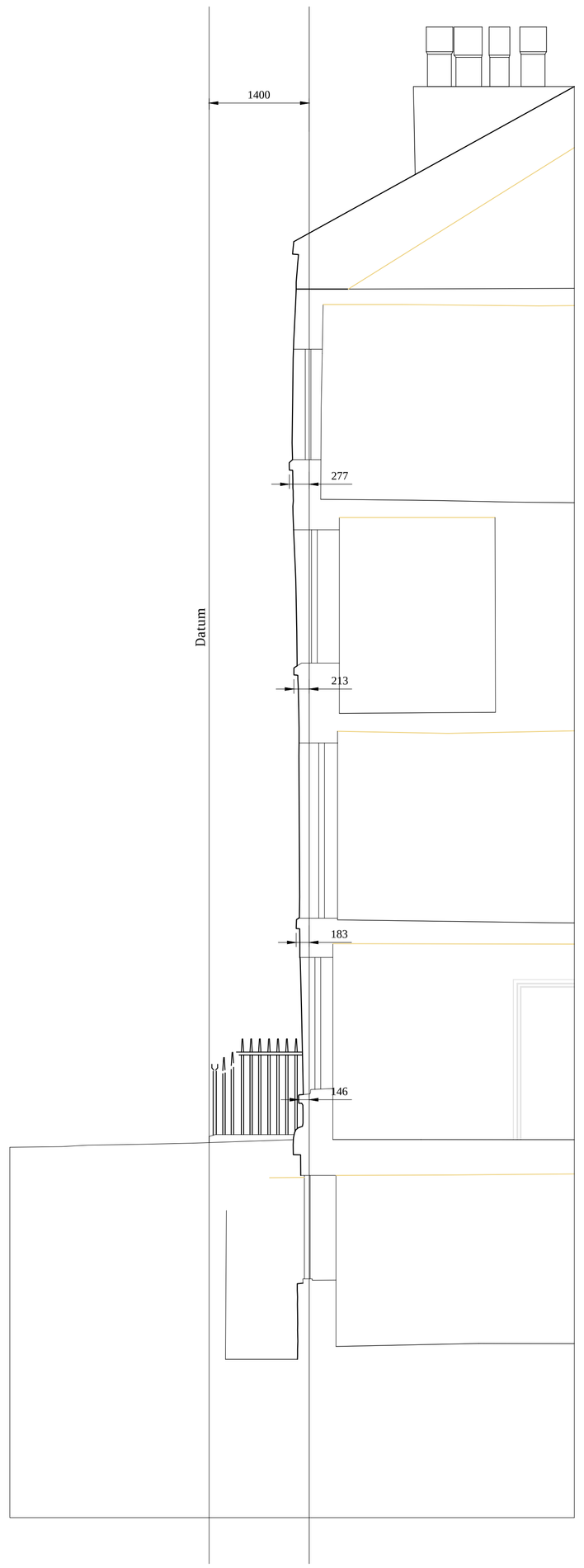

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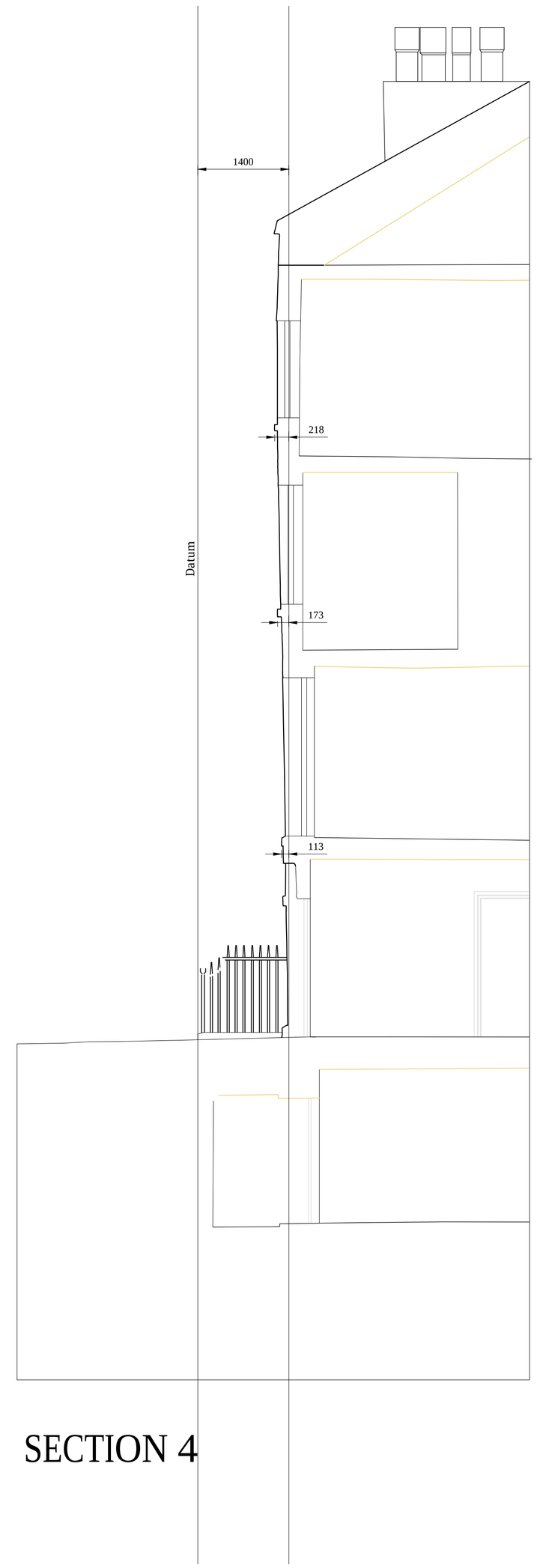

SECTION 4

Notes:

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6. All new steel beams to have a minimum of 100mm bearing either end.
7. Lengths of all members are to be verified on site by the Contractor.
8. Catnic type lintels to have a minimum bearing of 150mm either end.
9. All temporary works to ensure the structural stability of all elements in the temporary state during construction are to be the responsibility of the contractor.
10. Cover to reinforcement to be 25mm to all bars unless noted otherwise.
11. Checking the location of the existing services in relation to the elements of the new construction works is the responsibility of the principal contractor. Any discrepancy between the existing services and the new construction works should be reported to Elite Designers before the commencement of the works.
12. The principal contractor is to provide all necessary flexible sleeves or lintels where drainage pipes pass through walls or foundations.
13. The principal contractor is to ensure that at all times the excavations shall remain free from standing water.
14. Movement joints to be positioned @ 6m c/c in blockwork and @ 12m c/c in brickwork.
15. Movement joints to be 15mm hydrocell or similar joint filler with a 15x15mm two part polysulphate sealant.(colour and fire resistance of sealant to be advised by architect).
16. All load bearing blockwork below DPC to be 7N/mm² dense concrete block.
17. Provide Ancon ST1 wall ties in accordance with DD140 @ 450 c/c vertically and @ 900 c/c horizontally, staggered u.n.o.
18. All bolts to be Grade 8.8 M20 unless noted otherwise.
19. All insulation details have been produced to comply with relevant regulations where possible. However, the responsibility for checking the compliance and execution of insulation details lies with the main contractor.
20. Floor joists spanning in excess of 2.5m should be strutted by one or more rows of solid or herringbone strutting as follows:

Joists <2.5m - None required
Joists 2.5 - 4.5m - One row required
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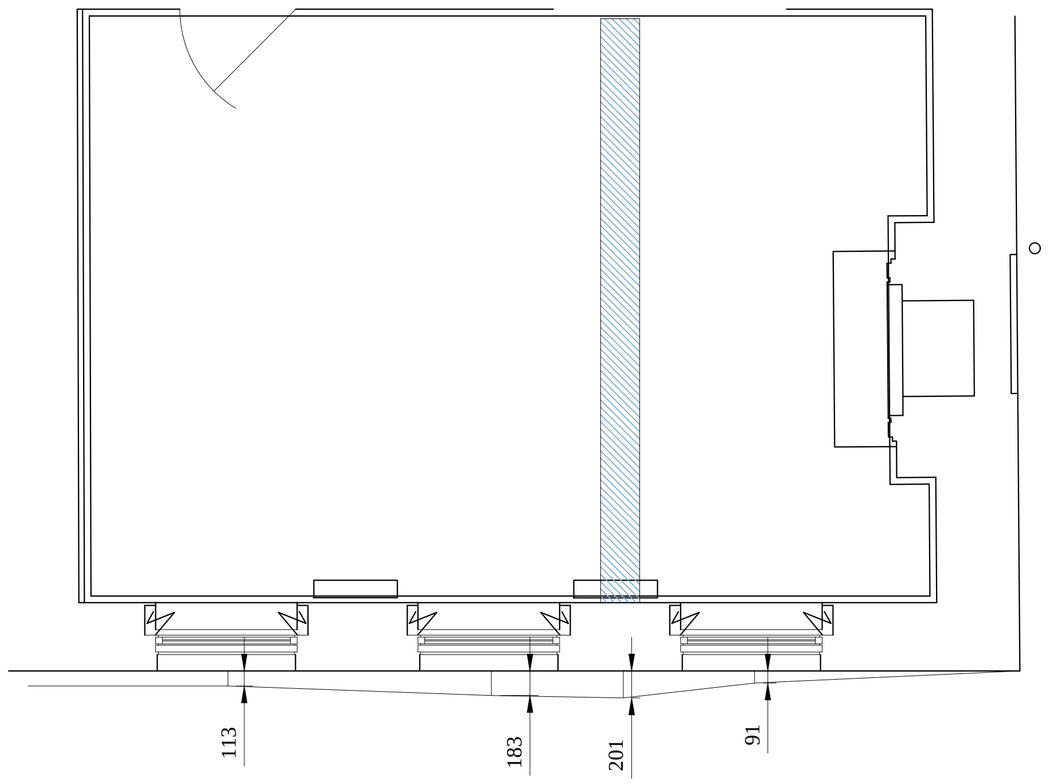
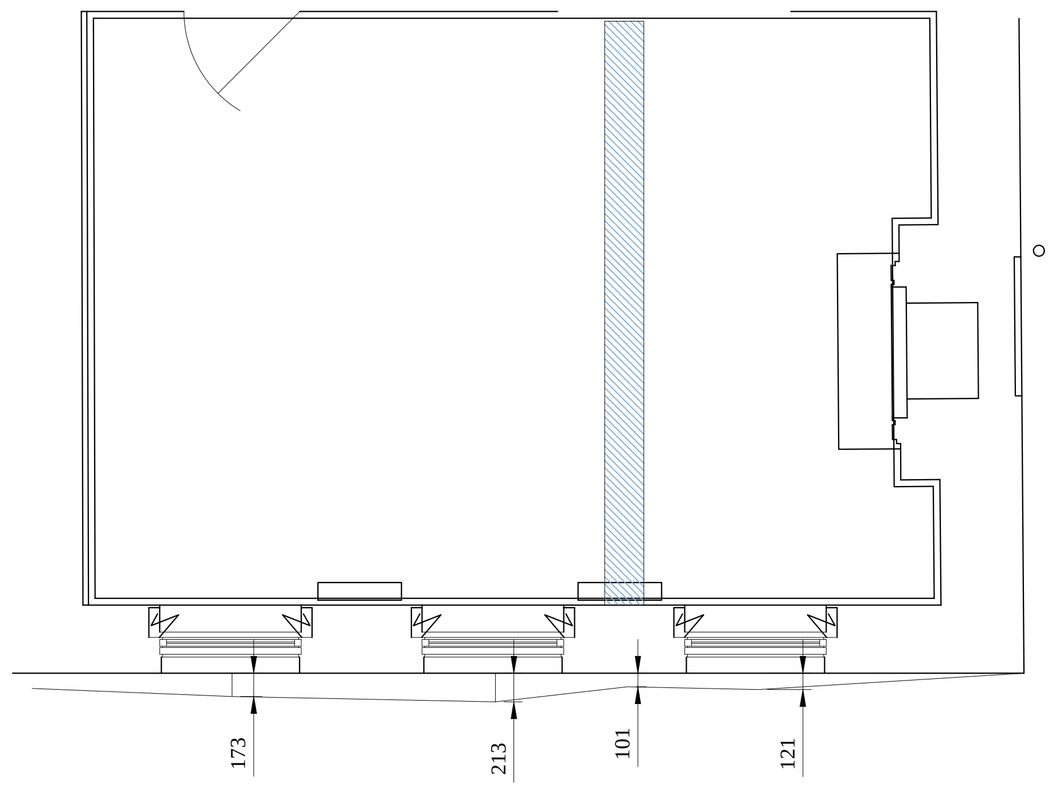


PROPOSED FIRST FLOOR PLAN

SCALE 1:50

(STRUCTURE ABOVE)



PROPOSED SECOND FLOOR PLAN

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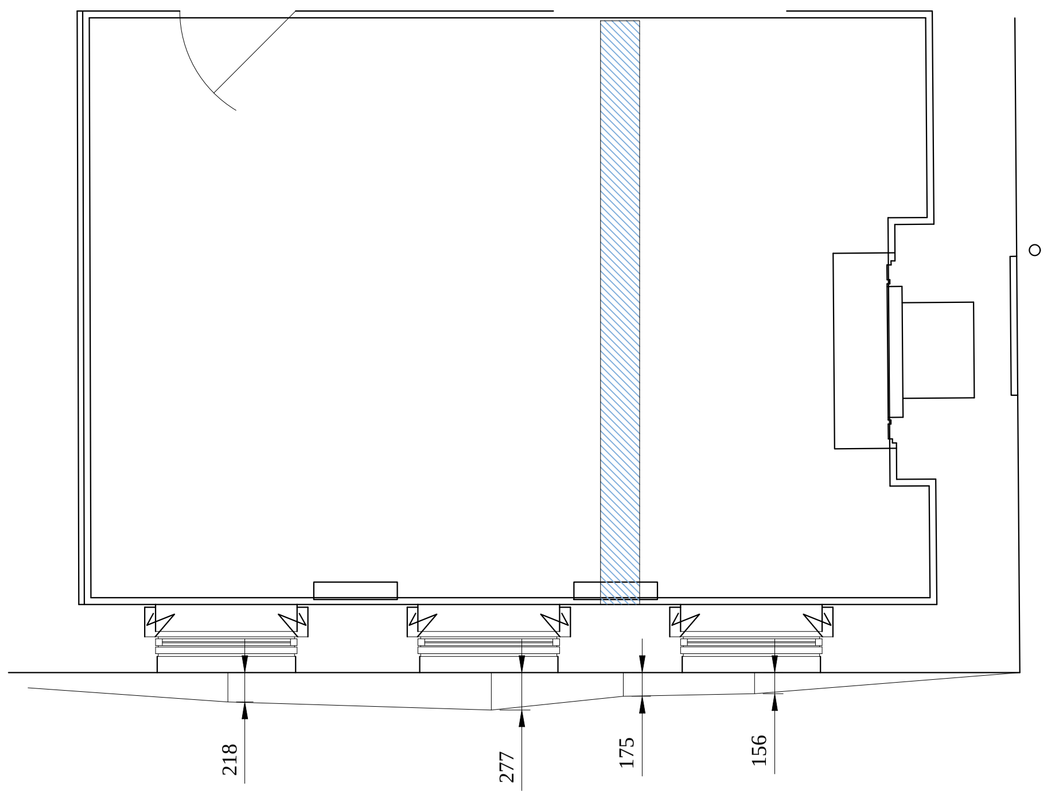

PROPOSED THIRD FLOOR PLAN

SCALE 1:50

(STRUCTURE ABOVE)

Notes:

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2. Any discrepancies between the site conditions and these drawings to be reported to Elite Designers. Dimensions must not be scaled and should be checked on site.
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4. Foundations have been designed on a safe increase in bearing pressure of 150kN/m² bearing 200mm into sandy gravel strata.
5. All new steelwork to be grade S355 and be supplied to site blast cleaned to Swedish standard SA2½ painted with high build zinc phosphate alkyd primer to 80 microns after fabrication. Any mechanical damage to coating to be touched up on site in accordance with the specification.
6. All new steel beams to have a minimum of 100mm bearing either end.
7. Lengths of all members are to be verified on site by the Contractor.
8. Catnic type lintels to have a minimum bearing of 150mm either end.
9. All temporary works to ensure the structural stability of all elements in the temporary state during construction are to be the responsibility of the contractor.
10. Cover to reinforcement to be 25mm to all bars unless noted otherwise.
11. Checking the location of the existing services in relation to the elements of the new construction works is the responsibility of the principal contractor. Any discrepancy between the existing services and the new construction works should be reported to Elite Designers before the commencement of the works.
12. The principal contractor is to provide all necessary flexible sleeves or lintels where drainage pipes pass through walls or foundations.
13. The principal contractor is to ensure that at all times the excavations shall remain free from standing water.
14. Movement joints to be positioned @ 6m c/c in blockwork and @ 12m c/c in brickwork.
15. Movement joints to be 15mm hydrocell or similar joint filler with a 15x15mm two part polysulphate sealant.(colour and fire resistance of sealant to be advised by architect).
16. All load bearing blockwork below DPC to be 7N/mm² dense concrete block.
17. Provide Ancon ST1 wall ties in accordance with DD140 @ 450 c/c vertically and @ 900 c/c horizontally, staggered u.n.o.
18. All bolts to be Grade 8.8 M20 unless noted otherwise.
19. All insulation details have been produced to comply with relevant regulations where possible. However, the responsibility for checking the compliance and execution of insulation details lies with the main contractor.
20. Floor joists spanning in excess of 2.5m should be strutted by one or more rows of solid or herringbone strutting as follows:

Joists <2.5m - None required
Joists 2.5 - 4.5m - One row required
Joists >4.5m - Two rows required

21. All beam end reactions shown are unfactored unless noted otherwise.

FOR INFORMATION

Rev.	Date	Description	by	ckd	app
A	13/07/23	ISSUED FOR INFORMATION	SB	SB	JGF

Project

16 Church Row
London
NW3 6UP

Title

SURVEY DATA

C/A

Sentinel Residential

Elite Designers Structural Engineers
3 Princeton Court
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London SW15 1AZ
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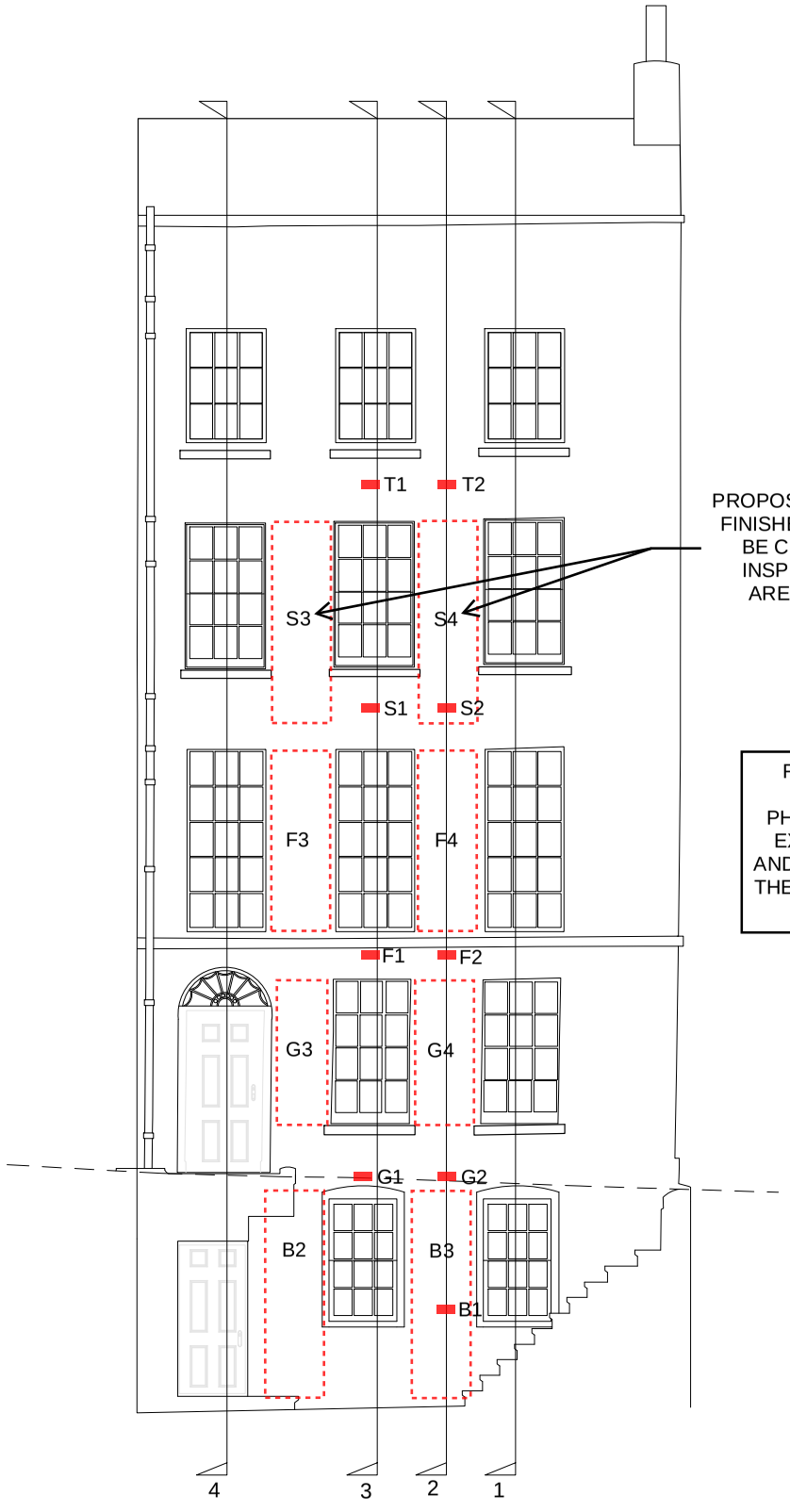
elitedesigners.co.uk

Scales (A1)	AS SHOWN	Dg. No.	Rev.
Drawn	SB 25/04/23	2023-026- 05	A
Ckd(Eng.)	SB 25/04/23		
Approved	SJM 25/04/23		


218
+53
277
+102
175
+19
156
+45
+64
+30
143
+40
213
+112
101
-20
121
+60
+30
+30
113
+70
183
+18
201
+110
91
+37
+6
146
161
85
4
3
2
1

APPENDIX B OPENING UP WORKS DRAWINGS

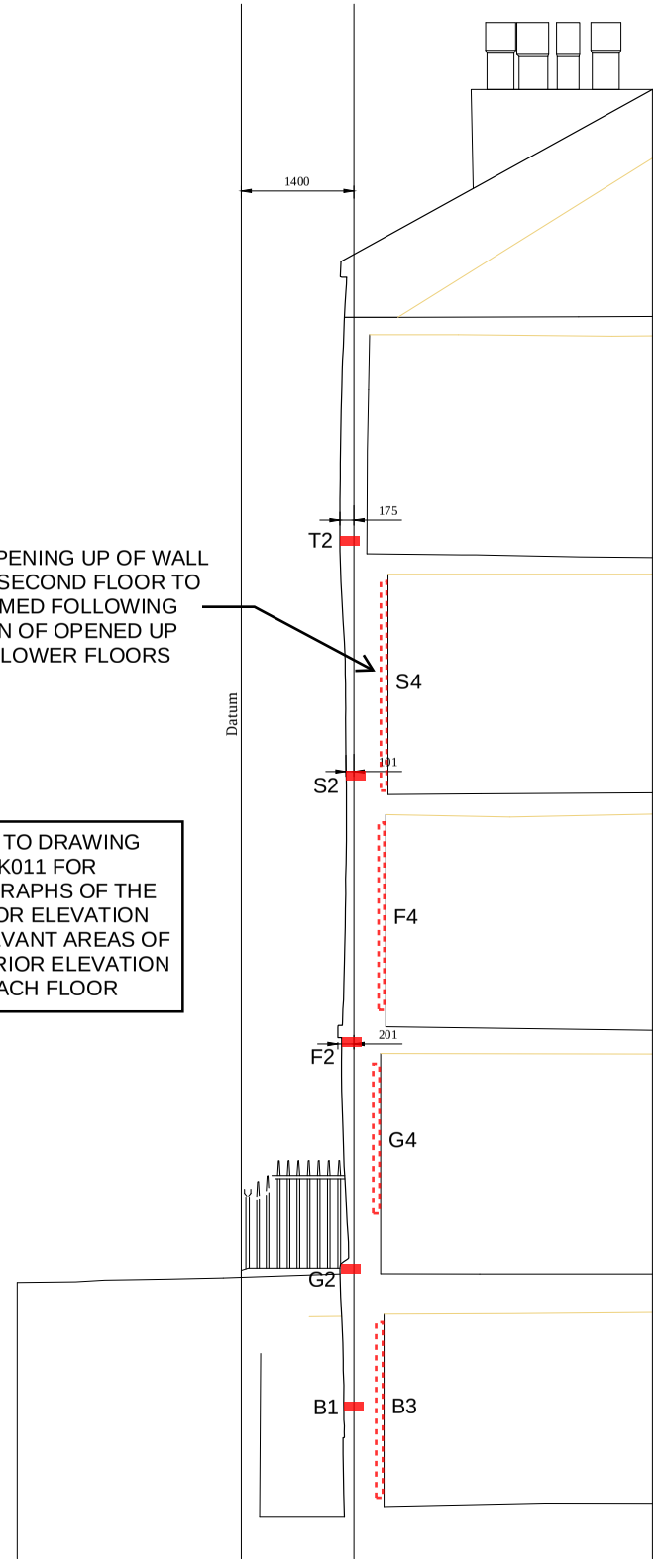
This drawing must be read in conjunction with the specification and all other relevant drawings. Do not scale from this drawing.



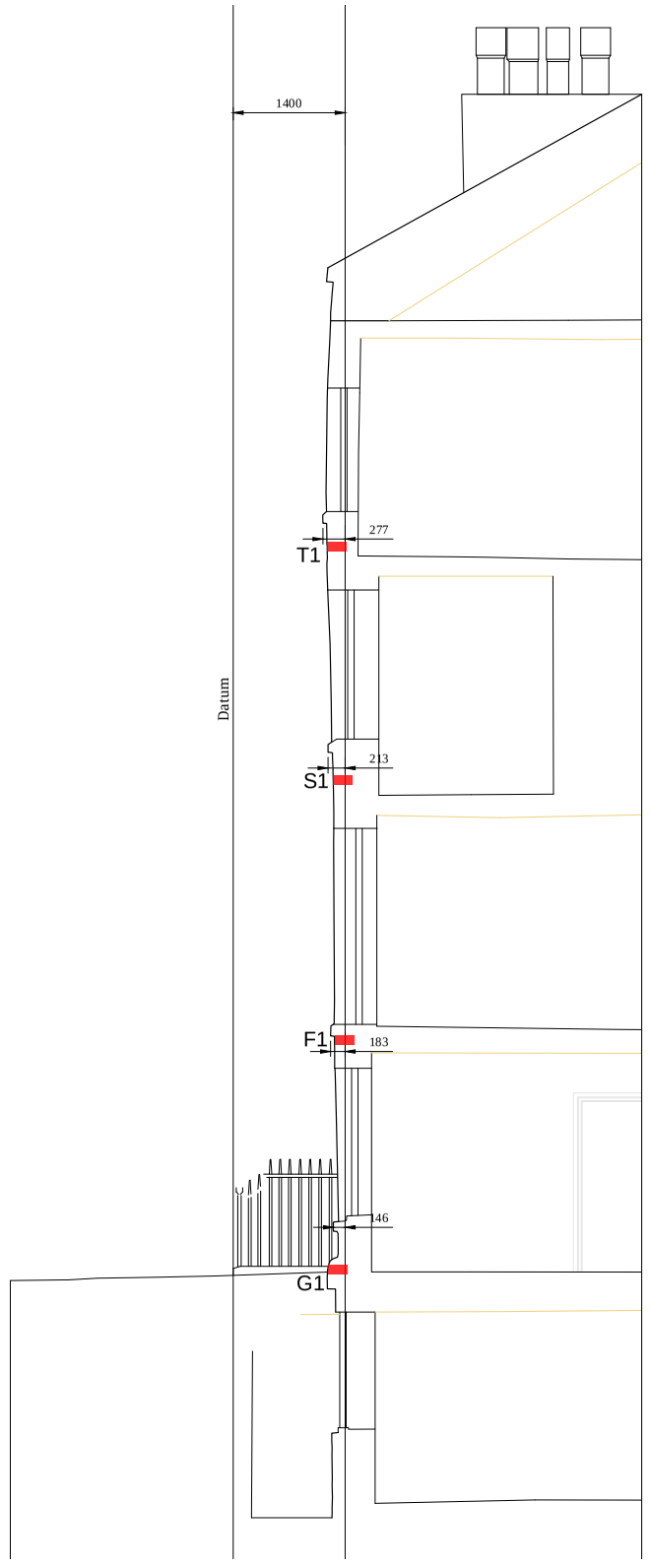
NORTH ELEVATION

PROPOSED OPENING UP OF WALL FINISHES AT SECOND FLOOR TO BE CONFIRMED FOLLOWING INSPECTION OF OPENED UP AREAS AT LOWER FLOORS

REFER TO DRAWING SSK011 FOR PHOTOGRAPHS OF THE EXTERIOR ELEVATION AND RELEVANT AREAS OF THE INTERIOR ELEVATION AT EACH FLOOR



SECTION 2



SECTION 3

NOTES

All necessary permissions and approvals are to be obtained before commencing any intrusive works.

All services are to be traced and their locations confirmed prior to commencing any intrusive works.

All site operations are to be undertaken by fully trained and qualified personnel.

The contractor is to take all necessary precautions to screen and protect relevant areas from the works.

All intrusive works are to proceed from basement upwards and inspected by the structural engineer at each stage.

All opened up areas are to be reinstated to suit their previous appearance following inspection by the structural engineer.

LEGEND

B1 Brick to be removed at each location marked thus to expose the original brickwork facade for inspection. All relevant bricks are to be appropriately tagged before removal by carefully cutting out the existing mortar using hand tools ensuring no damage is caused. After inspection all bricks are to be replaced using traditional lime/sand mortar (1 part NHL 2 to 3 parts sharp sand or similar approved) colour matched and texture matched to the current appearance to the Conservation Officer's approval.

B3 Internal wall finishes to be removed at each location marked thus to expose the original brickwork wall for inspection. All relevant finishes are to be appropriately tagged before careful removal ensuring no damage is caused. After inspection all finishes are to be replaced to match the current appearance making use of traditional lime/sand plaster (1 part lime putty to 3 parts sharp sand or similar approved) in relevant areas in accordance with the Conservation Officer's approval.

Rev	Date	Description	Drawn	Check
P2	31.07.23	Further details added	KC	KC
P1	26.07.23	Preliminary issue	KC	KC

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www.conisbee.co.uk

Project
16 Church Row, Hampstead, London

Title
Proposed opening up works

Drawing Status
PRELIMINARY

Project No
230595

Date
JUL 2023

Drawn
KC

Drawing No
SSK010

Scale
NTS

Engineer
KC

Revision
P2

This drawing must be read in conjunction with the specification and all other relevant drawings. Do not scale from this drawing.

EXTERNAL VIEW OF NORTH ELEVATION

INTERNAL VIEW OF NORTH ELEVATION AT LOWER GROUND FLOOR

INTERNAL VIEW OF NORTH ELEVATION AT GROUND FLOOR

INTERNAL VIEW OF NORTH ELEVATION AT FIRST FLOOR

INTERNAL VIEW OF NORTH ELEVATION AT SECOND FLOOR

INTERNAL VIEW OF NORTH ELEVATION AT THIRD FLOOR

Rev	Date	Description	Drawn	Check
P1	29.07.23	Preliminary issue	KC	KC

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Project
16 Church Row, Hampstead, London

Title
Record images of external and internal faces of north elevation

Drawing Status
PRELIMINARY

Project No
230595

Date
JUL 2023

Drawn
KC

Drawing No
SSK011

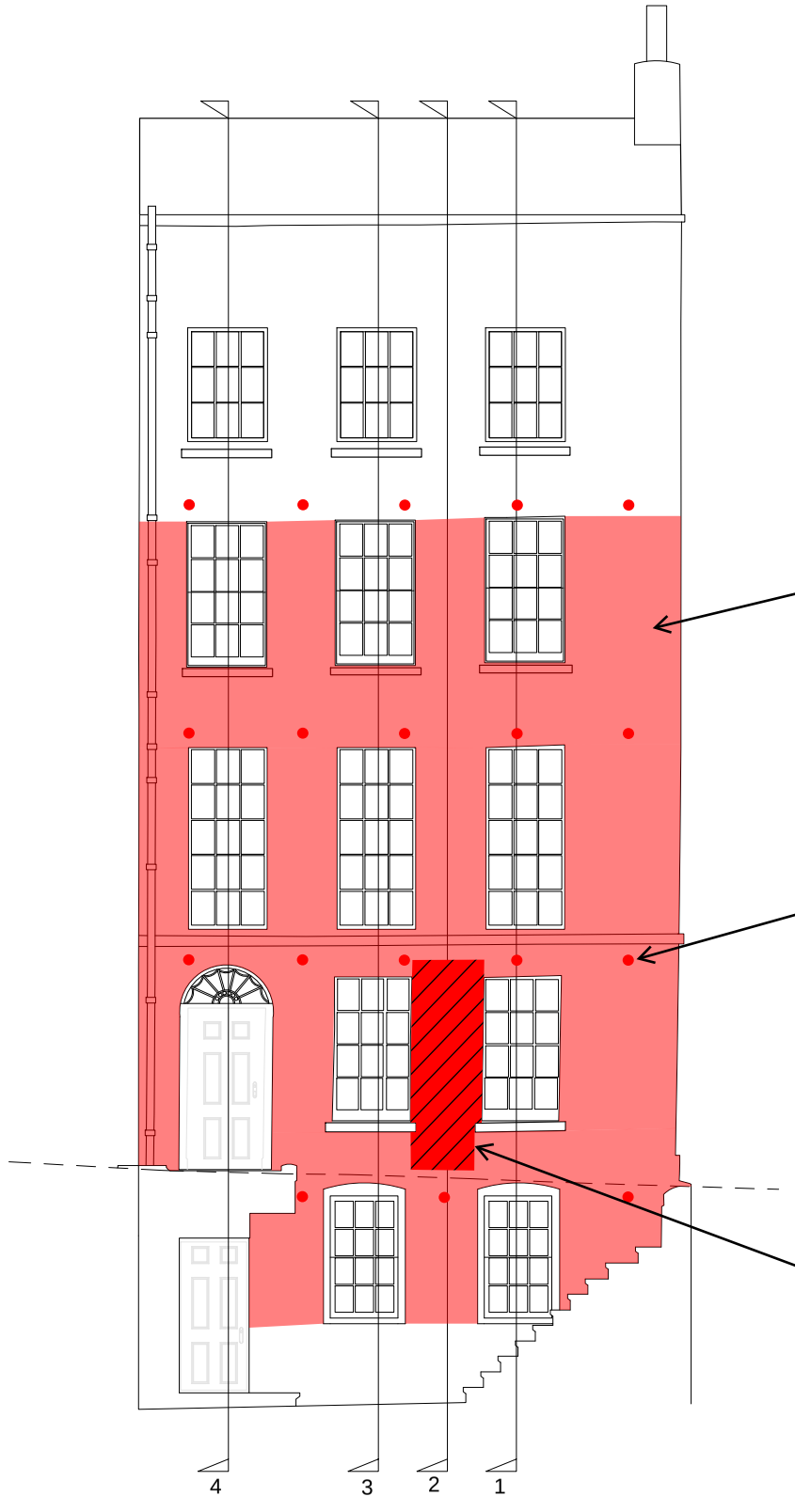
Scale
NTS

Engineer
KC

Revision
P1

APPENDIX C REMEDIAL STRUCTURAL PROPOSALS

This drawing must be read in conjunction with the specification and all other relevant drawings. Do not scale from this drawing.



NORTH ELEVATION

TO CONSOLIDATE DELAMINATED AREAS OF ORIGINAL BRICKWORK AND REFRONTING BRICKWORK INSTALL HELIFIX RESI TIES @ 900mm HORIZONTAL c/c AND 450mm VERTICAL c/c IN A STAGGERED PATTERN IN HIGHLIGHTED AREA IN FULL ACCORDANCE WITH MANUFACTURER'S GUIDANCE

TO ENHANCE LATERAL RESTRAINT OF THE FRONT ELEVATION INSTALL HELIFIX BOW TIES HD @ 1000mm HORIZONTAL c/c THROUGH EXTERNAL BRICKWORK WALL AND INTO TIMBER FLOOR JOISTS AT GROUND FLOOR, FIRST FLOOR, SECOND FLOOR AND THIRD FLOOR IN FULL ACCORDANCE WITH MANUFACTURER'S GUIDANCE

TEMPORARILY PROP FIRST FLOOR AND FRONT ELEVATION BRICKWORK WALL OVER. TEMPORARILY PROP REFRONTING BRICKWORK WALL EXTERNALLY. CAREFULLY REMOVE DEFECTIVE ORIGINAL PORTION OF BRICKWORK PIER WHILE LEAVING LATER REFRONTING BRICKWORK IN SITU WHERE POSSIBLE. REBUILD ORIGINAL PORTION OF BRICKWORK PIER USING SUITABLY SIZED AND SOURCED STOCK BRICKS OF 10N/mm² MINIMUM COMPRESSIVE STRENGTH LAID IN 1:3 NHL 5:SHARP SAND TIED TO REFRONTING BRICKWORK USING HELIFIX REMEDIAL WALL TIES AT 450mm VERTICAL AND HORIZONTAL CENTRES.

SECTION 2

NOTES

All necessary permissions and approvals are to be obtained before commencing any intrusive works.

All services are to be traced and their locations confirmed prior to commencing any intrusive works.

All site operations are to be undertaken by fully trained and qualified personnel.

The contractor is to take all necessary precautions to screen and protect relevant areas from the works.

All works are to be inspected and approved by the structural engineer at each stage.

All areas are to be reinstated to suit their previous appearance following inspection by the structural engineer.

Rev	Date	Description	Drawn	Check
P1	24.11.23	Preliminary issue	KC	KC

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Project
16 Church Row, Hampstead, London

Title
Proposed remedial works

Drawing Status
PRELIMINARY

Project No
230595

Date
NOV 2023

Drawn
KC

Drawing No
SSK100

Scale
NTS

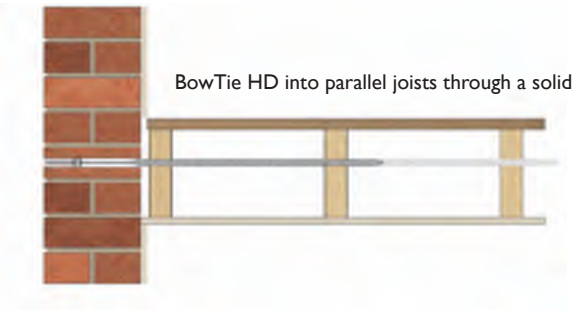
Engineer
KC

Revision
P1

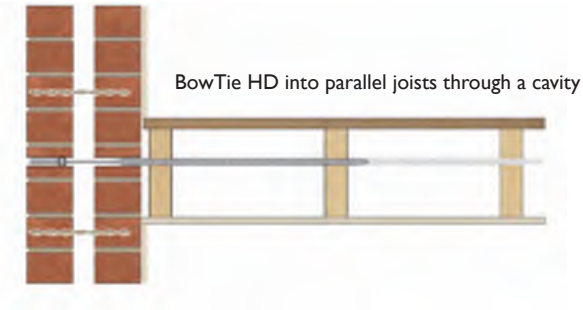
HELIFIX
SUSTAINABLE STRUCTURAL SOLUTIONS

BowTie HD

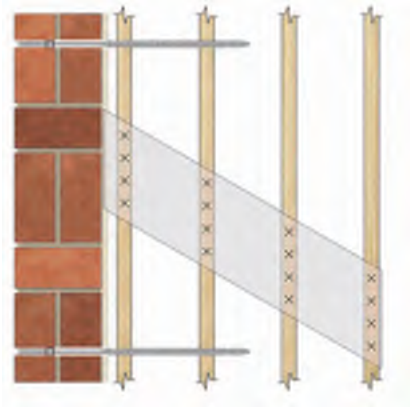
Remedial ties for restraining bowed walls



BowTie HD into parallel joists through a solid wall



BowTie HD into parallel joists through a cavity wall



BowTie HDs into roof space joists through a solid wall

Applications

- For stabilising bowed external building walls by securing them to internal floor and ceiling joists
- BowTie HDs are recommended when installing into joist sides

Features

- Quick, easy, non-disruptive external installation
- Self-tapping design – no splitting of timbers
- Effective in all common wall materials
- Suitable for hardwood use
- Easily tested for security of fixing
- Fully concealed – no unsightly external plates

BowTie HDs installed through parallel floor joists

Over 100 standard repair specifications are available online, covering all common structural faults.
Relevant Repair Details: RDs RB02, RB05, RB08

For full Product Information, Case Studies and downloadable Repair Details go to:

www.helifix.co.uk/products/remedial-products/bowtie/

Installation Procedures

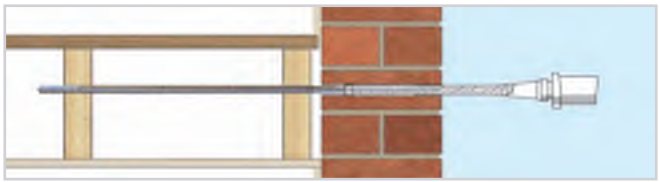
1. Mark the positions of the joists on the external wall.
2. Drill clearance holes normally 16mm **through the masonry only**, in line with the centre of the joists.
3. Clean out the hole to clear any dust or debris.
4. Fit the power support tool into an SDS rotary hammer drill and insert the BowTie HD.
5. Install the BowTie HD (with hammer off) into and through the first and second joists (and third joist, if specified). When the BowTie HD is between joists, take care to avoid 'whip'.
6. Fit the sleeve over the tie and push it to the back of the hole in the masonry with the BowTie Injection Tube.
7. Inject Helifix PolyPlus resin into the hole to fill it completely.
8. Allow the resin to gel (normally 15 to 20 minutes).
9. Make good all holes at the surface with brick dust or matching mortar or leave ready for any decoration.

NB With a cavity wall, install 4 additional cavity wall ties in a 300mm square around the BowTie HD.

1. Mark the position of the joist centre on the external wall and then drill a clearance hole (normally 16mm) through the wall. Clean out the hole

2. Fit the BowTie HD Support Tool to an SDS rotary hammer drill, insert the BowTie HD and drive it (off hammer) into, and through, the first and second joists

3. Fit the plastic sleeve over the BowTie HD and use the support tool to push it to the back of the hole in the wall (outer leaf in a cavity wall)



4. Inject PolyPlus resin to fill the hole and bond the BowTie HD to the masonry, allow the resin to gel and then make good

Technical Specifications

Material:	Austenitic stainless steel Grade 304 (1.4301)
Diameter:	12mm
Length:	Thickness of the wall + any cavity + sufficient to drive into the second parallel joist (or third where specified)
Standard lengths:	1m and 1.5m – in packs of 5
Diameter of masonry clearance hole:	16mm
Fixing density:	Maximum horizontal spacing of 600mm between BowTies
Bonding agent (near leaf only):	PolyPlus polyester resin
RECOMMENDED TOOLING	
For drilling clearance holes and insertion of BowTie HDs:	SDS rotary hammer drill 650/700w with hammer-stop
For installation of BowTie HDs:	BowTie HD driver
For injection of PolyPlus resin:	Applicator gun

HELIFIX
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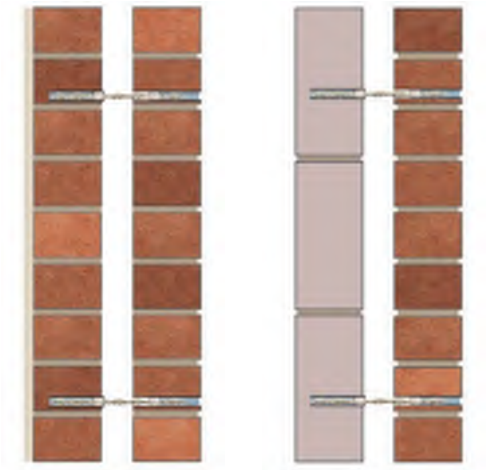
April 2014

ResiTie

A remedial wall tie with a resin / resin fix

Applications

- Replacement tie for cavity walls where a resin bond is required at both ends of the tie
- Recommended for small jobs requiring 200 ties or less
- Pinning multi-layer masonry (with ties up to 300mm long)



Remedial wall tie –
brick to brick and brick to block

Features

- Quick, easy, non-disruptive installation
- Effective in all common building materials
- Far and near leaf security of fixing easily proof tested
- Flexibility accommodates normal building movement

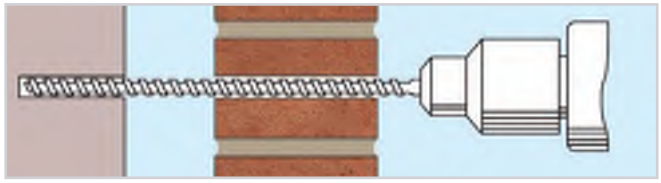
Over 100 standard repair specifications are available online, covering all common structural faults.
Relevant Repair Details: RD WT32

For full Product Information, Case Studies and downloadable Repair Details go to:

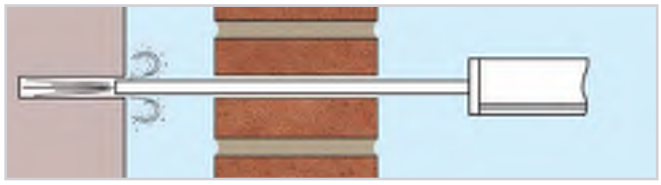
www.helifix.co.uk/products/remedial-products/resitie/

Injecting PolyPlus resin into near leaf to complete the ResiTie installation

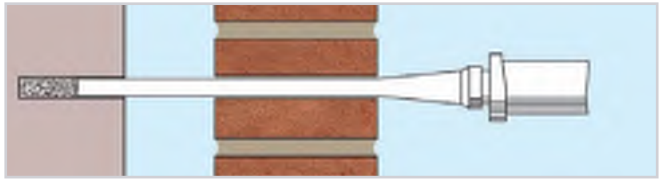
Installation Procedures



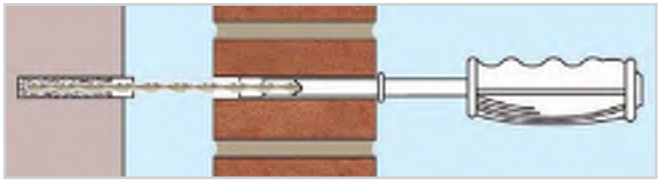
1. Mark the points for the ResiTies on the near leaf brickwork. Using a 10mm drill bit and rotary percussion drill, where possible, drill a clearance hole through the near leaf and 55mm into the far leaf. The hole should be drilled about half way up the brick and around 15mm from the end to avoid frogs and core holes



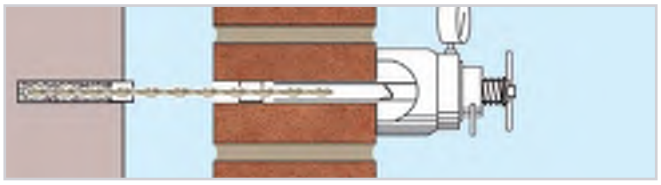
2. Clean both holes of debris using a pneumatic spoil cleaner or an airjet



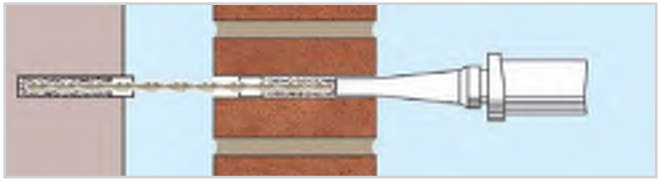
3. Inject PolyPlus resin to fill the hole in the far leaf



4. Using the hand-held support tool, insert the ResiTie, with plastic sleeves fitted, into the clearance hole until the far sleeve enters the far leaf



5. After the resin has cured, security of fixing in the far leaf can be tested with a Helifix Load Test Unit



6. Inject PolyPlus resin into the near leaf until the hole is filled and then make good the outer face

Technical Specifications

Material:	Austenitic stainless steel Grade 304 (1.4301) or 316 (1.4401)
Diameter:	6mm
Length:	¾ of near leaf thickness + cavity width + 55mm
Standard lengths:	155mm, 170mm, 195mm, 220mm, 245mm, 270mm and 295mm – in packs of 50
Diameter of clearance hole:	10mm
Depth of clearance hole in far leaf:	55mm
Minimum fixing density:	Ties should be at 900mm centres horizontally by 450mm vertically, in a staggered pattern, or as specified
Bonding agent:	PolyPlus resin
RECOMMENDED TOOLING	
For drilling clearance hole:	SDS hammer drill or rotary percussion drill, where possible
For installing ResiTie:	Helifix ResiTie hand held Support Tool
For injecting resin into the far leaf:	Metal nozzle extension
For proof testing:	Helifix Load Test Unit

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November 2020